2.1 Introduction

In the late summer of 1854, a dreaded disease called cholera struck a neighborhood in London, England. People suddenly began suffering cramps, vomiting, and terrible thirst. Many died within hours. In just 10 days, the disease killed about 500 people. Wagons carried away corpses for mass burials.

No one knew how cholera spread or how to stop it. But one doctor, John Snow, had an idea. Snow convinced officials to remove the handle from a water pump on Broad Street so that no one could use the pump. Soon the cholera stopped spreading. Snow had guessed correctly that the disease was spread through polluted drinking water.

By thinking like a geographer, John Snow solved the mystery of how cholera was spread. He had gone door to door to find out where people were dying. Later, he showed his findings on a map of the neighborhood. On the map, Snow made a mark next to each house where people had died from cholera. The map clearly showed that most of the deaths were clustered around the Broad Street pump.

John Snow's map is an example of a thematic map. A thematic map presents information related to only one theme or topic. In this chapter, you will learn how to identify and read different types of thematic maps. You will see how geographers use these tools to make sense of Earth's physical and human features.
2.2 The Geographic Setting

Thematic maps are all around us. Tune in to a news program and you’re likely to see a weather map showing high and low temperatures. To find your way on the local bus system, you might use a map of bus routes. These maps focus on a specific topic, or theme. They show information about some aspect of physical or human geography.

Thematic Maps Can Show Physical Geography Some thematic maps focus on physical features. Physical features are natural parts of Earth’s surface. They include landforms like mountains, plains, and plateaus. They also include bodies of water. A physical features map of Earth will show oceans, seas, bays, rivers, and lakes.

Thematic maps can show other aspects of the physical environment. For example, some maps focus on climate, or long-term patterns of weather. Climate maps show how much rainfall various areas receive. They also show how hot or cold places tend to be in winter and summer.

Climate has a big effect on the types of vegetation, or trees and other plants, that will grow in an area. You can see this by comparing a climate map of the Earth with a vegetation map. A vegetation map shows the kinds of trees and other plants that grow in various places. In many ways it looks like a climate map, although other factors also affect what will grow where.

Thematic Maps Can Show Human Geography Thematic maps can also focus on human geography. John Snow’s map of the cholera deaths near the Broad Street pump is a good example. Another example is a political map. The map on the next page shows the borders of the 50 U.S. states. It also shows the borders between countries. In addition to borders, political maps also show important cities, such as the capitals of states and countries.

Another type of thematic map shows population density. This is the number of people per unit of area, such as a square mile. The higher the number, the more crowded an area is. A population density map reveals where large numbers of people cluster.

Besides showing where people live, a thematic map can show what they do. A map of economic activity focuses on the ways people produce, buy, and sell goods and services. This kind of map might show the main types of business and industry in an area. It might also show the natural resources that fuel the area’s economy. Natural resources are useful items found in nature, such as wood, coal, and oil.

A Map’s Title and Legend State Its Theme To read a thematic map, first look at its title. The title states the topic of the map. Then look at the map legend. It tells you how to read the map’s symbols. On the U.S. political map, the legend shows the symbols for the national and state capitals. A map legend may also explain how the map uses colors. For instance, a thematic map might use colors to show differences in elevation or population density.
Geoterm

**climate** the pattern of weather over a long period of time

**economic activity** any action that relates to the making, buying, and selling of goods and services

**landform** any natural feature of Earth's surface that has a distinct shape. Landforms include major features such as continents, plains, plateaus, and mountain ranges. They also include minor features such as hills, valleys, canyons, and dunes.

**physical feature** any natural characteristic of Earth's surface, such as landforms and bodies of water

**population density** the average number of people who live in a unit of area, such as a square mile. Population density measures how crowded an area is.

**region** an area defined by one or more natural or cultural characteristics that set it apart from other areas

**thematic map** a map that shows a particular theme, or topic

**vegetation** all the plants and trees in an area

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**Political Maps**

Political maps are one type of thematic map. These maps help us see where countries, states, and important cities are located. On this map of the United States, you can see the borders of your state. A star marks the state's capital. A star with a circle around it shows the nation's capital.
2.3 Mapping Earth’s Physical Features

In the winter, snowboarders look for a snowy mountain to practice their sport on. In the summer, vacationers often cool off by a lake or river. These are just three of the landforms and bodies of water that you might see on a physical features map.

**Common Landforms** Geographers have given names to the many landforms found on Earth. Some landforms have distinctive shapes when viewed from above. A long, narrow peninsula, for example, juts out from a continent into water. Other landforms, like mountains, have distinct shapes when viewed from the ground.

Physical features maps show the shapes of features as seen from above. They also show the elevation, or height above sea level, of various features. Usually physical features maps use colors and shading to show changes in elevation.

**Bodies of Water** Geographers also label bodies of water on physical features maps. Many kinds of water bodies appear on the continents. For example, rivers flow down from mountains and make their way to the sea. Lakes are entirely surrounded by land. Other water bodies are created where oceans and seas meet the continents. A bay is partly enclosed by a wide, curving stretch of land. A strait is a narrow channel that connects two larger bodies of water.
This map shows major physical features in India. The Himalayas are India’s highest physical feature. Two long rivers, the Ganges and the Brahmaputra, flow out of the Himalayas. They form one of the world’s largest river deltas where they meet the Bay of Bengal.
2.4 Hot, Cold, Wet, Dry: Earth's Climates

Do you check a weather report each morning to see what the day will be like? Are most days sunny? Or does it rain a lot where you live? Such long-term patterns in weather are called *climate*.

**Climate Zones** To study climates, geographers divide Earth into *climate zones*. Each zone has a particular pattern of temperature and precipitation—rain, snow, or other moisture. This pattern is often shown on a *climagraph*, like those you see below.

A climagraph shows the average temperature and precipitation in a place over a year. The letters along the bottom of the graph stand for the months of the year. The curved line indicates the average monthly temperatures. The bars show the average monthly precipitation.

**Location Affects Climate** Many factors affect a place’s climate. One of the most important is latitude. Places in tropical latitudes, close to the equator, get the most direct rays from the sun all year. These areas have hot weather year-round. Places at high latitudes, close to the North and South poles, receive much less sunlight. As a result, they are very cold.

Another factor affecting climate is elevation, or altitude. Places at high elevations have colder climates than those lower down. You’ll learn more about the factors that affect climate throughout this book.

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**World Climate Zones**

Climographs for the 12 climate zones found around the world are shown below.

- **Ice Cap** very cold all year with permanent ice and snow
- **Subarctic** cold, snowy winters and cool, rainy summers
- **Marine West Coast** warm summers, cool winters, and rainfall all year
- **Tundra** very cold winters, cold summers, and little rain or snow
- **Highlands** temperature and precipitation vary with latitude and elevation
- **Humid Continental** warm, rainy summers and cool, snowy winters
Climate Zones of Australia

Australia has seven climate zones. This climate map shows each zone in a different color.

- **Tropic of Capricorn**
- **Great Australian Bight**
- **Gulf of Carpentaria**
- **Indian Ocean**
- **Coral Sea**
- **Gulf of Trafalgar**
- **Tasman Sea**

### Climate Maps

**Mediterranean**
- Warm all year with dry summers and short, rainy winters

**Semiarid**
- Hot, dry summers and cool, dry winters

**Tropical wet and dry**
- Hot all year with rainy and dry seasons

**Humid subtropical**
- Hot, rainy summers and mild winters with some rain

**Arid**
- Hot and dry all year with very little rain

**Tropical wet**
- Hot and rainy all year
2.5 Trees and Other Plants: Earth's Vegetation

Think about the climate where you live. Now think about the kinds of plants that grow nearby. In an arid climate, like a desert, you might see hardy cacti. In a humid continental climate, you might see lofty trees that stay green all year. Climate has a major effect on the kind of vegetation that grows in a place.

Vegetation Is Adapted to Its Environment Plants of some kind grow nearly everywhere on Earth. But in order to survive, plants must adapt to their environment.

Plants can adapt to even extreme environments. A tundra climate zone is very cold and dry. Yet small plants and bushes grow there. In arid climates, cacti can go for long periods without water. Other kinds of vegetation need lots of rainfall to survive.

Other factors besides climate affect what plants grow where. Among them are elevation, amount of sunlight, and richness of the soil.

Global Vegetation Zones Geographers study where different plants grow by dividing the world into vegetation zones. In each zone, a certain mix of plants has adapted to similar conditions.

Like climate zones, vegetation zones are affected by their location on Earth. They range from the barren ice cap zones at the poles to the dense broadleaf evergreen forest zones near the equator.
Vegetation Zones of North Africa

This map shows the vegetation zones found in North Africa. Chaparral thrives beside the Mediterranean Sea. Desert and desert scrub are found in the dry Sahara. A narrow band of broadleaf evergreen forest appears in the northeast corner of North Africa.

Vegetation Maps

This map shows the vegetation zones found in North Africa. Chaparral thrives beside the Mediterranean Sea. Desert and desert scrub are found in the dry Sahara. A narrow band of broadleaf evergreen forest appears in the northeast corner of North Africa. What do you think allows tropical trees to survive in such an arid region?
2.6 Where People Live: Population Density

In 2000, about 8 million people lived in New York City. They were jammed into an area of about 300 square miles. Compare this with the town of Skwentna, Alaska. There, 111 people were spread out over about 450 square miles. When it comes to crowding, these two places are about as different as they can be. Geographers show these kinds of differences using population density maps.

**Population Density Measures Crowding** Population density tells us how crowded a place is. To calculate the density of a place, divide the number of people there by its land area. The higher the result, the more crowded the place is. In 2000, New York City had a population density of about 26,000 people per square mile. In contrast, Skwentna had less than 1 person per square mile.

Population density affects how people live. In Skwentna, houses are spread out. There are no roads. People use airplanes, boats, or snowmobiles to get to the local store and the post office. Skwentna’s version of rush hour comes in February, when dogsled racers speed through town.

In New York City, people live packed in high-rise apartments. They may have hundreds of neighbors just in their own building. Every day millions of “straphangers” hold on tight as they jostle each other in the city’s crowded subways.

**Population Density from High to Low**

Population density is a measure of crowding. Some countries are very densely populated. Others are not. These photographs show places with different population densities.

- **More Than 250 People per Square Mile**
  Dhaka, Bangladesh, is one of the most crowded places on Earth. On average, many more than 250 people live in a square mile of this busy city.

- **125 to 250 People per Square Mile**
  Austria is a fairly crowded country. On average, between 125 and 250 people live in every square mile of this mountainous land.
### Population Density of China

<table>
<thead>
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<th>Urban Population</th>
<th>Population Density</th>
<th>Per sq. mi</th>
<th>Per sq. km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 8,000,000</td>
<td>Over 250</td>
<td>Over 100</td>
<td>50–100</td>
</tr>
<tr>
<td>4,000,000–8,000,000</td>
<td>125–250</td>
<td>10–50</td>
<td></td>
</tr>
<tr>
<td>1,000,000–4,000,000</td>
<td>25–125</td>
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</tr>
<tr>
<td></td>
<td>2–25</td>
<td>Under 2</td>
<td>Under 1</td>
</tr>
</tbody>
</table>

#### Population Density Maps

Population density maps show patterns of where people live. On this map, much of the North China Plain is colored purple. So are many coastal areas. These are the most crowded parts of China.

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**25 to 125 People per Square Mile**

This uncrowded New England village has a lot of space for living. On average, between 25 and 125 people live in every square mile of the town.

**2 to 25 People per Square Mile**

This photograph of Ireland's countryside shows a thinly populated country. Ireland has some big cities. But in most of Ireland, there is an average of 2 to 25 people per square mile.

**Fewer Than 2 People per Square Mile**

These herders in Mongolia live in an almost empty country. Fewer than 2 people live in every square mile of areas like this one.

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*Seeing the World Like a Geographer*
Economic Activity of Europe

The colors on this map show land use patterns in Europe. The most widespread land use is commercial farming. The symbols show the locations of important resources in Europe. Where is petroleum, or oil, found in Europe?

Livestock Raising in Australia
Cattle, sheep, and goats are raised on huge ranches. More than half of the farmland in Australia is used for raising sheep and cows. Australian livestock raisers lead the world in production of wool for clothing and carpets.

Commercial Fishing in Asia
Many people make their living by fishing the world's oceans, lakes, and rivers. The Pacific Ocean yields more than half the world supply of fish. In 2000, 35 million people worked in the fishing industry. More than 80 percent were in Asia.

Forestry in the United States
Forestry uses trees as a resource for making homes, furniture, and paper. In 2003, the United States was the leading supplier of wood in the world. The United States also used up more forest resources than any other country.

Trade and Manufacturing in Ireland
Manufacturing turns resources into goods to sell. In this Irish factory, workers assemble computers for shipment around the world.
2.8 Organizing Earth’s Surface: Regions

As you have learned, geographers use many kinds of maps to make sense of the world. Some of these maps focus on physical geography. Others focus on human geography. All of them reveal interesting patterns to explore.

Geographers use these patterns to organize the Earth’s surface into regions. A region is an area with one or more features that set it apart from other areas. As you’ll see, the concept of region allows geographers to divide the world in useful ways.

Unique Features Define a Region  Think about the community you live in. Does it have a business district? A shopping mall? An industrial park? A civic center? A residential neighborhood? Each of these areas has features that set it apart from other areas. You might think of one as a business region, another as a shopping region, and still another as a housing region. Each region looks different. Each has a different purpose. Each has different needs.

Transportation Region Maps
A region is an area with one or more features that set it apart from other areas. A feature might be something physical like climate. Or it might be a human feature such as roads and train lines. The network of routes on this map defines a transportation region in the San Francisco Bay Area.
Geographers define regions in several ways. The Sunbelt is a region defined by physical features. It is a region made up of states in the southern part of the United States. What sets the Sunbelt apart from other regions is its warm, sunny climate. The Corn Belt is a region defined by human features. It is made up of states in the center of the country where raising corn is an important economic activity.

Dividing the World into Seven Major Regions  The world is a very large place to make sense of. For this reason, geographers usually divide it into regions to study. These world regions are still very large. But each has its own special features.

This book divides the world into seven major regions. Each region is shown in a different color on the world regions map below. These colors are your guide to finding each region in this book. Your study of a region will begin with an introduction to its most important physical and human features. In that introduction, you will begin to see what makes each of these regions unique.

Regions of the World

[Image of a world map with regions colored and labeled: North America, South America, Africa, Asia, Australia, Europe, Polar Regions, and Oceans.]