CHAPTER 13

Natural Environment of Europe

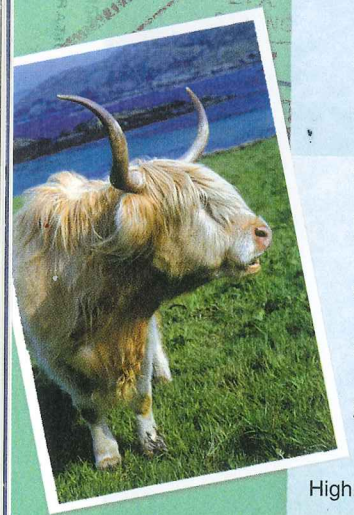
In this chapter you will learn about Europe's climates, resources, and physical features, including its great rivers. Here British writer Jan Morris (1926–) reflects on the importance of the Rhine River to Europe's economy.

Sunflower, Spain

"The boat people of the inland waterways form an inner community of Europe, forever on the move, crossing the old frontiers constantly and meeting colleagues from all over the continent at the big river ports and junctions. . . . The supreme European river is the Rhine—far more than a mere frontier [border], . . . but a majestic communication.

Rüdesheim in Germany is . . . one of the best (or worst) places to gauge the importance of the river and its valley as a conductor of traffic. . . . There is seldom a silent moment on the Rhine at Rüdesheim, scarcely a moment without the plod, hurtle or judder of the river's purpose. The Rhine is the busiest of all waterways. As a highway it begins at Konstanz, on the frontier between Switzerland and Germany, where a large zero on a riverside board tells the barge-captain that he has 1,165 kilometers [700 miles] to go to the North Sea. By the time he gets to Rotterdam he will have passed beneath some 150 bridges, sailed along the littorals [shores] of six nations and helped to define a continent. The Rhine, said Thomas Carlyle [a Scottish writer of the 1800s], was his 'first idea of a world river,' and a world river it is, because the goods it carries across Europe to the sea are distributed across all earth's oceans."

Rhine River, Germany



Highland cow, Scotland

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Section 1

Physical Features

READ TO DISCOVER

1. What are Europe's major landform regions?
2. What are the region's main rivers and bodies of water?

DEFINE

fjords
polders
dikes
navigable

LOCATE

Ural Mountains
Mediterranean Sea
Scandinavian Peninsula
Iberian Peninsula
Italian Peninsula

Locate, continued

Balkan Peninsula
Northern European Plain
Alps
Carpathian Mountains
Pyrenees
Black Sea
Bosporus
North Sea
Rhine River
Danube River

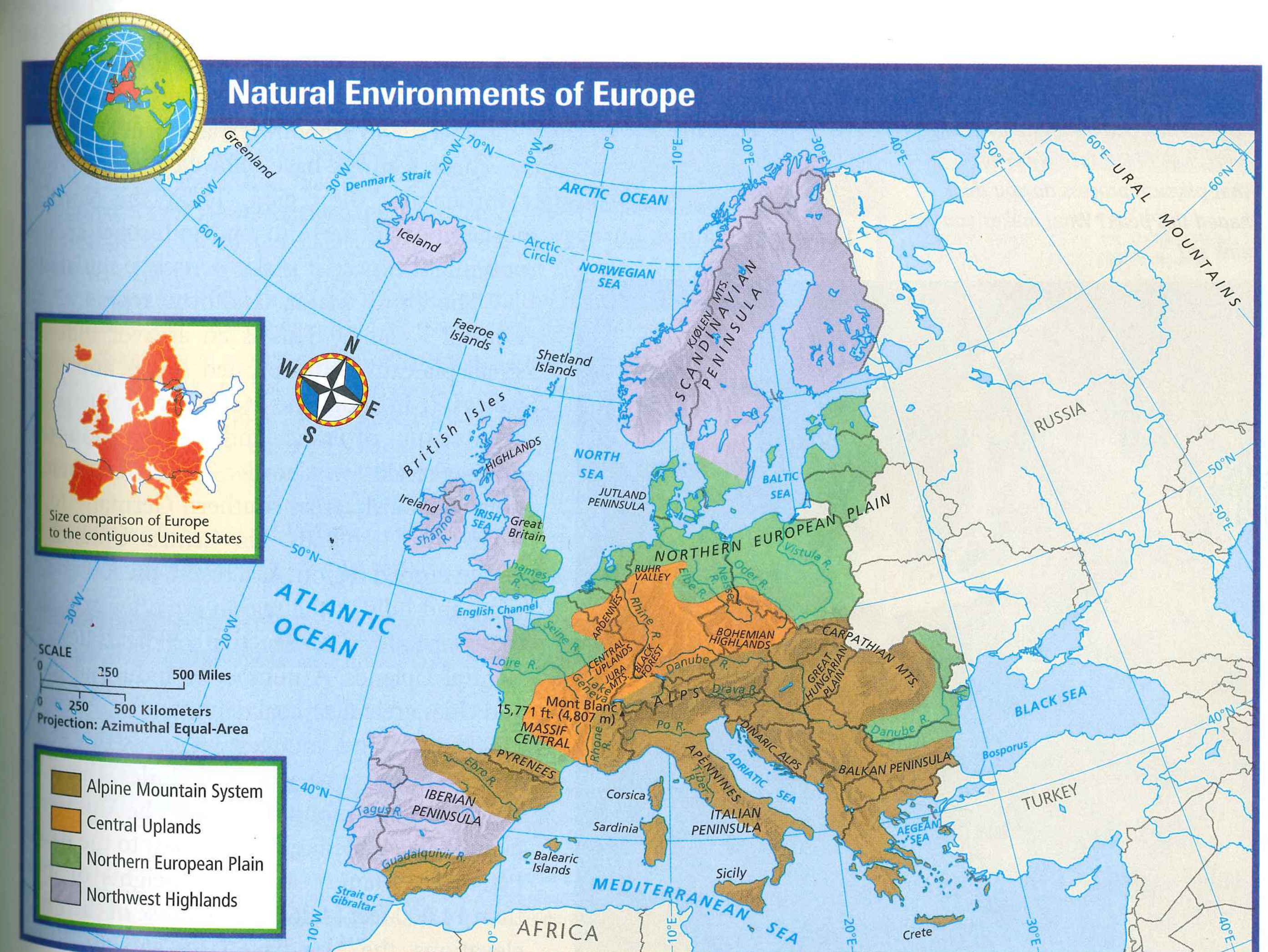
HOLT Geography's Impact Video Series

Watch the video to understand the impact of the North Atlantic Drift on parts of Europe.

Reading Strategy

VISUALIZING INFORMATION Before you read, preview the map of the Natural Environments of Europe. Make notes about features you see on the map that you think will help you understand what you are about to read. For example, how are each of the environments different from the others? As you read, explain how the features on the map relate to the materials in the section. Include key terms and their definitions.

Natural Environments of Europe



Our Amazing Planet

In 1783 a volcano in Iceland erupted continuously for 10 months, devastating large areas of the island. Poisonous gases released during the eruption killed about 75 percent of Iceland's livestock. Many people died from the resulting famine.

Landforms

Europe stretches from the Atlantic Ocean to the Ural Mountains and from the Arctic Ocean to the Mediterranean Sea. In this unit we will study the part of Europe that lies generally west of Russia, Belarus, and Ukraine. Compared to the other continents, Europe is small. However, within Europe's small area is a complex variety of landforms, islands, and peninsulas. Major islands include Great Britain, Ireland, and Iceland. Major peninsulas include the Scandinavian, Iberian, Italian, and Balkan Peninsulas.

Europe can be divided into four major landform regions. These regions are the Northwest Highlands, the Northern European Plain, the Central Uplands, and the Alpine mountain system. (See the map.) The Northwest Highlands is an ancient eroded region of rugged hills and low mountains. In the north it includes the hills of Ireland and England, the Scottish Highlands, and the mountains of Scandinavia. Northwestern France and some of the Iberian Peninsula are also part of the Northwest Highlands. During the last ice age, glaciers scoured the landscapes of Scandinavia and much of the British Isles. Glaciers also carved **fjords** (fee-AWRDZ) along Norway's coast. Fjords are narrow deep inlets of the sea set between high rocky cliffs. When the ice melted, the retreating glaciers left behind thin soils and thousands of lakes.

To the south lies the Northern European Plain. This broad coastal plain stretches from France's Atlantic coast all the way to the Urals. Most of the plain is less than 500 feet (152 m) above sea level. Many rivers flow across it before reaching the ocean. As a result, river towns and port cities have developed there. For example, large cities like Paris and Berlin are located in this region. In fact, its many rivers, short distances, and smooth terrain have long made human contact relatively easy. These features have allowed culture groups to travel, trade, and migrate throughout the region. Today the Northern European Plain is Europe's most important farming and industrial area. As you might expect, it is also densely populated.

The third major landform region is the Central Uplands. This is an area of hills and small plateaus, with forested slopes and fertile valleys. It includes the Massif Central (ma-SEEF sahn-TRAHL) of France and the Jura Mountains on the French-Swiss border. The region stretches northeastward across southern Germany to the Bohemian Highlands. The Central Uplands are an old eroded region. As a result, the low mountains and hills in the region are often rounded. Many of Europe's productive coal fields lie in the Central Uplands. A number of industrial towns and cities grew near coal deposits.

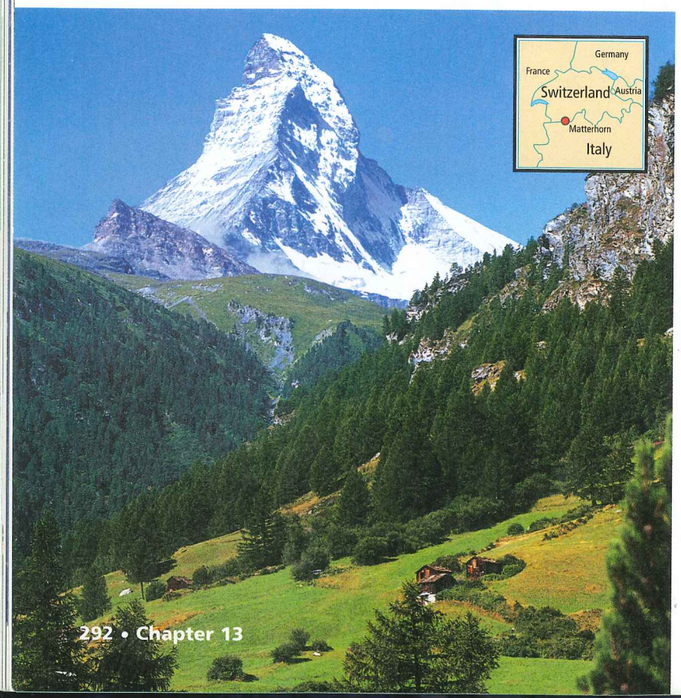
The last and youngest region is the Alpine mountain system, which includes the Alps, Europe's major mountain range. The Alps stretch from France's Mediterranean coast to the Balkan Peninsula. Many peaks reach heights of more than 14,000 feet (4,268 m). Because of their high elevations, the Alps have large snowfields and glaciers. Avalanches are fairly common in winter. Although the Alps are high mountains, historically they have not been a serious barrier to human interaction. People have crossed the Alps through mountain passes for thousands of years to trade and travel. Other ranges in the Alpine system include the Carpathian (kahr-PAY-thee-uhn) Mountains in Eastern Europe and the Apennines (A-puh-nynz) in Italy. The Pyrenees (PIR-uh-neez) of France and Spain are also part of this system.

Beginning about 65 million years ago, tectonic processes formed the mountains of the Alpine system. At that time, the African plate began pushing against the Eurasian plate. This caused the mountains to rise. Tectonic activity continues today. A subduction zone off the coasts of southern Italy and Greece still creates powerful earthquakes and volcanoes. Because it lies on a tectonic plate boundary, Iceland also experiences volcanic eruptions and earthquakes.

READING CHECK: *Physical Systems* How have physical processes affected the shapes of mountains and hills in the Central Uplands?

INTERPRETING THE VISUAL RECORD

The Matterhorn, on the Switzerland-Italy border, rises 14,691 feet (4,478 m). ***What physical process do you think shaped this peak? What makes you think so?***



internet connect

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KEYWORD: SW3 CH13
FOR: Web sites about the natural environments of Europe

Connecting to TECHNOLOGY

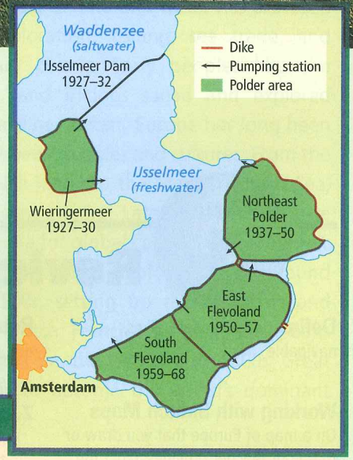
Polders

The Dutch have long used technology to shape their natural environment. For hundreds of years, they have been "creating" land by reclaiming it from the sea. Lands reclaimed from the sea are called **polders**.

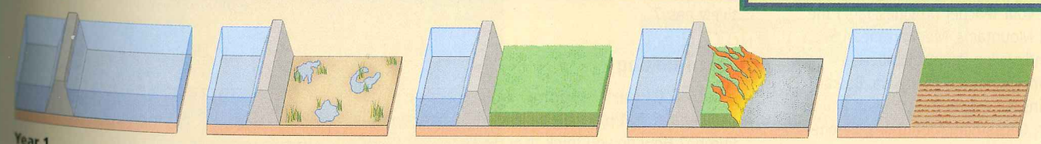
To create polders, the Dutch built earthen walls called **dikes** along the shoreline. Then they used windmills to pump out the seawater behind the dikes. The Dutch used the drained lands for farming or for housing. By using polders to grow crops and raise livestock, the Dutch greatly increased the amount of available farmland. In fact, the Netherlands is an exporter of agricultural goods. The Dutch export products such as flowers, grains, potatoes, and sugar beets, particularly to other European countries.

Today more than 25 percent of the Netherlands lies below sea level. A national system of dams, dikes, and floodgates holds back the sea, and water is constantly pumped out. This system ranks as one of the wonders of the modern world. The largest dike, 19 miles (31 km) long and 100 yards (91 m) thick, closes off a large inlet. Completed in 1932, this dike allowed for the creation of four huge polders. Farms and cities have sprung up on these lands.

Comparing In what other areas of the world, or against what environmental hazards, might Dutch techniques for creating polders be useful?



Creating a Polder



Year 1
Dikes are built around the area to be reclaimed. Pumps and canals drain the water.

Years 2–3
The water level falls. Seeds blow into the area and salt-tolerant plants grow.

Years 4–6
Reeds are planted over a net of woven twigs. The reeds draw up more water.

Year 7
The reeds are burned. Heavy plows turn their roots and the ash into the soil.

The land is ready for crops. Within 15 years the polder looks like it has been farmed forever.

In Romania, an artificial canal connects the Danube River to the Black Sea. The canal allows ships to avoid the marshy Danube Delta and shortens voyages by many miles. Locks, shown above, lift ships going upstream to the river's level and lower ships going downstream to sea level. By using rivers and canals, ships can now travel all the way from the Black Sea to the North Sea.

Water

Europe is nearly surrounded by water. To the south lies the Mediterranean Sea. It is connected to the Black Sea by the narrow Bosporus (BAHS-puh-ruhs). Geographers consider the Bosporus a boundary between Europe and Asia. The Arctic Ocean, North Sea, and Baltic Sea wash the shores of northern Europe. The shallow North Sea has long been important for trade and fishing. The smaller Baltic Sea freezes over during the winter months. To the west of Europe lies the North Atlantic Ocean. For centuries, European explorers, fishers, and merchants have traveled the waters of the Atlantic.

Europe's long, irregular coastline has hundreds of good natural harbors. These harbors are generally located near the mouths of **navigable** rivers, making Europe ideally situated for trade by sea. A navigable river is one that is deep enough and wide enough for shipping. Canals connect many rivers in Europe. For example, France's Canal du Midi lets boats and barges travel between the Atlantic Ocean and the Mediterranean Sea. Many interior towns and cities across Europe have access to the sea through canals and rivers.

The Rhine and Danube stand out among Europe's most important rivers. Many cities and industrial areas line their banks, and barges carry goods along their courses. The Rhine rises in the Swiss Alps. It then flows northwestward through Germany and the Netherlands before entering the North Sea. The Danube begins in the uplands of southern Germany. It flows eastward through nine countries in central and eastern Europe. It empties into the Black Sea. Unfortunately, large amounts of pollution enter the ocean from these and other rivers. Cleaning up and controlling pollution in Europe's rivers is a major environmental challenge.

✓ **READING CHECK:** *Environment and Society* How do Europe's interior towns and cities have access to the sea?

Section 1 Review

Define fjords, polders, dikes, navigable

Working with Sketch Maps

On a map of Europe that you draw or that your teacher provides, label the Ural Mountains, Mediterranean Sea, Scandinavian Peninsula, Iberian Peninsula, Italian Peninsula, Balkan Peninsula, Northern European Plain, Alps, Carpathian Mountains, Pyrenees, Black Sea, Bosporus, North Sea, Rhine River, and Danube River. Which river rises in the Swiss Alps, flows through the Netherlands, and empties into the North Sea?

Reading for the Main Idea

1. *Physical Systems* How did continental ice sheets shape the landscapes of the Northwest Highlands?
2. *Environment and Society* How has Europe's natural environment made human contact relatively easy?

Critical Thinking

3. **Making Generalizations** What are some physical features that probably shaped migration routes in Europe? How do you think they did so?
4. **Analyzing Information** Considering what you know about Europe's natural environments, where would you expect to find many of its largest and most important cities and settlements?

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Organizing What You Know

5. Copy the chart shown below. Use it to describe Europe's four major landform regions: the Northwest Highlands, Northern European Plain, Central Uplands, and the Alpine mountain system.

Northwest Highlands	
Northern European Plain	
Central Uplands	
Alpine mountain system	

Environment and Society

Geography for Life

A Peninsula of Peninsulas

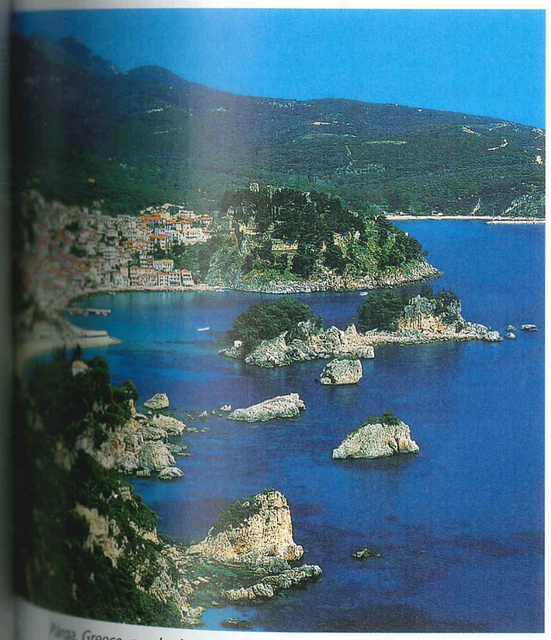
Look at a map of Europe. You will notice that the continent is actually a large peninsula made up of many smaller peninsulas. You might also notice Europe's jagged outline. What do you think created these features? How might they have affected the region's history?

This computer-enhanced satellite image shows the Balkan and Italian Peninsulas clearly.

Much of Europe's present-day coastline has taken shape since the end of the last ice age about 10,000 years ago. Since that time, sea levels have risen, flooding lowlands and changing Europe's shoreline. For example, in northern Europe the Baltic Sea formed from the melting Scandinavian ice sheet. The North Sea and Irish Sea also took their present form after the last ice age. Rising sea levels flooded the mouths of many rivers. This process formed estuaries that are now deep ocean ports.

Geographers have long noticed the remarkable influence of the sea on Europe. The sea greatly affects climate and rainfall patterns. Warm ocean currents bring mild temperatures and rainfall to much of western and northern Europe. In some places, these effects are felt far inland.

Europe's peninsular geography and rugged coastline have also influenced its history. Harbors along rocky shores have long offered protection for ships. Since ancient times, the joining of land and water has provided opportunities for exploration, fishing, sea trade, and political and military power. Early peoples like the Phoenicians, Greeks, and Vikings sailed and explored Europe's intricate coastline. In fact, Europe has long been a place of contact between peoples and cultures. From the Italian Peninsula, which juts into the Mediterranean Sea, the Romans ruled a vast empire. Later European culture groups turned to the sea for global colonial and economic power. Spanish and Portuguese explorers sailed around the world in the 1500s, setting up trading posts and colonies. The British, Dutch, French, and other Europeans followed. For example, in the 1700s and 1800s Great Britain used the seas to become the world's dominant colonial and sea power.



Párga, Greece, overlooks a picturesque harbor. Like that of many towns on Europe's peninsulas, Párga's harborside location has played a major role in its history and economy. Tourists also enjoy the town's setting.

Applying What You Know

1. **Summarizing** How has Europe's peninsular geography influenced its history?
2. **Making Generalizations** How do you think Europe's peninsular geography has affected the locations of its cities and settlements?

Section 2

Climates and Biomes

READ TO DISCOVER

1. How do ocean currents affect the distribution of Europe's climates?
2. Which biomes are found in this region?

IDENTIFY

North Atlantic Drift

LOCATE

British Isles

Reading Strategy

TAKING NOTES Taking notes while you read will help you understand and remember the information in this section. Your notes will be useful for reviewing the material. As you read this section, use the headings to create an outline. Beneath each heading write down the information you learn about each main idea. Include key terms and their definitions.

Climates

Europe has three major climate types: marine west coast, humid continental, and Mediterranean. (See the unit climate map.) The marine west coast climate is found throughout most of northern and western Europe. This climate region includes southern Iceland and the British Isles. It also stretches across northern continental Europe from northern Spain into Poland and Slovakia. Frequent Atlantic storms bring clouds and rain. Rainfall averages between 20 and 80 inches (51 and 203 cm) a year. (See the unit precipitation map.) Snow and frosts can occur in winter. Temperatures are mostly mild, and cloudy, drizzly, and foggy days are common.

INTERPRETING THE VISUAL RECORD

Ireland is one of the European countries that have a marine west coast climate. This hillside is in a part of Ireland where rainfall is very heavy—more than 60 inches (150 cm) per year. ***What is the connection between Ireland's climate and its nickname—the Emerald Isle?***

Areas from interior Norway and Sweden south to the Black Sea have a humid continental climate. This climate has four distinct seasons, including a cold snowy winter and mild to cool humid summer. Winters are severe in parts of this climate region. Periodic summer droughts affect Hungary and Romania.

High mountains, particularly the Alps, separate these first two climates from Europe's third major climate region to the south. Most of southern Europe has a Mediterranean climate. This region gets between 10 and 30 inches (25 and 76 cm) of rainfall a year. Most rainfall comes during the mild winter. Occasional North Atlantic storms pushed by the westerly winds bring rain at that time. Long, dry, and sunny summers are typical.

Smaller climate regions are found in other parts of Europe. For example, a subarctic climate stretches across northern Norway, Sweden, and Finland. The northernmost parts of these countries, along with interior and northern Iceland, have a tundra climate. A small humid subtropical climate region is located south and southeast of the Alps. This area stretches from Italy's Po Valley into the Balkans. In parts of Spain, high mountains block moist ocean air from reaching farther inland. A semiarid climate is found there.

Compared to world regions of similar latitude, much of Europe enjoys mild climates. Winter temperatures are particularly mild for such high latitudes. These mild temperatures are caused by the moderating influence of the **North Atlantic Drift**.

INTERPRETING THE MAP *Northern Europe's temperatures are relatively mild, thanks to the North Atlantic Drift.* ***What are some of the coastal countries affected by the current? Use the unit atlas to find the large island west of Iceland that is far from this ocean current and, as a result, is much colder.***

FOCUS ON GEOGRAPHY

The North Atlantic Drift The North Atlantic Drift is a warm ocean current. It originates off the coast of North America and is fed by the warm tropical waters of the Gulf Stream. (See the map.) The North Atlantic Drift warms the air above it. Then prevailing westerly winds carry this warm moist air across much of northwestern Europe. The winds bring mild temperatures and rain. These conditions allow farmers to grow crops as far north as Sweden and Iceland. Also, the warm waters keep seaports in Norway and at Murmansk, Russia, free of ice.

✓ **READING CHECK:** ***Physical Systems*** How do the North Atlantic Drift and prevailing westerly winds affect Europe's climates?

Plants and Animals

Human activities have affected Europe's plants and wildlife severely. For thousands of years, people there have hunted animals and cleared forests for timber and farmland. The growth of towns, cities, and roads has also changed the natural environment. Some waterways have been polluted. As a result, many species have become extinct from loss of habitat. Some other creatures, such as bears, lynx,

White storks build their nests on a rooftop in Spain.

INTERPRETING THE VISUAL RECORD *A member of the Sami people of northern Scandinavia works with his reindeer herd. Reindeer are known as caribou in North America. Their wide hooves allow them to walk more easily on snow.* ***What food sources do you think the tundra environment provides for the reindeer during the winter?***

wolves, and wild horses, survive mainly in areas where they are protected. Despite these changes, however, Europe can be divided into four major biomes. These biomes include temperate forest, Mediterranean scrub forest, boreal forest, and tundra.

Most of Europe lies within a temperate forest biome. Trees such as ash, beech, maple, and oak are common. Badgers, deer, and a variety of birds live in this environment. Today fields and towns occupy much of the land. Only remnants of the dense forests that once covered much of the landscape remain in this region.

You will find a Mediterranean scrub forest biome in some drier areas in southern Europe. Small trees, shrubs, and drought-resistant plants are typical of the region. Animals such as wild boars and wild sheep still roam remote Mediterranean mountain areas.

Large parts of northern and central Europe lie within the boreal forest biome. These northern forests make up most of Europe's remaining woodlands. Finland, Norway, and Sweden all have large evergreen forests. Trees here, such as pine, spruce, and fir, provide most of Europe's timber for building and papermaking. However, logging and other human activities have greatly reduced the area's animal life.

Far northern Europe has a tundra biome. This biome includes much of Iceland and northern Scandinavia. The land in this cold treeless area is frozen most of the year. During the short Arctic summer, the tundra thaws, and many swamps and marshes form. Millions of migratory birds visit during the summer. Reindeer and foxes are among the tundra's mammals.

READING CHECK: *Physical Systems* In which biome would you find trees such as ash, beech, maple, and oak?

Section 2 Review

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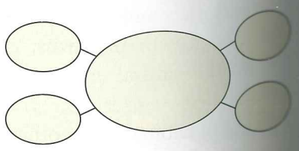
Identify
North Atlantic Drift

Working with Sketch Maps
On the map you created in Section 1, label the British Isles. Which climate dominates the British Isles?

Reading for the Main Idea
1. *Places and Regions* Where in Europe is a marine west coast climate found?
2. *Physical Systems* How do the Alps affect the distribution of climates in Europe?
3. *Environment and Society* What human activities have affected Europe's plants and wildlife?

Critical Thinking
4. **Drawing Inferences and Conclusions** What advantages might forestry industries in Norway, Sweden, and Finland have over forestry operations in other European countries?

Organizing What You Know
5. Create web diagrams like the one below to describe the climates of Europe. Use as many circles as you need to provide important details about each climate.



Section 3 Natural Resources

READ TO DISCOVER
1. Where are Europe's forest, soil, and fishery resources located?
2. What energy and mineral resources are found in this region, and where are they located?

DEFINE
loess

LOCATE
Po Valley
Guadalquivir River

Reading Strategy
DEVELOPING VOCABULARY Before you read, write the key terms on a sheet of paper. Leave space between each one. As you read the section, write down the meaning of each term. Then describe how the term relates to the natural resources of Europe.

Forests, Soils, and Fisheries
Most of Europe's original forests were cleared centuries ago. For example, clearing or overgrazing in ancient times destroyed nearly all of the Mediterranean area's original oak woodlands. Only a scrub-plant community covering the hillsides remains. Air pollution and acid rain have destroyed many more trees throughout the continent. Large areas of timber-producing forests exist only in limited areas, such as Sweden and Finland. As a result, most European countries must now import lumber. However, most European countries also have reforestation and forest protection programs.

Europeans have made good agricultural use of their soils. In fact, more than half of Europe's land area is used for farming. Some of the best soils are found in the Northern European Plain. Farmers grow a variety of grains there and raise cattle and hogs. Some of these soils developed from **loess**—fine-grained, windblown soil that is very fertile. Such soils can keep their fertility for many years. In southern Europe, alluvial soils are particularly productive. River valleys, such as Italy's Po (POH) Valley and Spain's Guadalquivir (gwah-dahl-kee-VEER) River valley, are major farming centers. With the help of irrigation, these soils produce a wide range of crops. Farmers grow lemons, oranges, and many different vegetables. Farmers in southern Europe also raise goats, hogs, and sheep.

Autumn tints grapevines growing in southwestern Germany. Partly because they can grow in many different soils, grapes are grown in several European countries.

Lavender, which is used in perfumes and soaps, grows in a region of southern France called Provence. Fertile soil and a temperate climate make farming possible throughout the country. Each region has its specialties. France's agricultural bounty makes it one of the world's largest exporters of farm products.

Europe produces many crops, such as large amounts of grapes, olives, potatoes, and wheat. Efficient methods and modern technology have made Europe's crop yields among the highest in the world. Farmers use chemical fertilizers to enrich the soil. They also rotate crops to maintain fertility. Modern machinery is used in planting and harvesting. However, some areas lag behind in farm production. This is the case in Europe's formerly communist countries. Farming technology is often outdated there.

Throughout history, fishing has been an important part of the European economy. Fishing villages dot Europe's coasts, and fishing boats can be found in all waters bordering the continent. Europe's best fisheries are located in the North Atlantic and Arctic Oceans and in the North Sea. Coastal waters, particularly where the warm North Atlantic Drift mixes with cold polar waters, are excellent fishing grounds. Iceland, Norway, Spain, and Denmark are major fishing countries. However, overfishing and coastal pollution threaten the future of the fishing industry in the Mediterranean and North Atlantic.

✓ **READING CHECK:** *Places and Regions* Where are some of the best farming soils in Europe found?

Energy and Minerals

To meet its current industrial and energy needs, Europe must rely heavily on mineral imports. Europe's technologically advanced economies lack sufficient supplies of critical natural resources, such as oil, iron, and other metals.

Europe does have large deposits of coal, however. Some countries, such as Germany, Britain, and Poland, have mined coal for hundreds of years. (See the unit land use and resources map.) In fact, Germany's Ruhr coal field is one of the world's largest. During Europe's industrial era, coal and iron were essential to the creation of the steel and manufacturing industries. However, in the 1900s oil replaced coal as the most important energy source. Europe became increasingly dependent on imported oil. Today oil and gas from Southwest Asia, Russia, and Africa power the economies of most European countries.

INTERPRETING THE VISUAL RECORD

Workers cut marble from a quarry near Carrara, Italy. For centuries, sculptors have favored the white stone. ***How might changes in technology have affected the marble industry of Carrara?***

Europe's main oil and natural gas deposits lie beneath the North Sea. These deposits were discovered in the early 1960s. They have greatly benefited the economies of Norway and Britain. Both countries are now energy exporters. The Netherlands also produces and exports natural gas.

Hydroelectricity is another important energy source. It is produced in mountainous Norway, Sweden, and Switzerland. France produces ocean tidal power and solar power. Iceland uses geothermal energy to heat homes and generate electricity. Nuclear power also supplies energy, particularly in France, Belgium, Bulgaria, and Sweden. However, many Europeans are worried about the long-term safety of nuclear power.

Other mineral resources in Europe include iron ore, uranium, lead, and zinc. Sweden and France both have large deposits of iron ore in upland regions. France also has sizable uranium deposits. Lead, zinc, and other metals are found in Spain and southern Europe. Marble, a stone used for building and sculpting, has long been mined in parts of southern Europe, such as in Carrara, Italy.

✓ **READING CHECK:** *Places and Regions* Where are Europe's main oil and natural gas fields?

Our Amazing Planet

The world's largest deposits of amber are found along the shores of the Baltic Sea. Some deposits of this fossilized tree resin date back to perhaps 60 million years ago. The preserved bodies of ancient insects have been found in some deposits. The yellowish translucent amber is usually made into jewelry.

Section 3 Review

Define loess

Working with Sketch Maps On the map you created in Section 2, label the Po Valley and Guadalquivir River. Which of these areas is a major agricultural region in Spain?

Reading for the Main Idea

1. *Places and Regions* What types of soils are found in river valleys such as Italy's Po Valley? How useful are these soils for agriculture?
2. *Physical Systems* How does modern farming technology affect European agriculture?
3. *The Uses of the Geography* How did the growing importance of oil as an energy source in the 1900s affect Europe?

Critical Thinking

4. **Problem Solving** How might Europeans lessen their dependence on imported oil?

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Organizing What You Know

5. Copy the chart shown below. Use it to list Europe's main energy resources and where they are found. Add as many rows as you need.

Energy source	Location