

# *Teaching Social Studies with Digital Maps*

## **Texas Alliance for Geographic Education**

Department of Geography

Texas State University

601 University

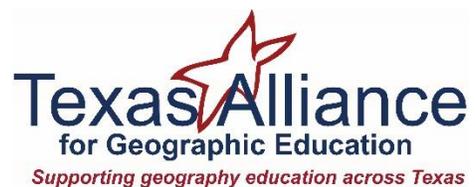
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# Teaching Social Studies with Digital Maps

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The Teaching Social Studies  
with Digital Maps Project is  
coordinated by the Texas  
Alliance for Geographic  
Education at Texas State  
University.

The goal of this project is to  
equip Texas high school social  
studies teachers with the  
geographic content knowledge  
and technical skills needed to  
use digital maps as tools for  
geographic exploration.

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## **Acknowledgements**

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Texas State University, Department of Geography

Esri

Please visit us at <http://www.geo.txstate.edu/tage/>

### **The Importance of Social Studies**

In the 21<sup>st</sup> century, students need to be able to recognize societal problems. Toward this end, a strong foundation in social studies enables students to become knowledgeable and active citizens. Courses in economics, geography, government, and history help students develop the skills necessary to ask good questions, conduct investigations, consider solutions, distinguish evidence-based claims from opinions, and to communicate knowledge. The importance of these skills is evident in the Texas Essential Knowledge and Skills (TEKS) where each grade level is expected to apply critical thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology.

Lessons developed through the *Teaching Social Studies with Digital Maps Project* are designed for high school social studies teachers who are interested in using technology to help students explore Earth's peoples and places and all of the connections, past and present, among them. In other words, the lessons promote the process of geographic inquiry.

### **The Nature of Geographic Inquiry**

The purpose of geographic inquiry is "to find out why something we know 'for sure,' here, is wrong over there, and why something that works for someone else, where they are, won't necessarily work for us, here."<sup>1</sup> This process begins by asking where things, or places, are located. Once the locations of things are known, students are able to study the conditions and/or connections at and between places.

The geographic inquiry process is driven by spatial reasoning which seeks ways to organize knowledge about conditions and connections and to suggest hypotheses for further inquiry.

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<sup>1</sup> This quotation and the discussion of geographic inquiry draws upon Phil Gersmehl's book *Teaching Geography, 2<sup>nd</sup>* (2014).

Questions that drive spatial or geographic reasoning include:

- What groups of places have similar conditions?
- What groups of places have similar connections?
- What influence does a place have on its neighbors? And vice versa.
- How are these places similar or different?
- How does this place fit inside of larger areas?
- Are there places in similar positions on other continents, in other cities, etc.?
- Do particular things tend to occur together in the same place?
- Are things arranged in a non-random way?
- How do things change as you go from one place to another?

Links to history, ethics, humanities, and science can be found in related questions such as:

- How do conditions, connections, patterns, associations, etc. change over time?
- What processes "cause" conditions, patterns, associations, connections, etc.?
- Do I like it? Is it efficient? Is it fair?

Given the nature of geographic inquiry it should come as no surprise that maps figure prominently in the process. In recent years, user-friendly, online geographic information systems (gis) have given teachers unprecedented access to high quality maps and data. Esri's ArcGIS Online is one example.

### **ArcGIS Online**

ArcGIS Online<sup>2</sup> is a cloud-based platform that allows users to use, create, and share maps, scenes, apps, and data. Users access ArcGIS Online through any device (PC, Mac, tablet, smartphone, etc.) with any web browser.

<sup>2</sup> For more information about ArcGIS please visit: <http://www.arcgis.com/features/>.

## Getting Started with *Teaching Social Studies with Digital Maps*

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### Overview of the Lessons

The *Teaching Social Studies with Digital Maps Project* has created lessons. While each of the lessons focuses on a particular Texas high school social studies course (i.e., Economics, Geography, Government, US. History, World History) the lessons are designed to work across the curriculum.

Each of the fifteen lessons

- is designed to be completed in one 50 minute class period,
- includes TEKS-correlated content and skills,
- indicates one of three ArcGIS Online scaffolded skill levels:
  - Level One: Explorer  
Begin exploring the world without logging in.
  - Level Two: Cartographer  
Manipulate map layers to analyze the world without logging in.
  - Level Three: Geoanalyst  
Develop powerful skills and learn to create and share content using an ArcGIS Online Account.
- provides students with a brief background reading and relevant vocabulary,
- provides step-by-step hands on geographic inquiry instructions, and
- includes an annotated teacher's copy of the student assignment.

### How do I get started?

In preparation for using the lessons in class, we suggest that you:

1. Read both the student and teacher versions of the lessons materials,
2. Test your school's internet capability. Be sure that the ArcGIS Online website (<http://www.arcgis.com>) is not blocked.
3. Create an Esri Public Account (<https://www.arcgis.com/home/signin.html>).

[html](#)). Having a public account will allow you to save any maps you create.

4. Once you have a public account, we encourage you to complete the free Esri online course "Teaching with GIS" (<http://www.esri.com/training/main/my-training>). The lesson introduces the concept of a geographic information system (GIS), basic ArcGIS Online tools, and the geographic inquiry process.
5. For additional free training we suggest you work through Esri's "SkillBuilder Activities" (<https://esri.app.box.com/agoskillbuilder>).

### Resources

The Texas Alliance for Geographic Education website (<http://www.geo.txstate.edu/tage/>) is the home for all *Teaching Social Studies with Digital Maps* materials. Resources include: digital versions of each lesson, maps, data, and ancillary documents. We encourage you to explore these ArcGIS Online resources:

- Esri GIS Education Community (<http://edcommunity.esri.com>)
- Esri Education User Conference (<http://www.esri.com/educ>)
- GIS.com Web site (<http://www.gis.com>)

We also recommend reading the third edition of *Teaching Geography* by Phil Gersmehl. The book is written for educators who wish to enhance their student's ability to think spatially about the world. The book provides hundreds of teacher-generated and classroom-tested teaching materials.

### Texas Alliance for Geographic Education

If you have any questions or need assistance contact the Texas Alliance at [tage.geography@txstate.edu](mailto:tage.geography@txstate.edu) or 512.245.3827. We welcome feedback and suggestions.

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## Roads and the Cultural Landscape

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In this lesson students explore the cultural landscape of roads using digital maps and satellite imagery. Students analyze road patterns in their neighborhood and in Fez, Morocco.

### Social Studies Connections and Content

- Economics
- Geography: North Africa, North America, urban geography, cultural landscape
- Government
- US. History
- World History: 600-1450 (Postclassical Era), 1914-present (20th Century to the Present)

### ArcGIS Online Skill Level

- Level One: Explorer
- Level Two: Cartographer
- Level Three: Geanalyst

**Grade Level:** 9-12

**Time Period:** 50 minutes

### Warm-Up Questions

Use the questions below to introduce the concepts discussed in this lesson. Possible answers are italicized.

- What is a geographic pattern?
  - *Organization of subdivision housing; City streets meet at right angles; Cities near coastlines/ rivers/ lakes*
- What is the purpose of a road?
  - *Transportation of goods and people; Trade; Boundary*
- What defines the cultural landscape?
  - *Types of housing; Types of recreational activities; Types of religious structure*

### Vocabulary

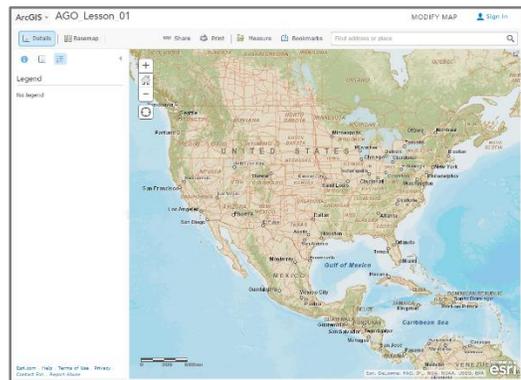
Cultural Landscape	A geographic area (including both cultural and natural resources) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.
Imagery (remote sensing)	Images (photographs) gathered from a satellite or an aircraft.
Basemap	A map depicting background reference information such as landforms, roads, and political boundaries, onto which other thematic information is placed.
Economic advantage	Potential gains from trade for individuals, firms, or nations that arise from differences in their infrastructure or resources.
Cul-de-sac	A street with no outlet designed to protect neighborhood residents, particularly children, from the dangers of traffic.
Roundabout or circle	A type of circular intersection or junction in which road traffic flows almost continuously in one direction around a central island.
Medina	The Arabic word <i>al-Madīnah</i> (المدينة) for “the city.” Commonly refers to the oldest part of an Islamic city.

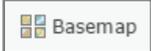
## Curriculum Matrix

<b>Texas Essential Knowledge and Skills</b> (Students will understand ...)	<b>Learning Objectives</b> (Students will be able to ...)	<b>Essential Knowledge</b> (Students will know that ...)
WG(2) History: how people, places, and environments have changed over time and the effects of these changes.	(A) describe the human and physical characteristics of the same regions at different periods of time to evaluate relationships between past events and current conditions.	<ul style="list-style-type: none"> <li>✓ Roads reflect geographic patterns.</li> <li>✓ Road patterns change over time and space.</li> <li>✓ The cultural landscape reveals distinct cultural influences from different time periods.</li> </ul>
WG(6) Geography: the types, patterns, and processes of settlement.	(B) explain the processes that have caused changes in settlement patterns, including urbanization, transportation, access to and availability of resources, and economic activities.	<ul style="list-style-type: none"> <li>✓ 9<sup>th</sup> century Islamic urban design explains the pattern of pathways in the Medina (old city) of Fez, Morocco.</li> <li>✓ 19<sup>th</sup> century French urban design explains the pattern of roads and boulevards in New Fez.</li> </ul>
WG(21) Social studies skills: The student applies critical thinking skills to organize and use information acquired from a variety of valid sources, including electronic technology.	(C) create and interpret different types of maps to answer geographic questions, infer relationships, and analyze change.	
<b>ArcGIS Online Skills</b> (What ArcGIS Online skills will students use?)	Using the zoom, search, and measure tools; changing the basemap; using bookmarks; change what is visible; using hyperlinks and pop-ups	

**Introduction**

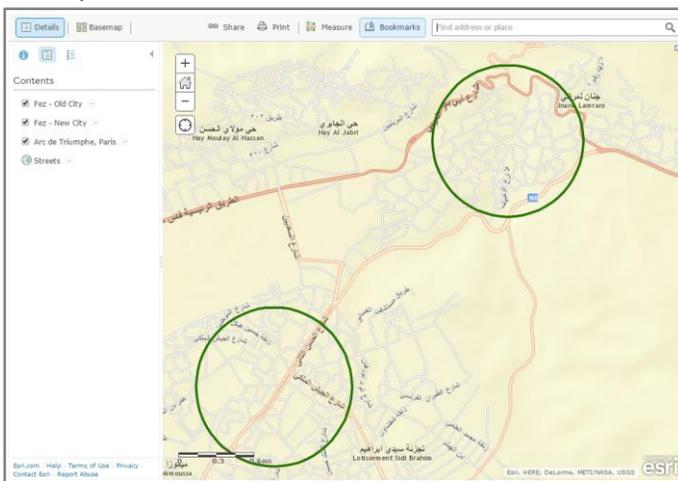
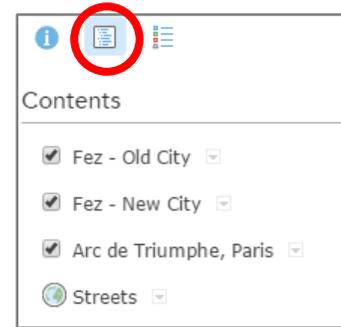
The first roads were paths made by animals and later followed by humans. Fast forward a few thousand years to Roman times. Tired of traveling on rough, muddy paths, the Romans created roads by throwing dirt and rocks from side ditches toward the center. The result was a high path, or *way*, that made transportation easier. Today we use the word highway to describe major roads. A good road system had advantages. With a large network of highways ancient Romans were able to move armies more quickly than their enemies. The network of roads also gave Romans an economic advantage because they could access goods, like food, from a larger area. Finally, roads allowed Roman administrators the ability to communicate and maintain order across great distances. Over time roads, along with nearly everything that humans have created, became an important part of the cultural landscape. Today it is possible to study road patterns from around the world and from different times in order to understand how people have organized their world.

**Task 1: Open and Explore the Map**

1. Launch an internet browser and follow this link:  
<http://arcg.is/1cJ1HfF>.
2. You should see a map centered on the United States. White dots indicate major cities. Areas shaded green are forests. The red lines represent major roads.
3. Click the plus sign three or four times. What happened to the map?  
\_\_\_\_\_
4. Type your home address into the “Find address or place” search box then click the search icon. What happened to the map?  
\_\_\_\_\_
5. Click the minus sign three or four times. Describe the pattern of roads around where you live.  
\_\_\_\_\_
6. How far away is the nearest interstate highway from where you live? \_\_\_\_\_ Miles
  - a. Click the minus sign until you see an interstate highway.
  - b. Click on the “measure” tool (top center, above map).
  - c. Click on the distance tool and select “miles.”
  - d. Click on the place where you live and then on the nearest interstate highway.
7. Click on the basemap icon.  Then click on “imagery.” What happened to the map? Do you see where you live? What is nearby?  
\_\_\_\_\_  
\_\_\_\_\_

**Task 2: Comparing Road Patterns**

1. Click the “home” button.
2. Click on basemap and select “streets.”
3. Click on “Show Contents of Map.” On the left side of the screen you will see the “Contents” of the map. The first three items in the list are maps notes created to help you understand the map. The last item “Streets” is the name of the basemap.
4. Click on “Bookmarks” (top, center above the map). Select “Fez, Morocco.” The map zooms to the North African city of Fez, Morocco. Notice the two green circles. The northeast circle indicates the oldest part of the city. The southwest circle indicates a much younger area of the city.



5. In the contents menu click on the drop down menu next to “Fez – Old City.” Click “Zoom to.” Describe the pattern of roads.

\_\_\_\_\_

6. Click anywhere inside the green circle. Read the information in the pop-up.

When was Fez founded? \_\_\_\_\_ year \_\_\_\_\_ century

Why was Fez founded? \_\_\_\_\_

7. In the contents menu click on the drop down menu next to “Fez – New City.” Click “Zoom to.” Compare the pattern of roads in New Fez to the pattern in Old Fez.

\_\_\_\_\_

\_\_\_\_\_

8. Click anywhere in the green circle surrounding New Fez. Read the information in the pop-up.

9. In the contents menu click on the drop down menu next to “Arc de Triomphe.” Click “Zoom to.” Click in the green circle and read the pop-up information.

10. Based on your exploration, why does the pattern of roads in New Fez and Old Fez differ?

\_\_\_\_\_

\_\_\_\_\_

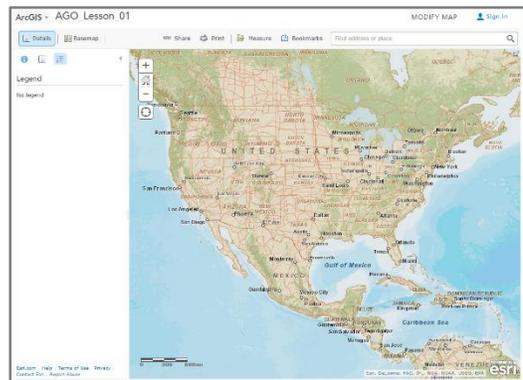
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## Introduction

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### Task 1: Open and Explore the Map

1. Launch an internet browser and open this link:  
<http://arcg.is/1cJ1Hff>.
2. You should see a map centered on the United States. White dots indicate major cities. Areas shaded green are forests. The red lines represent major roads.
3. Click the plus sign three or four times. What happened to the map?



*The scale changed. The map “zoomed in.” More roads, cities, and other features appeared.*

4. Type your home address into the “Find address or place” search box then click the search icon. What happened to the map?

*The map “zoomed” to my house/neighborhood. Street names appeared.*

5. Click the minus sign three or four times. Describe the pattern of roads around where you live.

*Answers will vary (grids, cul-de-sacs, major freeway loops, influence of physical features)*

6. How far away is the nearest interstate highway from where you live? *Answers will vary Miles*

- a. Click the minus sign until you see an interstate highway.
- b. Click on the “measure” tool (top center, above map).
- c. Click on the distance tool and select “miles.”
- d. Click on the place where you live and then on the nearest interstate highway.

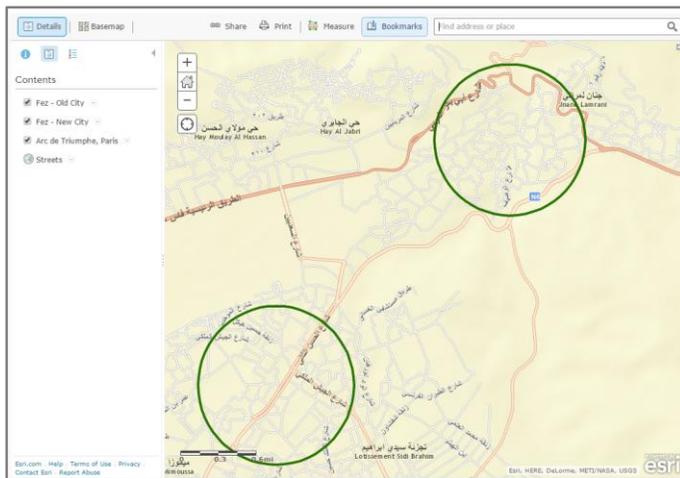
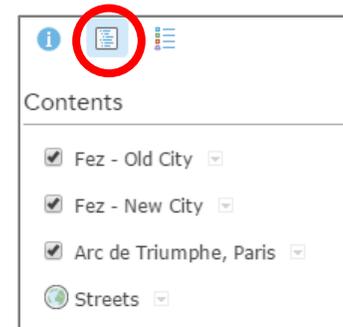


7. Click on the basemap icon.  Then click on “imagery.” What happened to the map? Do you see where you live? What is nearby?

*The map changed to show satellite imagery. Answers will vary (houses, apts., undeveloped land, pools, warehouses, parking lots, “big-box” stores)*

**Task 2: Comparing Road Patterns**

- Click the “home” button.
- Click on basemap and select “streets.”
- Click on “Show Contents of Map.” On the left side of the screen you will see the “Contents” of the map. The first three items in the list are map notes created to help you understand the map. The last item “Streets” is the name of the basemap.
- Click on “Bookmarks” on the top of the screen. Select “Fez, Morocco.” The map zooms to the North African city of Fez, Morocco. Notice the two green circles. The northeast circle indicates the oldest part of the city. The southwest circle indicates a much younger area of the city.



- In the contents menu click on the drop down menu next to “Fez – Old City.” Click “Zoom to.” Describe the pattern of roads.  
*Maze-like. Twisty small roads. Lots of dead ends. Irregular.*
- Click anywhere inside the green circle. Read the information in the pop-up.
- When was Fez founded? Early 800s year 9th century

Why was Fez founded? Refugees from Spain and Tunisia needed a safe place to live.

- In the contents menu click on the drop down menu next to “Fez – New City.” Click “Zoom to.” Compare the pattern of roads in New Fez to the pattern in Old Fez.  
*New Fez roads are generally straight and connect to major roads with roundabouts. New Fez roads were created by French colonialists about 1000 years after the Medina.*
- Click anywhere in the green circle surrounding New Fez. Read the information in the pop-up.
- In the contents menu click on the drop down menu next to “Arc de Triomphe.” Click “Zoom to.” Click in the green circle and read the pop-up information.
- Why is the pattern of roads in New Fez different from the pattern in Old Fez?  
*The pattern of roads in New Fez is different from the pattern in Old Fez (the Medina) because the roads reflect 19<sup>th</sup> century French culture with Haussmann-style boulevards not 9<sup>th</sup> century Islamic culture.*

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# Historical Hurricanes

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In this lesson students explore the natural hazards, specifically hurricanes, and settlement patterns. The lesson uses digital maps to learn about the 1900 Galveston hurricane and Hurricane Katrina.

## Social Studies Connections and Content

- Economics
- Geography: North America, Physical Geography
- Government
- US. History
- World History

## ArcGIS Online Skill Level

- Level One: Explorer (observe, identify, describe)
- Level Two: Cartographer (explain, analyze)
- Level Three: Geanalyst (infer, etc.)

**Grade Level:** 9-12

**Time Period:** 50 minutes

## Warm-Up Questions

Use the questions below to introduce the concepts discussed in this lesson.

- What is a type of natural hazard?
  - *Flooding; Hurricane; Tornado*
- How do humans interact in the environment?
  - *Alter the landscape; Build urban areas; Depend on natural resources to support living*
- How can the environment impact human settlement?
  - *Climate can determine settlement; Resources can determine location of settlement; Natural hazards can impact the way of life*

## Vocabulary

Cultural Landscape  
Physical Landscape  
Basemap  
Natural Hazard  
Hurricane  
Phenomena

<b>Texas Essential Knowledge and Skills</b> (Students will understand ...)	<b>Learning Objectives</b> (Students will be able to ...)	<b>Essential Knowledge</b> (Students will know that ...)
US History (12) Geography. The student understands the impact of geographic factors on major events.	(A) analyze the impact of physical and human geographic factors on the settlement of the Great Plains, the Klondike Gold Rush, the Panama Canal, the Dust Bowl, and the levee failure in New Orleans after Hurricane Katrina; and	<ul style="list-style-type: none"> <li>✓ Students will be knowledgeable of the impact of natural hazards such as hurricanes</li> <li>✓ Students will have applied a understanding of geographic phenomena to real-world events, specifically The Great Hurricane and Hurricane Katrina</li> <li>✓ Students will know about Hurricane Katrina and the impact experienced in and around New Orleans, LA.</li> </ul>
US History (14) Geography. The student understands the relationship between population growth and modernization on the physical environment.	(A) identify the effects of population growth and distribution on the physical environment	<ul style="list-style-type: none"> <li>✓ Students will knowledgeable of several examples of hurricanes and the impact of the natural hazards on settled populations</li> <li>✓ Students will know that populations change the environment to meet their needs</li> <li>✓ Students will be able to identify the relationship between people and their environment</li> </ul>
TEK		
<b>ArcGIS Online Skills</b> (What ArcGIS Online skills will students use?)	Using the zoom, search, and measure tools; changing the basemap; create pushpins; view map contents/legend	

**Introduction**

Throughout history natural hazards have long impacted human civilizations. In recent years, advancements in technology has allowed for increased awareness, preparation, and opportunities to track these storms. One part of learning history is to investigate situations that took place to develop an understanding of the impact of those events. In the case of this lesson, we will look at the natural phenomenon, hurricanes, and its impact on human and physical factors connected with settlement. One particularly severe hurricane, Hurricane Katrina, impacted the Gulf Coast region of the United States most significantly in New Orleans, LA.

**Task 1: Open and Explore The Great Storm**

1. Open ArcGIS Online at <http://www.arcgis.com> and select Map. Change the base map using the Basemap Tab  to "Imagery with Labels."



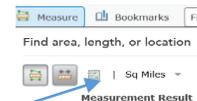
2. Click the "Add Layer" tab and search for "The 1900\_Galveston Hurricane." Add the layer to the map.
3. Click on the Details tab to view the legend of the layer. What do you notice about the path of the Hurricane of 1900?

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4. Use the measure tool to find the length of the hurricane's path.




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5. What are some impacts or results of a hurricane on the landscape?

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6. How did this type of devastation impact human settlement in 1900?

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7. In addition to Galveston, TX, what other cities and states were impacted by this storm?

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8. Checkout the following websites to learn more about the impact and destruction of The Great Storm. <http://www.cnn.com/SPECIALS/2000/galveston/>

9. How might this event impact future human settlement patterns?

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Name: \_\_\_\_\_

**Task 2: Investigate Recent Natural Hazards**

10. In ArcGIS Online, use the search box in the upper right-hand corner to search New Orleans, LA. What happened to the map? \_\_\_\_\_

11. Zoom out to view the state of Louisiana. What are some physical characteristics of this region of the United States? \_\_\_\_\_  
\_\_\_\_\_

12. How many people live in this area of the United States? Add a layer of data by clicking on “Add Layer” and search using the term “Population.” Add the layer of data called “USA population Density” – What do you notice about the population density of the area around New Orleans, LA? \_\_\_\_\_

13. Search for and add the layer of data titled “02\_HurricaneKatrina\_2005”. Check out the Legend under the Details tab. What are the colored categories for this layer of data?  
\_\_\_\_\_  
\_\_\_\_\_

14. Zoom out so that you can view the entire track of Hurricane Katrina. Where did this storm begin? Use the legend to determine the classification of the storm at the beginning.  
\_\_\_\_\_

15. What region(s) of the United States was primarily impacted by the hurricane? \_\_\_\_\_  
\_\_\_\_\_

16. How can this type of natural phenomena impact human settlement patterns?  
\_\_\_\_\_  
\_\_\_\_\_

17. Using the Add Layer tab, select “Add Map Notes” Place a pushpin in the states you believe people sought refuge from the hurricane.

18. What challenges did those states likely encounter? \_ \_\_\_\_\_  
\_\_\_\_\_

19. What other historical hurricanes have impacted the United States? \_\_\_\_\_  
\_\_\_\_\_

20. What steps can be taken to prepare for hurricanes in areas prone to this type of natural disaster? \_\_\_\_\_  
\_\_\_\_\_

## Introduction

Throughout history natural hazards have long impacted human civilizations. In recent years, advancements in technology has allowed for increased awareness, preparation, and opportunities to track these storms. One part of learning history is to investigate situations that took place to develop an understanding of the impact of those events. In the case of this lesson, we will look at the natural phenomenon, hurricanes, and its impact on human and physical factors connected with settlement. One particularly severe hurricane, Hurricane Katrina, impacted the Gulf Coast region of the United States most significantly in New Orleans, LA.

### Task 1: Open and The Great Storm

1. Open ArcGIS Online and change the base map using the Basemap Tab  to "Imagery with Labels."
2. Click the "Add Layer" tab and search for "The 1900Galveston Hurricane." Add the layer to the map.



3. Click on the Details tab to view the legend of the layer. What do you notice about the path of the Hurricane of 1900? Began in the Atlantic Ocean, increased in intensity before hitting the Gulf Coastline, curved to the North and East after hitting the coastline.

4. Use the measure tool to find out the length of the hurricane's path. Over 4,000 miles



5. What can be the impact or result of a hurricane on the landscape? flooding, wind destruction, soil erosion, tornadoes, destruction of both the physical and human landscape
6. How did this type of devastation impact human settlement in 1900? Houses and buildings were destroyed, transportation routes were impacted, loss of life
7. In addition to Galveston, TX, what other cities and states were impacted by this storm? Dallas, TX, Oklahoma, Kansas, Missouri, Iowa, and likely Louisiana though not directly.
8. Checkout the following websites to learn more about the impact and destruction of The Great Storm. <http://www.cnn.com/SPECIALS/2000/galveston/>
9. How might this event impact future human settlement patterns? People move inland, seawalls were built to help protect future populations

Name: \_\_\_\_\_

**Task 2: Explore**

10. Using the search box in the upper right-hand corner, search New Orleans, LA. What happened to the map? it automatically zoomed to New Orleans, LA
11. Zoom out to view the state of Louisiana. What are some physical characteristics of this region of the United States? southern part of the US, near the Gulf Coast, coastline, Mississippi River, Lake Pontchartrain, low elevation, surrounded by bodies of water
12. How many people live in this area of the United States? Add a layer of data by clicking on “Add Layer” and search using the term “Population.” Add the layer of data called “USA population Density” – What do you notice about the population density of the area around New Orleans, LA? there is high population density near the bodies of water and in the major cities
13. Search for and add the layer of data titled 02\_HurricaneKatrina\_2005. Check out the Legend under the Details tab. What are the colored categories for this layer of data? deep purple – category 5, light purple – category 4, red –category 3, light orange – category 2, yellow – category 1, light green – subtropical storm, teal – subtropical depression.
14. Zoom out so that you can view the entire track of Hurricane Katrina. Where did this storm begin? Use the legend to determine the classification of the storm at the beginning. In the Atlantic Ocean near the Bahamas
15. What region(s) of the United States was primarily impacted by the hurricane? South and the Mid-Atlantic to Ohio
16. How can this type of natural phenomena impact human settlement patterns? People may want to move or relocate to an area that is not as susceptible to flooding, new types of housing, changes to the physical environment
17. Using the Add Layer tab, select “Add Map Notes.” Place a pushpin in the states you believe people sought refuge. Texas, Arkansas, etc.
18. What challenges did those states likely encounter? States had to deal with an increase in population, finding a place to put people in terms of housing, education, food, etc.
19. What other historical hurricanes have impacted the United States? Hurricane Andrew, Hurricane Ike
20. What steps can be taken to prepare for hurricanes in areas prone to this type of natural disaster? Use of weather technology, GIS, meteorology, building codes, city planning, preservation of wetland areas

## Ancient Civilizations and Their Landscapes

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This lesson looks at the ancient civilizations of the Maya, Inca, and Aztec by focusing on the location and geography of their centers.

### Social Studies Connections and Content

- Economics
- Geography: North America, South America, Physical Geography
- Government
- US. History
- World History: Ancient Civilizations (Aztec, Inca, Maya)

### ArcGIS Online Skill Level

- Level One: Explorer (observe, identify, describe)
- Level Two: Cartographer (explain, analyze)
- Level Three: Geanalyst (infer, etc.)

**Grade Level:** 9-12

**Time Period:** 50 minutes

### Warm-Up Questions

Use the questions below to introduce the concepts discussed in this lesson.

- What are some examples of the locations of ancient civilizations?
  - *East Asia; Central America; Southwest Asia*
- What necessities did civilizations need to survive?
  - *Water; Fertile Soil/Vegetation; Habitable Climate*
- What challenges can the environment provide for human civilizations?
  - *Lack of access to water resources; Elevated landscape; Climate*

### Vocabulary

Cultural Landscape  
Physical Landscape  
Contour Lines  
Topography

**Curriculum Articulation**

<b>Texas Essential Knowledge and Skills</b> (Students will understand ...)	<b>Learning Objectives</b> (Students will be able to ...)	<b>Essential Knowledge</b> (Students will know that ...)
World History  6) History. The student understands the characteristics and impact of the Maya, Inca, and Aztec civilizations.	(A) compare the major political, economic, social, and cultural developments of the Maya, Inca, and Aztec civilizations and explain how prior civilizations influenced their development; and	<ul style="list-style-type: none"> <li>✓ Students will be able to identify the location of three different ancient civilizations in Latin America</li> <li>✓ Students will know that these civilizations left behind cultural landscapes</li> <li>✓ Students will know that in geography can be impacted by other groups by their location</li> </ul>
World Geography (8) Geography. The student understands how people, places, and environments are connected and interdependent.	(A) compare ways that humans depend on, adapt to, and modify the physical environment, including the influences of culture and technology;	<ul style="list-style-type: none"> <li>✓ Students will have understanding of the physical landscape of these civilizations</li> <li>✓ Students will know that people are connected to the environment and can modify the environment</li> <li>✓ Students will learn that human populations create cultural landscapes using resources available</li> </ul>
<b>ArcGIS Online Skills</b> (What ArcGIS Online skills will students use?)	Using the zoom, search, add a pinpoint/pushpin; changing the basemap; use StoryMaps	

**Introduction**

The study of world history is complicated. In order to develop an understanding of events and eras that have occurred it is important to consider the time period, people involved as well as the geography of the landscape. In order to do this, one can start with the investigation of early civilizations. Though early civilizations stretched from Asia to North America, the purpose of this activity is to identify and discuss characteristics of the populations inhabiting Central and South America. Several components contributing to the success of these early populations include the geography and natural resources that supported their daily activities. This activity will first investigate the Maya by taking a look at architecture and location of the cultural landscape left behind. The second task in the activity is to create a map using the tools of Online GIS to highlight two additional early civilizations, the Inca and Aztec.

**Task 1: Where was the Mayan civilization located?**

1. Search the Story Map Gallery for “Maya Archaeological Sites.” Open the following Story Map and explore some of the Maya Archeological sites in MesoAmerica.



<http://storymaps.arcgis.com/en/>

2. Though the Story Map is focused on Belize, what surrounding countries were also home to the Mayan Civilization? \_\_\_\_\_
3. What characteristics of the physical landscape do you notice in the images of the region? \_\_\_\_\_
4. What do you know about the climate of this region? \_\_\_\_\_
5. Using the images and your knowledge of the Maya, what types of structures did the Mayan’s build and what resources did they primarily use? \_\_\_\_\_
6. Open ArcGIS Online and change the basemap  to Imagery. Use the search tool to find the location of the Mayan site, Chichen Itza. Where is this located? \_\_\_\_\_
7. What do you notice about the landscape in this region that was suitable for the Mayan civilization to thrive? \_\_\_\_\_

**Task 2: Explore the geography of other early civilization locations.**

8. Using your knowledge as well as the textbook, where was the Incan Empire located?  
\_\_\_\_\_
9. Search for Andes Mountains, Peru, using the search box tool. What do you notice about the physical geography of this region?  
\_\_\_\_\_  
\_\_\_\_\_
10. Now search for Machu Picchu, Peru. What do you find?  
\_\_\_\_\_
11. Change the basemap while still in the same view to Topography. How can you tell the elevation of this region? \_\_\_\_\_  
\_\_\_\_\_
12. What challenges did this population likely encounter living in this region? \_\_\_\_\_  
\_\_\_\_\_
13. Create a pinpoint at the location of Machu Picchu, Peru, by adding a layer of "Map Notes." Change the symbol, by clicking on symbol, then select Outdoor Recreation and the mountain symbol.  
\_\_\_\_\_
14. What was the center for the Aztec empire? \_\_\_\_\_  
(need a hint...think South Central Mexico)
15. Search for this location using the search tool on the map. Describe the physical geography of the region. \_\_\_\_\_  
\_\_\_\_\_
16. What is the climate like within this region? Search for and add the following layer of data: Climate Zones Robinson. \_\_\_\_\_  
(hint: you can use the legend under the details tab, or you can click on the area to determine the type of climate)
17. Turn off the climate map, and change the basemap to imagery. What do you see in this region?  
\_\_\_\_\_  
\_\_\_\_\_
18. After investigating each civilization, what do you think supported their ability to thrive in the various regions?  
\_\_\_\_\_  
\_\_\_\_\_

**Introduction**

The study of world history is complicated. In order to develop an understanding of events and eras that have occurred it is important to consider the time period, people involved as well as the geography of the landscape. In order to do this, one can start with the investigation of early civilizations. Though early civilizations stretched from Asia to North America, the purpose of this activity is to identify and discuss characteristics of the populations inhabiting Central and South America. Several components contributing to the success of these early populations include the geography and natural resources that supported their daily activities. This activity will first investigate the Maya by taking a look at architecture and location of the cultural landscape left behind. The second task in the activity is to create a map using the tools of Online GIS to highlight two additional early civilizations, the Inca and Aztec.

**Task 1: Where was the Mayan civilization located?**

1. Go to <http://storymaps.arcgis.com/en/> and Search the Story Map Gallery for “Maya Archaeological Sites.” Open the following Story Map and explore some of the Mayan Archeological sites in MesoAmerica.



<http://tbsl.maps.arcgis.com/apps/MapTour/index.html?appid=08ce51ecfbc743148c0e112ea7723e71&webmap=33ee834bc51f4bb99b1b6cfc9f1c644>

2. What is this StoryMap about? What story is it telling?  
\_\_\_\_\_
3. Though the Story Map is focused on Belize, what surrounding countries were also home to the Mayan Civilization? \_\_\_\_\_ Mexico, Guatemala, some parts of Honduras and El Salvador \_\_\_\_\_
4. What characteristics of the physical landscape do you notice in the images of the region?  
\_\_\_\_\_ Green, lush vegetation (tall trees, shrubs), hilly regions, flat areas, a few dry areas \_\_\_\_\_
5. What do you know about the climate of this region? \_\_\_\_\_ Tropical due to location near the water, likely humid and receives rain \_\_\_\_\_
6. Using the images and your knowledge of the Maya, what types of structures did the Mayan’s build and what resources did they primarily use? \_\_\_\_\_ Stone structures, temples... \_\_\_\_\_
7. Open ArcGIS Online and change the basemap  to Imagery. Use the search tool to find the location of the Mayan site, Chichen Itza. Where is this located (you may need to zoom in or out to determine the location)? \_\_\_\_\_ The Yucatan Peninsula in Mexico. \_\_\_\_\_

Name: \_\_\_\_\_ *Ancient Civilizations and Their Landscapes*

8. What do you notice about the landscape in this region that was suitable for the Mayan civilization to thrive? imagery shows green colors, access to nearby major water resource, as you zoom in low elevation

**Task 2: Explore the geography of other early civilization locations.**

- Using your knowledge as well as other resources, where was the Incan Empire located?  
Primarily Peru, South America, but it did extend into other neighboring countries
- Search for Andes Mountains, Peru, using the search box tool. What do you notice about the physical geography of this region? Elevated landscape, dry areas, not much vegetation, extensive mountain range on western coast of Peru
- Now use the search box to search for Machu Picchu, Peru. What do you find? The map zooms directly to Machu Picchu, which has vegetation and is mountainous.
- Change the basemap to Topographic while still in the same view. How can you tell the elevation of this region? There are contour lines showing higher elevations
- What challenges did this population likely encounter living in this region? difficulty with mountainous landscape, access to water resources, communication, trade, movement
- Create a pinpoint at the location of Machu Picchu, Peru, by adding a layer of "Map Notes." Change the symbol, by clicking on symbol, then select Outdoor Recreation and the mountain symbol.
- What was the center for the Aztec empire? Tenochtitlan, Mexico (need a hint...think South Central Mexico)
- Search for this location using the search tool on the map. Describe the physical geography of the region. converging Sierra Madre mountains, Lake Texcoco nearby
- What is the climate like within this region? Search for and add the following layer of data: Climate Zones Robinson. Highlands, Tropical Dry  
(hint: you can use the legend under the details tab, or you can click on the area to determine the type of climate)
- Turn off the climate map, and change the basemap to imagery with labels. What do you see in this region? Some vegetation, developed urban areas as you zoom in, elevated areas
- After investigating each civilization, what do you think supported their ability to thrive in the various regions? Climate, water resources, vegetation, defense in both Inca and Aztec regions due to elevation (answers can vary)

## World Ecosystems

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Students will investigate different landforms, types of vegetation, and climates based on a variety of locations on Earth.

1. Explore world ecosystems including landforms, types of vegetation, and climate.
2. Apply strategies using ArcGIS Online such as zooming in and out as well as toggle between different layers

### Social Studies Connections and Content

- Economics
- Geography: Physical Geography
- Government
- US. History
- World History

### ArcGIS Online Skill Level

- Level One: Explorer (observe, identify, describe)
- Level Two: Cartographer (explain, analyze)
- Level Three: Geoanalyst (infer, etc.)

**Grade Level:** 9-12

**Time Period:** 50 minutes

### Teacher Notes

### Warm-Up Questions

Use the questions below to introduce the concepts discussed in this lesson.

### Vocabulary

## World Ecosystems

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### Curriculum Articulation

<b>Texas Essential Knowledge and Skills</b> (Students will understand ...)	<b>Learning Objectives</b> (Students will be able to ...)	<b>Essential Knowledge</b> (Students will know that ...)
(3) Geography. The student understands how physical processes shape patterns in the physical environment.	(A) explain weather conditions and climate in relation to annual changes in Earth-Sun relationships;  (B) describe the physical processes that affect the environments of regions, including weather, tectonic forces, erosion, and soil-building processes; and	✓
(4) Geography. The student understands the patterns and characteristics of major landforms, climates, and ecosystems of Earth and the interrelated processes that produce them.	(A) explain how elevation, latitude, wind systems, ocean currents, position on a continent, and mountain barriers influence temperature, precipitation, and distribution of climate regions; (B) describe different landforms and the physical processes that cause their development; and (C) explain the influence of climate on the distribution of biomes in different regions.	✓
(21) Social studies skills. The student applies critical-thinking skills to organize and	(A) analyze and evaluate the validity and utility of multiple sources of geographic information	

## World Ecosystems

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<p>use information acquired from a variety of valid sources, including electronic technology.</p>	<p>such as primary and secondary sources, aerial photographs, and maps; (B) locate places of contemporary geopolitical significance on a map; and (C) create and interpret different types of maps to answer geographic questions, infer relationships, and analyze change.</p>	
<p><b>ArcGIS Online Skills</b> (What ArcGIS Online skills will students use?)</p>	<p>Using the zoom, search, add a pinpoint/pushpin; changing the basemap; use StoryMaps</p>	

**Student Lesson page 1: A Global View**

**Introduction:** Physical geography is the study of Earth’s natural environment including elements such as climate, landforms, soil type, bodies of water, vegetation, and animal habitats. Investigating these features is important in developing an understanding of the diversity and distribution of ecosystems as well the connections with human settlement and activities on Earth.

1. Open Story Maps at the following web address <http://storymaps.arcgis.com/en/>. Once the page opens, scroll down and access the Story Map titled “Explore a Tapestry of World Ecosystems.”



2. **Metadata** is very important in online mapping by providing the source(s) of the data shown in the maps. What individual or organization authored the Story Map?  
\_\_\_\_\_
3. Scroll down in the introduction of the story map to learn about the different layers of data that will be available. List the four layers of data that will be used below:
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
  - c. \_\_\_\_\_
  - d. \_\_\_\_\_
4. Look at the map, do you see any patterns among the locations of the ecosystems?  
\_\_\_\_\_  
\_\_\_\_\_
5. In the introduction, click on the bolded and underlined term “landforms.” Are landforms evenly distributed on Earth’s landscape?  
\_\_\_\_\_
6. Now click on the “Rock Type” bolded and underlined term in the introduction. Zoom into Africa by using the plus (+) sign. Determine the type of rock that is found predominantly along the west coast by clicking on the blue color.  
\_\_\_\_\_
7. Click on the “Land Cover” bolded term in the introduction. What are two types of vegetation found in South America?
  - a. \_\_\_\_\_
  - b. \_\_\_\_\_
8. Are there any regions with no vegetation? If yes, where?  
\_\_\_\_\_

**Student lesson page 2: Spatial Connections Across Earth**

1. Click on the house icon on the far right. The map should adjust back to a global view.



2. Click on the first dot under the house on the right side of the webpage. What region did the map zoom to after clicking the dot?  
\_\_\_\_\_

3. Read the short introduction about the Sweetwater Mountains. Identify two characteristics of the region that you learned.

- a. \_\_\_\_\_
- b. \_\_\_\_\_

4. Click on "Bioclimate" highlighted in green. What type of climate is found at this location?  
\_\_\_\_\_

5. Which nearby location also has the same climate? (*Hint*: click on the green tab located nearby).  
\_\_\_\_\_

6. Checkout the other layers of data by clicking on the labels – "Landform" "Rock Type" and "Land Cover." What factors may contribute to the type of climate found at this location?  
\_\_\_\_\_

7. Scroll down the dots along the far right hand of the page until you get to "Ixtapan del Oro, Mexico." How is the Bioclimate different in this region? Why do you think this is?  
\_\_\_\_\_  
\_\_\_\_\_

8. Click on the tab 16-30 on the far right. Scroll down the dots to select Ust' Bokson Siberia, Russia. What type of bioclimate can be found in this region?  
\_\_\_\_\_

9. How is this bioclimate different from that of the climates found in the USA and Mexico? What factors may contribute to the difference in climate between these three regions?  
\_\_\_\_\_  
\_\_\_\_\_

10. Using the map minus (-) function, zoom out to a world view. Find one other region with a similar climate to Ust' Bokson, Siberia Russia? \_\_\_\_\_

11. Discuss one conclusion you can make from the bioclimates viewed across Earth's landscape.  
\_\_\_\_\_  
\_\_\_\_\_

**Student Answer Sheet****Student Lesson page 1: A Global View**

**Introduction:** Physical geography is the study of Earth’s natural environment including elements such as climate, landforms, soil type, bodies of water, vegetation, and animal habitats. Investigating these features is important in developing an understanding of the diversity and distribution of ecosystems as well the connections with human settlement and activities on Earth.

1. Open Story Maps at the following web address <http://storymaps.arcgis.com/en/>. Once the page opens, scroll down and access the Story Map titled “Explore a Tapestry of World Ecosystems.”



2. **Metadata** is very important in online mapping by providing the source(s) of the data shown in the maps. What individual or organization authored the Story Map?

    The United States Geological Survey    

3. Scroll down in the introduction of the story map to learn about the different layers of data that will be available. List the four layers of data that will be used below:

- a.     Bioclimate
- b.     Landforms
- c.     Rock Type
- d.     Land Cover

4. Look at the map, do you see any patterns among the locations of the ecosystems?

    Answers may vary, but students may reference areas near the equator as well as areas near the poles have similar features; or South America and Central Africa with similar features, etc.    

5. In the introduction, click on the bolded and underlined term “landforms.” Are landforms evenly distributed on Earth’s landscape?

    No, landforms vary in how they are distributed.    

6. Now click on the “Rock Type” bolded and underlined term in the introduction. Zoom into Africa by using the plus (+) sign. Determine the type of rock that is found predominantly along the west coast by clicking on the blue color.

    Metamorphic Rock    

7. Click on the “Land Cover” bolded term in the introduction. What are two types of vegetation found in South America?

- a.     Needleleaf Evergreen
- b.     Mostly Deciduous Forest

8. Are there any regions with no vegetation? If yes, where?     Yes, Northern Africa, Central or Southwestern Asia, Northern Canada, Northern Russia

**Student lesson page 2: Spatial Connections Across Earth**

1. Click on the house icon on the far right. The map should adjust back to a global view.



2. Click on the first dot under the house on the right side of the webpage. What region did the map zoom to after clicking the dot? *The United States of America – specifically, California*

3. Read the short introduction about the Sweetwater Mountains. Identify two characteristics of the region that you learned. *(Answers will vary)*

- a. \_\_\_\_\_
- b. \_\_\_\_\_

4. Click on “Bioclimate” highlighted in green. What type of climate is found at this location?  
*Cold Moist*

5. Which nearby location also has a similar climate? *(Hint: click on the green tab nearby).*  
*Bishop Creek*

6. Checkout the other layers of data by clicking on the labels – “Landform” “Rock Type” and “Land Cover.” What factors may contribute to the type of climate found at this location?  
*Landforms, nearby water resources, elevation, etc.*

7. Scroll down the dots along the far right hand of the page until you get to “Ixtapan del Oro, Mexico.” How is the Bioclimate different in this region? Why do you think this is?  
*Hot Moist – This region is further south and closer to the equator where it will receive more direct sun light creating a warmer temperature as well as its location relative to nearby bodies of water creating moisture.*

8. Click on the tab 16-30 on the far right. Scroll down the dots to select Ust’ Bokson Siberia, Russia. What type of bioclimate can be found in this region?  
*Very Cold Wet*

9. How is this bioclimate different from that of the climates found in the USA and Mexico? What factors may contribute to the difference in climate between these three regions?  
*The temperature is colder. The location is farther north not receiving direct rays from the sun that the other locations receive. Additional answers can vary.*

10. Using the map minus (-) function, zoom out to a world view. Find one other region with a similar climate to Ust’ Bokson, Siberia Russia? *Answers may vary, but some may include Tower Mountain, Montana, or Semily, Czech Republic*

11. Discuss one conclusion you can make from the bioclimates viewed across Earth’s landscape.  
*Answers will vary.*