



# Environment and Society

Social Studies School Service

Learning about the environment means investigating the give and take between humans (and human activities) and the natural world. How do people impact the natural environment? How does the natural environment affect people and help them make choices? What role do natural resources play in shaping people's decisions and actions? These are some of the questions that this presentation will address.



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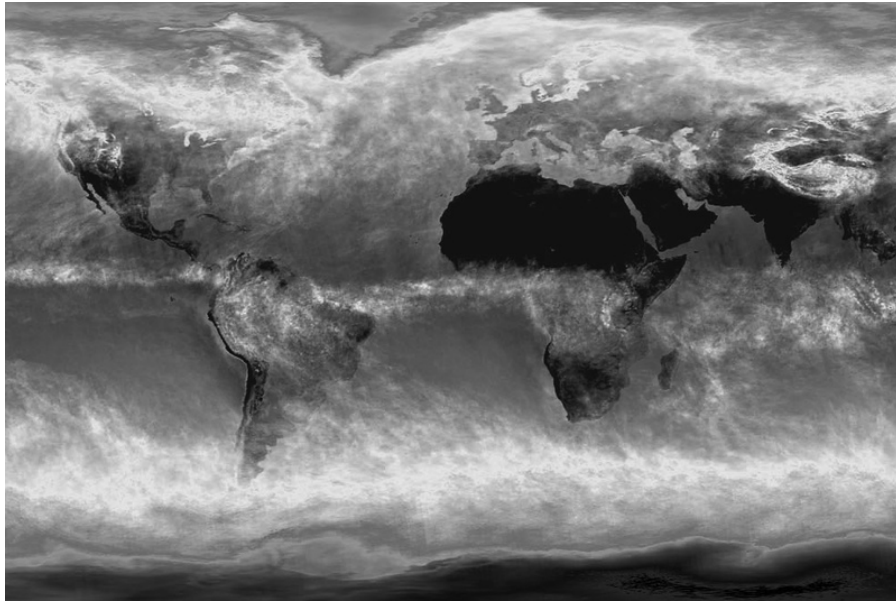
### **Geography Standard 14**

People impact the physical environment in many ways, with results ranging from harmless to devastating. Each of the earth's four basic components—atmosphere, hydrosphere (water), lithosphere (soil and rock), and biosphere (life)—has been and continues to be greatly affected by human activities.



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Cars, industry, and smaller machines such as lawn mowers all contribute to air pollution, such as this smog over the city of Houston. Smog results when chemicals and particles (such as nitrogen oxides) mix together in the lower layers of the atmosphere. Burning fossil fuels such as coal and oil causes most of the smog in U.S. cities.

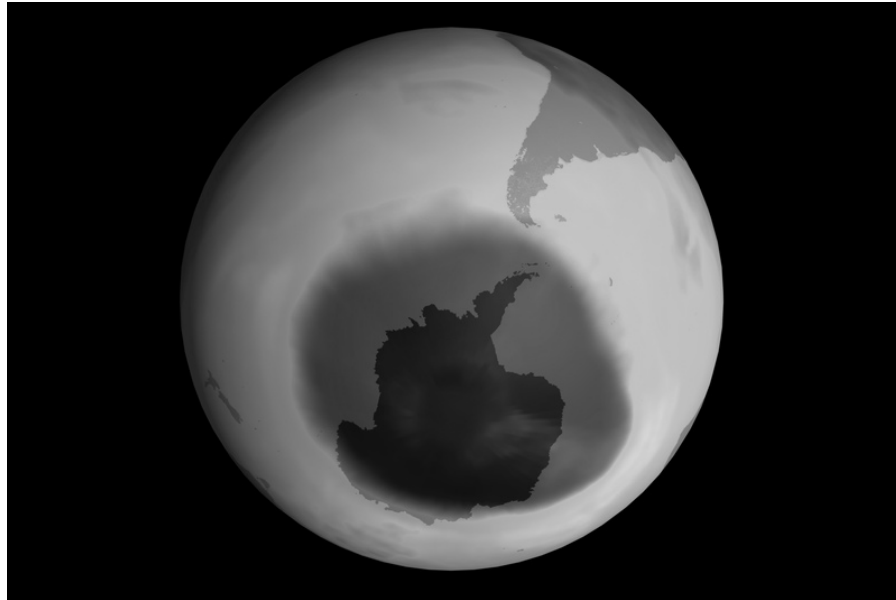


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Over the past several years, scientists have discovered that the earth's temperatures are rising at faster rates than they have since the end of the last ice age (about 10,000 years ago). This phenomenon is known as "global warming"; scientific evidence overwhelmingly suggests that human activities are in large part responsible.

Global warming occurs when emissions from the use of fossil fuels (such as gasoline exhaust from cars and emissions from coal-burning power plants) rise into the air and get trapped in the atmosphere by a phenomenon called the "greenhouse effect." The greenhouse effect, a normal function of our atmosphere, reflects heat radiated from the earth's surface back to the earth and prevents it from escaping into space. This process helps keep our planet's temperatures moderate enough for us to withstand. When the earth's surface emits increasing levels of heat, however, the greenhouse effect contributes to a gradual increase in the planet's temperatures—global warming.





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Fossil fuel emissions have also caused a hole in the ozone layer over Antarctica. Ozone, a molecule that contains three oxygen atoms, can be both good and bad for our planet, depending on where it's situated in the atmosphere and how much of it there is. On a smoggy day, you might hear that the "ozone level" is particularly high. Ozone occurs as a part of smog; when it's close to the ground, it causes irritation to the eyes and lungs. This is the "bad" ozone.

"Good" ozone exists in the stratosphere, high above the earth's surface. At this altitude, ozone traps ultraviolet radiation coming from the sun and thus protects the earth's inhabitants from receiving too much of this potentially harmful radiation. The ozone hole occurs when human-made chlorofluorocarbons (CFCs) deteriorate the stratospheric ozone. CFCs appear in numerous products, including many aerosol sprays and chemicals used in refrigerators and air conditioners. People living in Australia and New Zealand, where the ozone hole is particularly noticeable, are subject to worse-than-usual sunburn.



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Global warming also causes an increase in the temperatures of the earth's oceans and gradually melts glaciers and oceanic ice. Scientists have made various predictions of what might occur if this trend continues, but most scientists agree that global warming poses a looming threat to our planet.



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In addition to global warming, the earth's oceans suffer from pollution because people dump things into it like oil, garbage, and other toxins. In addition, people also dump waste into rivers, lakes, and other bodies of fresh water—many of which eventually flow into the oceans.



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Since many people live near rivers and other bodies of water, water pollution poses a major problem throughout the world. In many regions, people bathe, wash clothes, and drink from the same rivers into which raw sewage is deposited. This not only contributes to serious health problems but also degrades the quality of water in the rivers, which in turn pollute the lakes and oceans into which they flow.



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Agriculture impacts the earth's hydrosphere (water) and lithosphere. Water runoff from farms usually contains fertilizers, pesticides, and animal waste that can easily contaminate rivers, lakes, and groundwater. All agricultural practices impact the soil (lithosphere) in some way.



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We can see one example of how agriculture affects soil by examining the ground in tropical areas, which tends to have red, muddy, clay-based soil with few nutrients. When people cut down trees and attempt to farm the land, the nutrient-poor soil can only provide a few years of productive crops. After exhausting all the nutrients in a particular patch of land, people abandon their farming efforts there and move on. At this point, erosion from rain becomes a major problem because the depleted soil no longer has any vegetation to hold it in place. Rain therefore easily washes the soil into rivers, contaminating the water.



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Although deserts formed and disappeared for millennia before people inhabited the earth, human activities have had a significant impact on the world's deserts—particularly the areas at desert edges. For example, livestock pound down desert soil with their hooves, making it more difficult for the soil to absorb water and increasing the likelihood of erosion. Grazing and firewood collection further deteriorate the desert ecosystem by removing plants that keep the soil in place.



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When people clear land for wood extraction, farming, building, or other purposes, they expose the soil. Rain or wind can then cause this soil to erode, leaching away its nutrients and polluting nearby water sources. “Clear-cutting,” a logging practice in which all the trees in an area are removed (as shown in the photo in this slide), leaves the soil particularly susceptible to erosion.





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Logging changes the biosphere dramatically by reducing or eliminating the trees in a forest and therefore diminishing the habitat of forest species.



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Agriculture affects the biosphere as well as the hydrosphere and lithosphere. Clearing forests to make room for farmland deprives many species of their natural habitat. Crops provide a habitat for some of these creatures but are not generally suitable for the majority of native species, which rely on trees and other forest plants. Farm animals create waste and sometimes overgraze the land, making the soil even more susceptible to erosion. In addition, fertilizers and pesticides may harm animals and plants that live in or near a farm.



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According to the World Wildlife Fund, an estimated five to 15 million species exist on earth today, including plants, animals and microorganisms. Scientists have yet to identify most of these species. Many species disappear each year, due in large part to loss of habitat. Human activities such as farming, logging, and urban and suburban development contribute to this habitat loss on a daily basis around the world.



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Ever since people began traveling, they have inadvertently introduced species from one ecosystem into another. Sometimes this doesn't cause any harm, but much of the time it wreaks havoc on the new ecosystem. Creatures already in the ecosystem are not accustomed to the newly-introduced species and become susceptible to being eaten, outcompeted, or otherwise destroyed by the new species.

For example, the fungus that causes Dutch elm disease arrived in a shipment of logs from Europe to the United States in the early 20th century. Earlier, it had been transported to Europe from the Himalayas in Asia. By 1970, the disease had killed 77 million American elm trees, dramatically changing the appearance of countless small towns throughout the eastern and central parts of the United States.



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Think about human activities that you've witnessed, such as suburban development; driving cars, SUVs, and trucks; and recreational activities. How do these actions impact the environment? Specifically, how do they affect air and water quality, ecosystems, and soil? What are some high-impact and lower-impact ways in which the activities shown on the next two slides can be done?



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**Social Studies School Service**



**Social Studies School Service**

Human activities in one area can lead to changes to the environment in an area far away. For example, acid rain results from sulfur and nitrogen emissions that concentrate in raindrops. Coal-burning power plants in the northeastern United States emit sulfur dioxide and nitrogen oxides, but the acid rain these emissions produce generally falls downwind from these plants, sometimes several hundred miles from where the emissions occurred. The photograph in this slide shows trees damaged by acid rain. The trees are in Great Smoky Mountain National Park in Tennessee and North Carolina, but the contaminants that caused the acid rain probably originated north of the park.

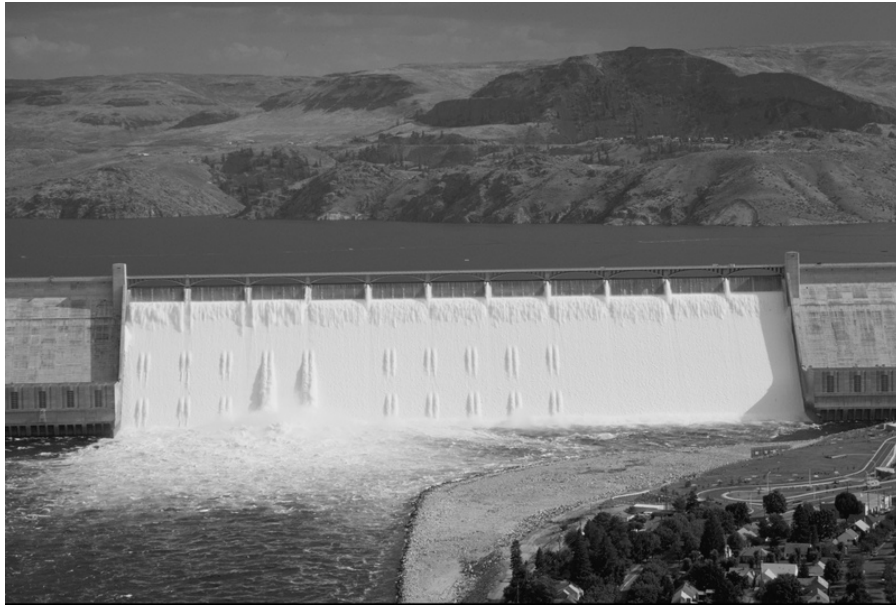




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Watershed pollution offers another example of how human activities in one area can impact far-away locations. “Watershed” refers to the entire land area that drains into a river, stream, or other body of water. For example, all ponds, streams, rivers, and other waterways that ultimately drain into the Los Angeles River are part of that river’s watershed.

If people pollute the water in several mountain streams that form part of a river’s watershed, the pollution can make it all the way into the major river. That river in turn flows into a lake, another river, or the ocean, sending the contaminants into those bodies of water. Multiple pollution sources throughout a watershed can therefore have a significant impact on water quality in the ocean.



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Dams produce particularly significant effects on the environment. The area immediately upstream from a dam construction site gets flooded when the dam is finished, destroying habitats and often forcing people out of their homes. Downstream from the dam, water levels change, altering the river ecosystem for miles. People who live downstream also will have less access to water than they did before the construction of the dam.

Dams can, however, have positive environmental impacts. They generate electricity by means of hydropower, thus reducing the need for the fossil fuel consumption that causes air pollution. They also help control flooding by allowing people to manipulate the amount of water that flows through the dam.



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Technology has allowed people to modify the environment in many significant ways. In prehistoric times, harnessing fire allowed people to migrate to colder climates, where they subsequently caused changes in the environments of those places. Fire also allowed people to cook food and make more sophisticated weapons and tools, which led to further environmental changes.



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Early agricultural inventions such as the simple wooden plow enabled people to till the land and grow crops on large plots. These practices altered the ecosystem, soil, and water of the places people farmed.

The domestication of animals paved the way for advances in farming technology, since animals could pull plows and perform many other tasks that people previously had to do themselves.



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Technological innovations of the Industrial Revolution greatly expanded people's ability to modify the physical environment. Steam and diesel engines, electricity, and computers have enabled humans to drastically change the world around them. Sometimes these changes are intentional, as when people use machinery to clear brush from their homes for fire prevention or to construct artificial ecosystems in urban areas. More often, the changes result from activities intended to have other effects, such as dam-building (for electricity and flood control), the conversion of farmland into suburbs, and the enjoyment of outdoor recreational activities such as boating and motorcycling.



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In recent decades, technological advances have had a major effect on agricultural practices. These changes have subsequently impacted the natural environment both on farms and in places far away from farms.

The ability to synthesize agricultural chemicals for use as pesticides has helped farms become more productive and profitable than in years past, but it has also contributed to the contamination of waterways, ecosystems, and human farmworkers. Chemicals used on a farm can get into the watershed and travel hundreds of miles to pollute distant lakes and oceans. In addition, when people eat food treated with chemical pesticides they ingest some of the pesticides.



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Recent technologies have allowed scientists to genetically modify many farm crops to make them more resistant to pests and drought. This practice has provoked great controversy in Europe and, to some degree, in the United States. Although they might be better to grow than “conventional” crops, some fear that genetically-modified crops might mix with wild or non genetically-modified plants and alter the genetic composition of species crucial to ecosystems. Some people also have concerns about the possible health consequences of eating genetically-modified foods.



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Other recent technologies work to improve conditions in the physical environment. For example, attaching “scrubbers” to existing coal-burning power plants helps to filter the plant’s emissions before they get released into the atmosphere. Similarly in an attempt to reduce air pollution, some people have developed automobiles that operate on alternate energy sources such as vegetable oil. As of yet, none of these cars have proven cost effective or convenient for consumers; consequently, you’ll rarely see one on the road.





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What examples of technology's impact on the environment can you think of?



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### **Geography Standard 15**

While it's often obvious how people have modified the physical environment, it's not quite as easy to see how significantly the environment affects us. To realize the importance of the environment's influence on humans, just think about the types of crops that can be grown in your region, the types of housing people live in, and the activities you can and can't do outdoors in your area. If you live in cold and arid Wyoming (pictured in this slide), you won't see many vineyards or orchards but you will be able to ice skate outdoors in the winter, which residents of Arizona cannot do. Similarly, builders in Phoenix typically construct houses from light-colored material that reflects the bright sun, while houses in rainy Oregon use darker colors and wood to absorb as much sunlight as possible. These differences also reflect the building materials readily available in these areas.



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Thatched huts commonly appear in the tropics because of the abundance of palm trees to make the roofs.



**Social Studies School Service**

People in northern latitudes and mountain areas commonly build houses of wood, reflecting the abundance of hardwood trees in these regions.



**Social Studies School Service**

Adobe is popular in the American Southwest because it cools the house in the scorching summertime and can be made from local materials.



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Many factors can limit growth in an area. For example, deserts are too dry to support most kinds of crops without intensive irrigation. Tropical rainforests have soil low in nutrients, making them bad places to farm.

What limiting factors exist in the region where you live?



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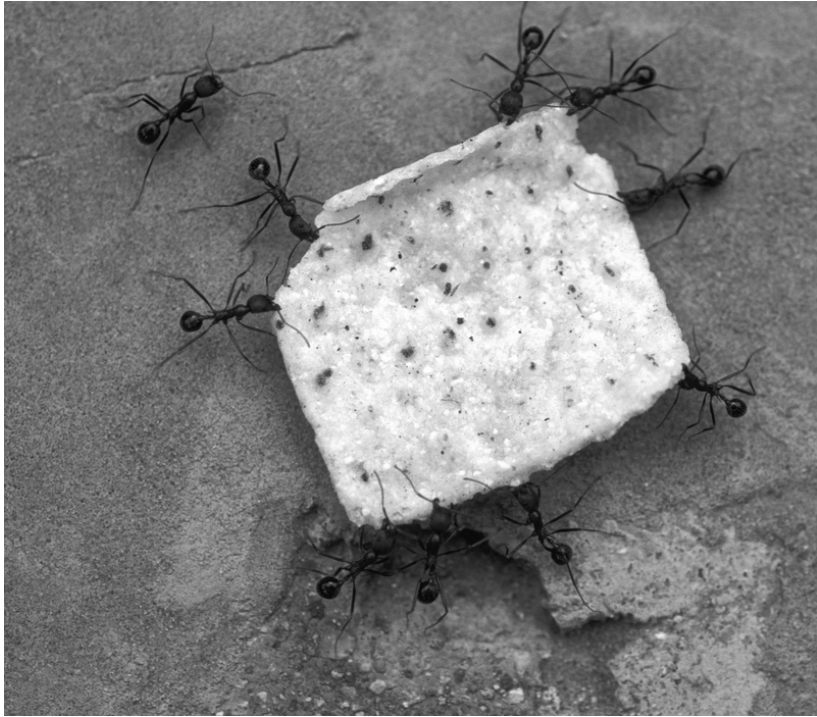
Technological advances have made it easier to overcome many of these limitations. Irrigation and fertilizers allow people to farm in the Arizona desert; air conditioning lets people live in hot places even if they don't build their adobe homes; and inhabitants of tropical rainforest areas can take advantage of transportation and communication technologies that enable them to sell rain forest products to the global market. In turn, this allows them to leave their forest homes intact instead of cutting them down to cultivate crops.



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Agricultural practices vary in different parts of the world. Some of these differences result from cultural traditions, but the differences also reflect limitations and opportunities that exist in the local environment. For example, early Native Americans grew corn because it grew in its wild form in the regions they inhabited and they were able to domesticate it into a suitable crop. North American farmers continue to farm corn, which grows well throughout much of the continent.





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Think about the ways in which people react to changes in their environment. For example, how do people cope with drought, extreme cold, or insect/rodent infestations?



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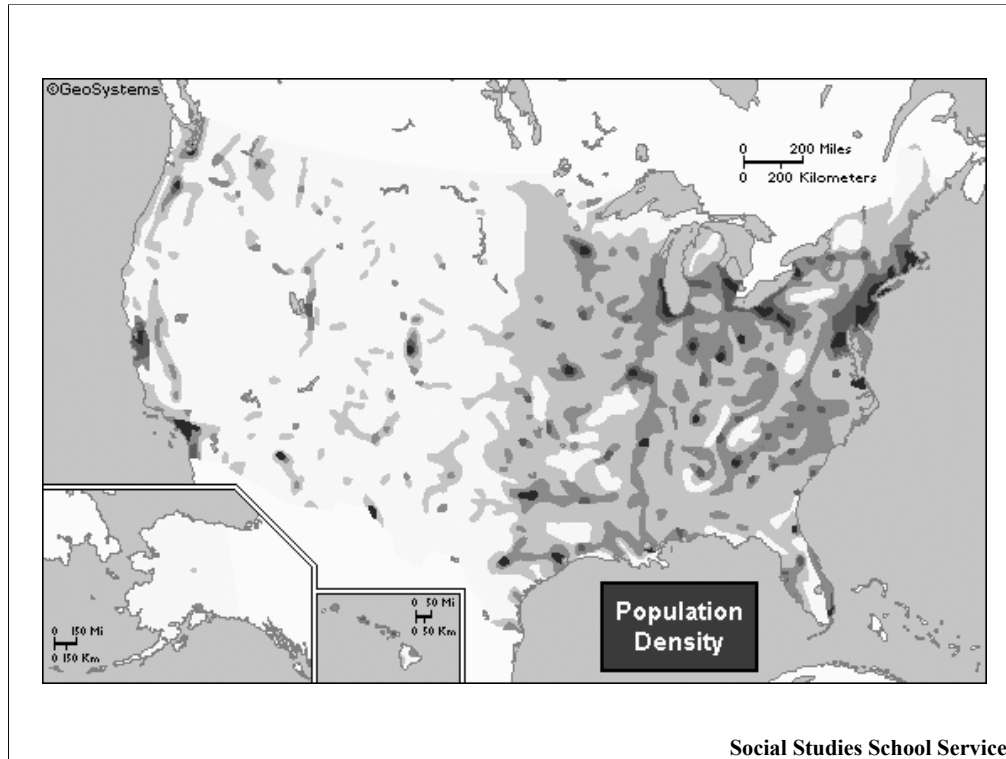
How do you think overuse of the environment can affect people's ability to live and work in a place? One example of overuse involves overcultivation of a field. Growing the same crop on a field too many years in a row can cause the soil can lose its nutrients and produce lower-quality crops in successive years. Another example: overharvesting of forests depletes trees more rapidly than they can be replenished. How do you think this affects the lives of people who live in or near the forest or who rely on its products?

What other examples of overuse can you think of?

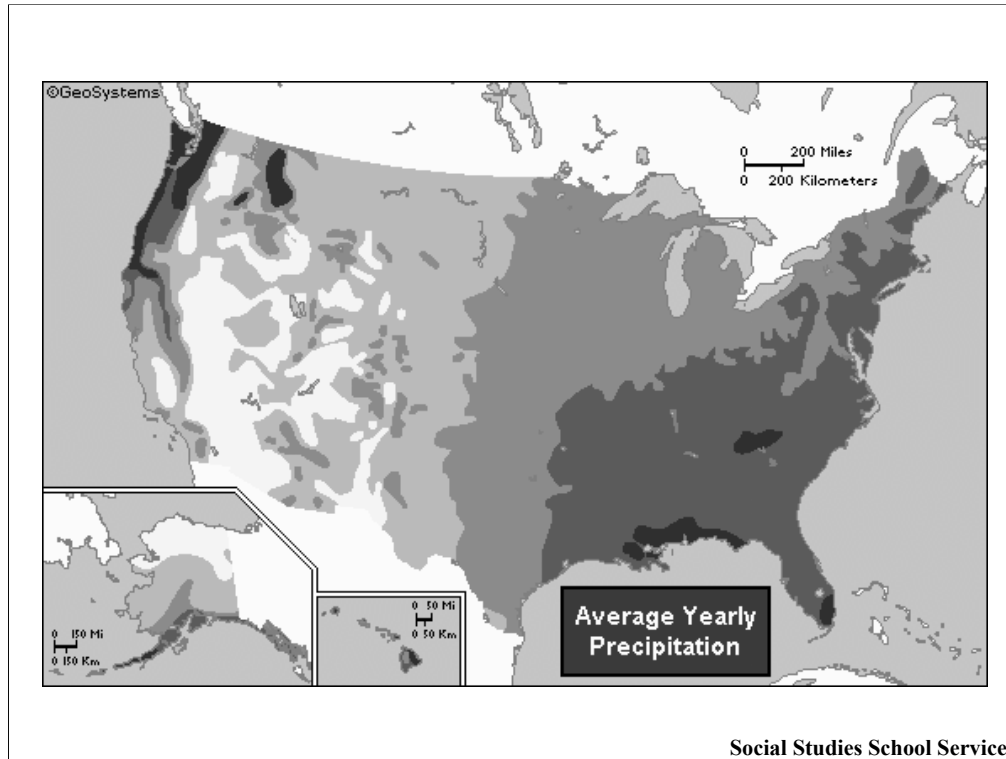


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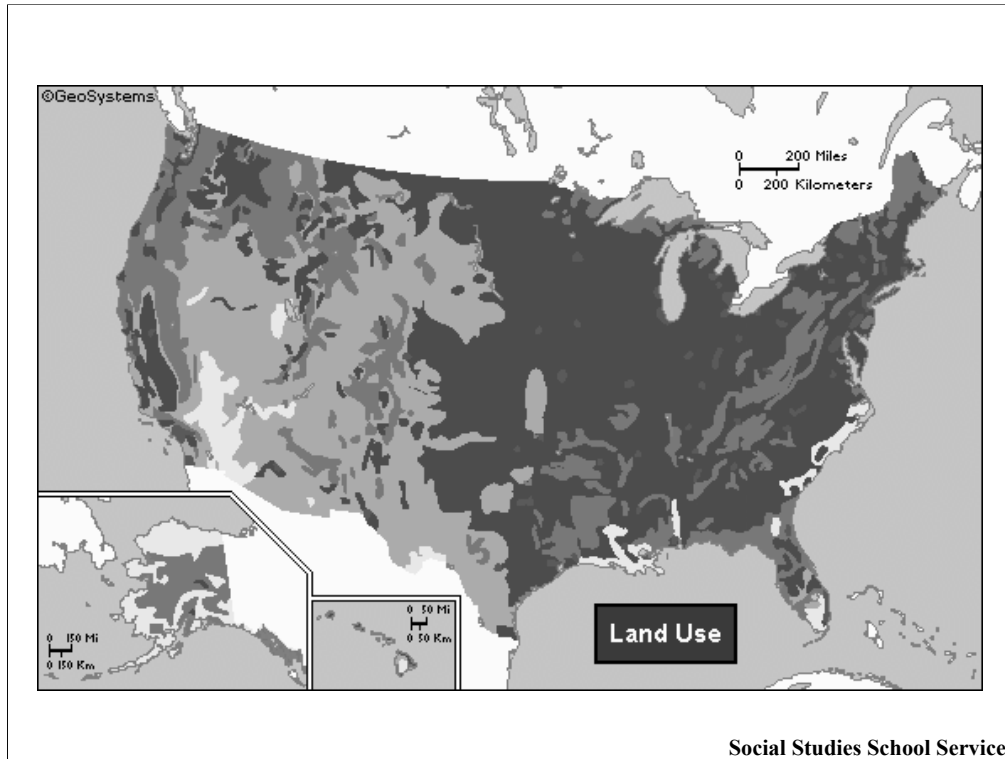
What role might the environment play in determining where people settle and conduct business? What features of the natural environment encouraged or discouraged early settlers from establishing homes in your region? What factors might attract you to or keep you from a place today?



The relationship between human settlement and the physical environment can be clearly seen on some simple thematic maps. This map shows the population density of the United States, with the lighter shades representing areas of lower density than the darker shades. Compare this map to the maps on the next two slides.



This map shows average annual precipitation in the United States. The lighter the shade of blue, the less precipitation a region receives. What relationship between settlement and precipitation do this map and the previous one reveal? Why do you think this relationship exists?



This map shows land use, with the following color-coded legend:

- dark green: farming
- lighter green: forestry
- orange: grazing
- red: manufacturing
- tan: little-used land

How does this map compare to the two previous maps showing population density and precipitation? Why do these relationships exist?



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Natural hazards also have a significant impact on human life, but people have found numerous ways to cope with and prepare for these hazards. For example, inhabitants of lands at or below sea level, such as the Netherlands, have developed a system of dikes and sea walls to keep water out of settled land and drainage systems to remove unwanted water from the land. People in earthquake-prone areas such as California and Japan often use special construction techniques to strengthen their buildings in the event of an earthquake.

Can you think of any special ways in which the people of your region prepare for or respond to natural hazards?



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People live in many places considered hazardous, such as directly below volcanoes, on hills prone to mudslides, and on riverbanks susceptible to annual flooding. Often, the people living in these vulnerable areas are the least affluent members of society who cannot afford to live in a safer location or to “disaster-proof” their homes. This fact too often leads to tragedy, as in 1998 when Hurricane Mitch caused several deaths in Honduras.





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### **Geography Standard 16**

People extract natural resources such as oil, coal, gold, diamonds, aluminum, and numerous other minerals and metals, for many purposes. The location of these resources has played a large part in determining where people settle, where businesses are located, what types of businesses develop, and what people do for a living.



**Social Studies School Service**

Gold can be found in many parts of the world, including the western United States.



**Social Studies School Service**

South Africa is famous for its diamonds.



**Social Studies School Service**

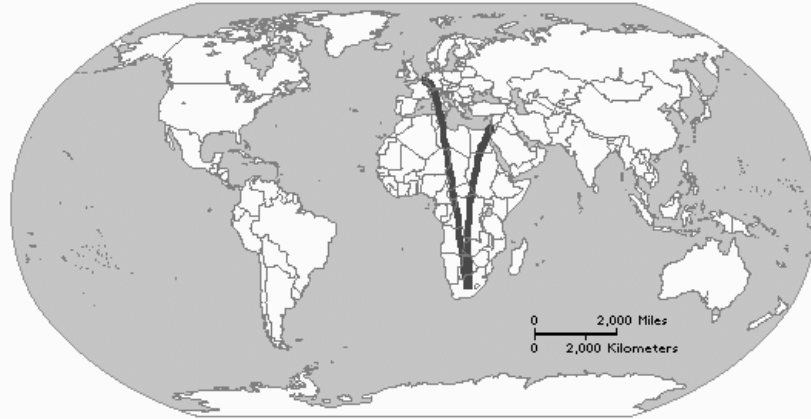
You're probably aware that the Middle East has abundant reserves of oil. Did you know that large oil deposits also exist in northern South America (particularly Venezuela), Indonesia, Alaska, and other parts of the world?



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Coal also occurs in various parts of the world, including Colorado and West Virginia in the United States. Coal mining is an important occupation today in China.

## The World



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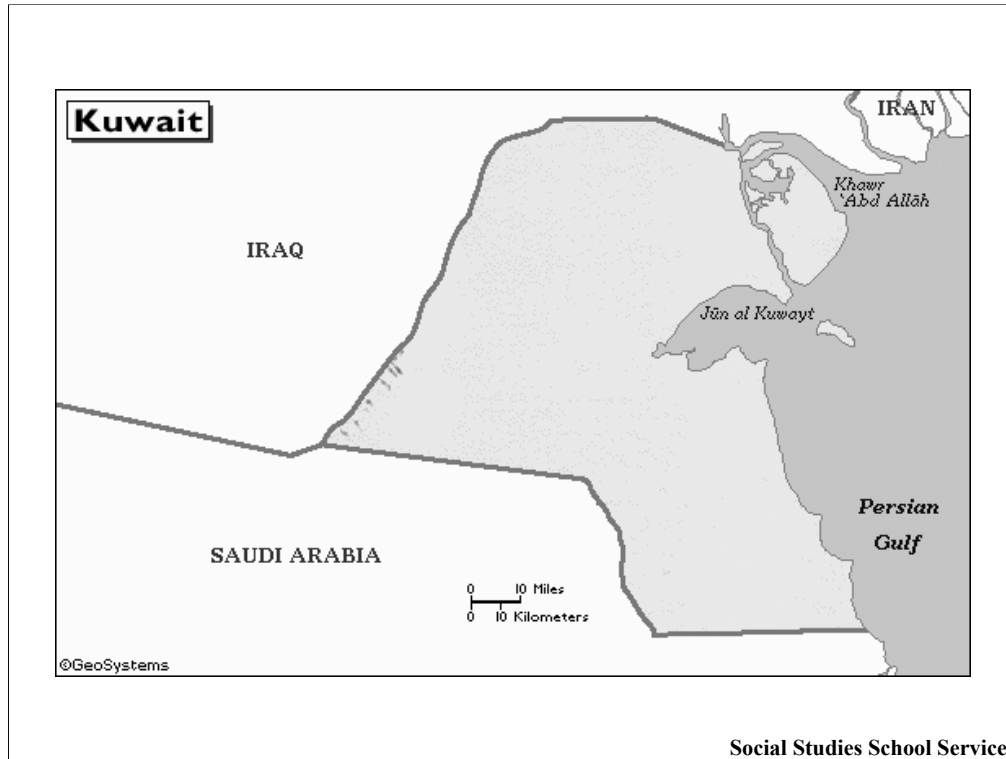
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The business of extracting, processing, and marketing natural resources depends in large part on the ability to transport the raw materials to processing centers, which convert these materials into products that governments, businesses, or individuals want to buy. For example, South Africa commonly sends its diamonds to Belgium or Israel for processing.



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It would seem logical to think that a country with plentiful natural resources would be an affluent one, with a high per capita income and standard of living. This is often not the case. The presence of a valuable resource does not mean that the people of a country have access to that resource or receive the monetary benefits its extraction provides. Some countries lack the funds to build a suitable infrastructure to extract their natural resources. Frequently, international corporations and a country's own government control natural resource extraction, and the financial benefits of the extraction do not reach the average person in the country. For example, South African diamond miners are typically very poor men who live in compounds near the mines, working long hours for little pay.



When “regular” people do manage to benefit significantly from their country or region’s natural resources, they typically have a higher standard of living than they would if those natural resources did not exist in their area. For example, the tiny country of Kuwait is a major oil producer and also has a relatively high per capita gross domestic product (GDP) of \$18,100, while the per capita GDP in neighboring Iraq is only \$1600. Although Iraq has abundant oil reserves, its political situation has prevented its oil wealth from spreading to the bulk of the country's residents.

Another example: In the state of Alaska, all residents receive an annual dividend of \$1100 from the state’s oil wealth account. This dividend is particularly helpful to residents of very remote regions that have limited cash economies.





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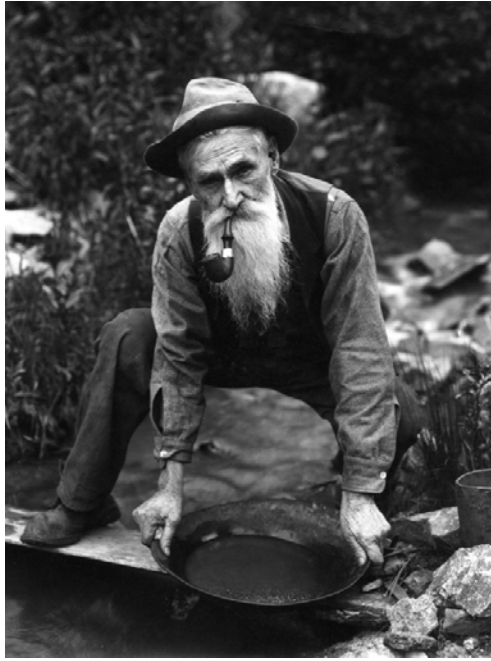
Some countries or regions rely almost exclusively on a particular natural resources for their economic stability and growth. What do you think might be some challenges for these places? What might happen if the natural resource became depleted or if difficulties arose in the ability to distribute or sell that resource?



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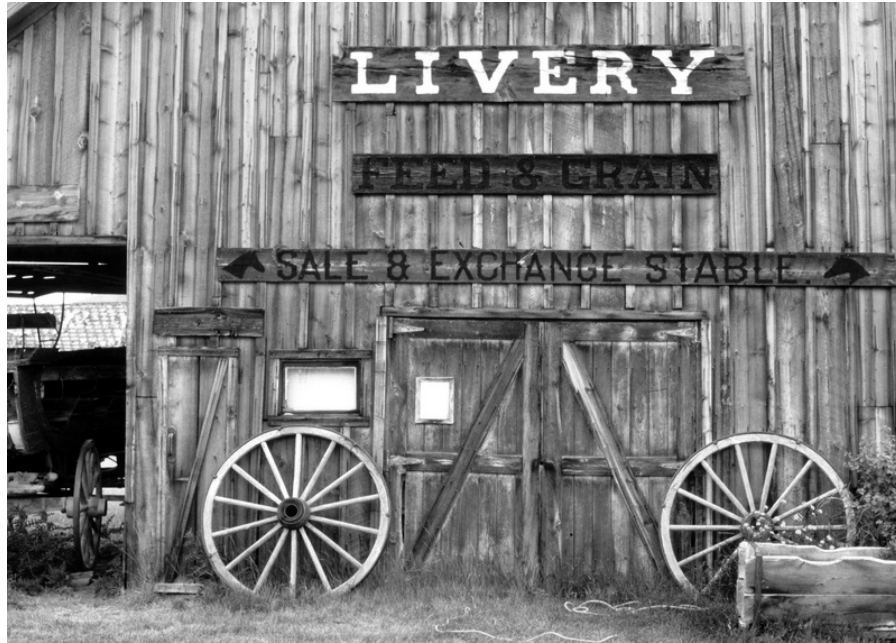
Access to natural resources can act as a major cause of conflict both within and between countries. For example, Iraq invaded Kuwait in 1990 in part because it wanted territory that was rich in oil and offered access to the Persian Gulf.

Another example: Indigenous communities and large oil corporations have struggled for control of resources on the indigenous communities' lands. This has occurred in many countries, including Venezuela and Nigeria. The corporations typically work with national governments, making it very difficult for the indigenous groups to retain access to and profit from their land's resources.



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The discovery of natural resources led people to settle in many locations that they might otherwise have passed. California, Colorado, and Alaska all attracted large numbers of people to remote areas that had gold reserves, although very few miners actually “struck it rich.”



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Very shortly after the discovery of gold at Sutter's Mill in the California mountains in 1848, thousands of men began to arrive from the East to try their luck at the gold mines. An infrastructure rapidly developed to search for, extract, and transport the gold. Merchants also set up businesses to serve the miners: general stores carried tools, clothing, and other supplies; livery stables sold and took care of horses and mules; and saloons provided weary gold seekers with alcohol and entertainment. Entire towns arose around the economy created by the mines.



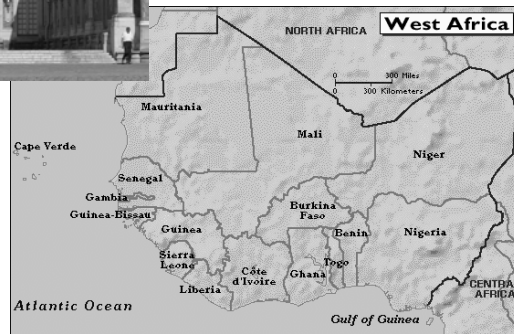
**Social Studies School Service**

Once the gold started to run out and miner's yields became smaller and smaller, these businesses and towns began to fade. In a short period of time, many settlements in the Sierra Nevada mountains became "ghost towns," with most or all of their inhabitants leaving to pursue more lucrative ventures elsewhere.

This pattern of boom and bust repeats itself wherever a nonrenewable natural resource is discovered in abundance, extracted in large quantities, and then either becomes depleted or loses its market value.



**France's Palace of Versailles**



**West Africa, colonized primarily by France**

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European countries sought colonies not only to enhance their international standing, but also to gain access to natural resources. Europeans searched for and “discovered” resources such as spices, rubber, and gold in the Americas, Africa, and Asia. They also established colonial governments to control the extraction and transport of these materials.

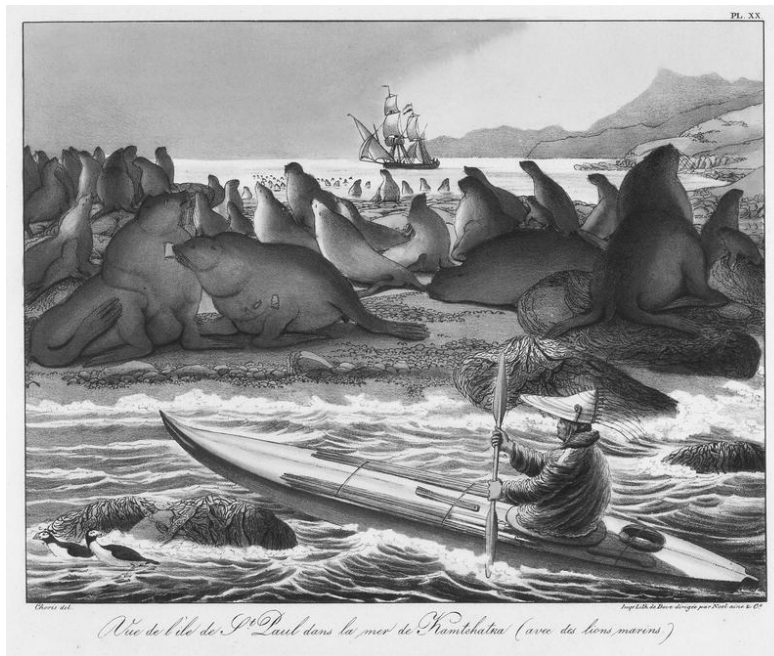


**Christopher  
Columbus**

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Other well-known historic quests for natural resources include Christopher Columbus, the Spanish Conquistadors, and Russian fur hunters.

Columbus initially sought a western route to the East Indies, where he hoped to find riches in “exotic” spices such as black pepper and cloves. Instead, he found a series of islands previously unknown to Europeans and caught a glimpse of the South American continent. Columbus quickly realized that there was gold in these lands. His four voyages paved the way for additional exploration of South America, North America, Central America, and the Caribbean Islands; however, he also laid the groundwork for Europeans to colonize the Americas and exploit the “New World’s” people and resources.



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The Russians hunted seals and sea otters for their pelts, which they then sold in large numbers to the Chinese. This hunting occurred in the cold waters of Siberia and Alaska. Russia established trading posts and towns in Alaska during the 18th century and indentured Aleutian natives to hunt the animals.





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Natural resources change in value over time, affecting businesses that extract and sell them. For example, salt was at one time highly prized and worth a lot of money in Europe. The ancient Greeks traded slaves for salt, and the Roman government gave its soldiers salt rations called *salarium argentum*, which is the source of our modern English word “salary.” Today salt mines still exist throughout the world, but salt is very inexpensive and gets taken for granted in most places.



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For human settlements to succeed, they need to be located close to reliable energy sources. In the past, this meant living near a forest that provided firewood. In modern times, it means different things in different parts of the world. In some parts of the developing world, people still depend on forests; in Westernized countries, most people try to live in locations that offer easy access to the infrastructure that provides energy via electrical plants, gas lines, etc.



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Imagine how your life would differ if you did not live in a home hooked up to the electrical grid and to gas lines. What types of energy would you use to heat your home and to operate appliances?



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What would our society be like today without the energy sources we take for granted? What if there were no coal, oil, or natural gas to heat our homes, fuel our ovens, propel our cars, and power our electrical plants? Do you think we would live the same lifestyles as we do today? What types of alternate energy sources might we use?



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In addition to fossil fuels (coal, oil, and natural gas), the United States and many other parts of the world also use nuclear energy. It provides about 20 percent of the electricity used in the United States. Some people refer to nuclear energy as “clean energy” because it doesn’t emit sulfur and other byproducts of fossil fuels into the air; however, the production of nuclear power carries other dangers. Since nuclear plants use radioactive materials (such as uranium), some people fear that radiation leakage or a catastrophic “meltdown” could occur. Also, the issue of where to deposit nuclear waste has become increasingly pressing and generated a great deal of controversy. In high enough doses, exposure to radioactive materials can kill a person; lower doses can lead to cancer, radiation sickness, or other maladies.



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It's common to hear about "alternate" energy sources such as solar, wind, hydro (water), or geothermal energy. All of these methods of harnessing energy are "renewable," which means that they depend on energy from sources that most likely won't be depleted any time while humans inhabit the earth.

The photograph in this slide shows solar panels in the desert. Solar energy is clean and harnesses a virtually limitless source of energy—the sun.



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These windmills harness energy from the wind. Not surprisingly, they generally exist in locations that receive a lot of wind, such as on the desert or plains. Wind is another source of renewable energy—as long as weather as we know it continues to exist, we'll have wind.



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Dams generate hydroelectric power (also known as hydropower). Dams range in size from large ones such as the Glen Canyon dam (pictured in this slide) to smaller ones that provide energy to a much more limited area. We characterize hydropower as renewable because, unless a major drought or climatic event intervenes or another dam gets built upstream, the river that powers the dam is not going to stop flowing. Dams can, however, generate some environmental problems, as described previously.





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Geothermal energy comes from the earth's interior, which is extremely hot. It usually surfaces as steam, which people can use to power turbines that create electricity. Iceland, which is located over a "hot spot" and has many hot springs and geysers, relies much on geothermal energy.



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Which of these alternate energy sources do you think would be the most suitable for your area? Do you think efforts should be made right now to harness this energy? What might be the pros and cons of doing this?



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Earlier in this presentation, you learned about global warming. Conservation of fossil fuels and increased use of alternate energy sources are two good ways to combat this developing problem.

Saving electricity, reducing trips in cars or trucks, and buying more fuel-efficient vehicles all represent important steps individuals can take to help lessen global warming.

Increasingly, utility companies have started to offer consumers the option of purchasing some of their electricity from alternate energy sources. This practice can help reduce the use of the fossil fuels that contribute to global warming.



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Recycling or reusing materials and conserving water and energy are also important ways that can have an impact on the environment.

Numerous items and materials can be recycled, including aluminum (soda cans), paper, glass, and plastic.

Recycling does have its limitations. For example, recycling plastic is an expensive process, and many recycling facilities only recycle one or two types of plastic, leaving the rest for the landfill. Additionally, most recycled plastic gets turned into nonrecyclable materials such as textiles or plastic lumber, and thus does not help to reduce the manufacture of new plastics (which are made from petroleum) for packaging. Because of these limitations, the best way to reduce the production of plastic is to limit the amount of plastic you purchase. This practice, in turn, reduces the amount of petroleum used to produce new plastic materials.



**Social Studies School Service**

In environmental terms, the word “sustainable” means capable of being maintained without harming the environment and without depleting the environment’s resources.

The extraction of natural resources can be accomplished with varying degrees of sustainability. Clearcutting forests, for example, removes all trees from a given area, ensuring that it will take a long time for the forest to regenerate and leave the soil vulnerable to erosion. This is an example of less sustainable resource extraction. Selective logging involves taking only certain trees out of a forest area and leaving other ones to continue growing. If done properly, this practice helps prevent erosion, preserve habitat, and maintain the overall integrity of the forest. This is a more sustainable method of forestry than clearcutting.



**Social Studies School Service**

Think about activities that you do or are familiar with. Which ones are more environmentally sustainable? Which of your favorite activities might be more damaging to the environment than others? Can you think of ways to make these activities more sustainable while still enjoying them?