

GEOGRAPHY STANDARD 16: The changes that occur in the meaning, use, distribution, and importance of resources

Image credit: Mary Claire May

Large-scale processing equipment at the Black Thunder Mine in the Powder River Basin of Wyoming extracts and moves approximately 10 percent of the total US coal production each year.



Image credit: Mary Claire May

Large turbines use wind as a flow resource in the production of electrical power at a wind farm near Palm Springs, California.

The geographically informed person must understand that a “resource” is a cultural concept. A resource is any physical material constituting part of Earth that people need and value. Natural materials become resources when humans value them. The uses and values of resources change from culture to culture and from time to time. Resources are spatially distributed varying in quantity and quality. Some resources are finite, while others can be replenished at varying rates. However, humans need to balance short-term rates of use against long-term availability to ensure a sustainable future.

Therefore, Standard 16 contains these themes: Types and Meanings of Resources, Location and Distribution of Resources, and Sustainable Resource Use and Management.

Three basic resources—land, water, and air—are essential to survival. The characteristics and quantity of a resource are defined by whether it is a renewable, nonrenewable, or flow resource. Renewable resources can be replenished if their environments remain intact. Nonrenewable resources can be extracted and used only once. Flow resources, such as water, wind, and sunlight, must be used when and where they occur because they are neither renewable nor nonrenewable.

Resource location influences the distribution of people and their activities. People settle where they can make a living and where the needed resources are available—resources such as fertile soils, potable water, fuel, and building materials. The patterns of population distribution resulting from the relationship between resources and employment change as needs and technologies change. New technology alters how people appraise resources, influences where they live and work, and affects how economic systems adapt.

Students must understand how and why resources are valued, why they cause fierce competition among countries, and how resources are distributed across Earth’s surface. In addition, they must recognize that maintaining renewable resources at a sustainable level is a local and global responsibility.

Sustainable resource use and management is a key solution to many ecological problems. Understanding these three themes enables students to address a fundamental question: In the absence of regulation and prudent public policy, can our present industry-based and consumer-oriented lifestyle continue without causing irreversible ecological damage and perhaps even ecological collapse?

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4th GRADE

the student knows and understands:

Types and Meanings of Resources

1. The characteristics of renewable, nonrenewable, and flow resources

Therefore, the student is able to:

- A. Identify and explain the characteristics of renewable, nonrenewable, and flow resources, as exemplified by being able to
 - ▶ Explain the meaning of the term “resource” and then illustrate the idea of renewable, nonrenewable, and flow resources by sorting example photographs into each of the three categories.
 - ▶ Identify the types of energy resources that students and their families use in their everyday lives and then categorize each as renewable, nonrenewable, or flow resources.
 - ▶ Identify the types of nonrenewable resources students and their families use in their everyday lives and identify renewable and flow resources that could be used instead of nonrenewable resources.

8th GRADE

the student knows and understands:

Types and Meanings of Resources

1. People can have different viewpoints regarding the meaning and use of resources

Therefore, the student is able to:

- A. Describe examples of how cultures differ in their definition and use of resources, as exemplified by being able to
 - ▶ Describe differences in the types of resources used in different geographic contexts in various parts of the world (e.g., the use of wood or animal dung versus electricity or natural gas as a cooking fuel, the use of electrical appliances versus doing household chores by hand).
 - ▶ Describe the size and effect on the environment of the ecological footprint of an US school student versus a young person living in a rural area of a developing country.
 - ▶ Describe how cultures value things differently in terms of resource use (e.g., Old Order Amish choose not to use petroleum and electricity, Muslims and Jews choose not to use pork as a food source, many cultures around the world choose not to use insects as food source).

12th GRADE

the student knows and understands:

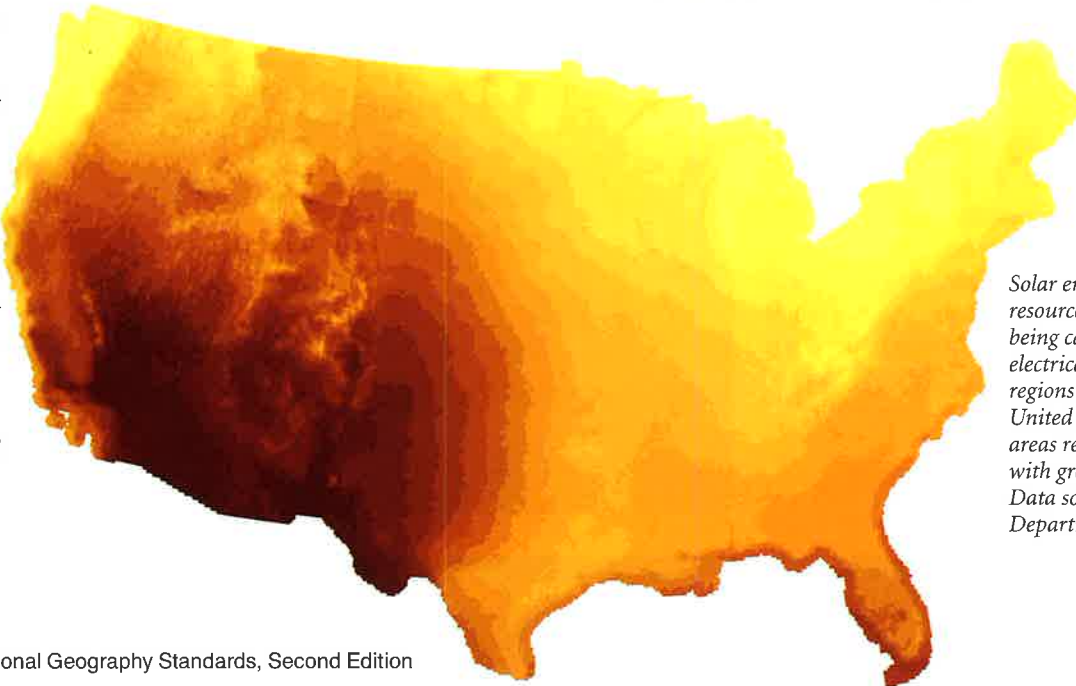
Types and Meanings of Resources

1. The meaning and use of resources change over time

Therefore, the student is able to:

- A. Explain the relationship between the quest for resources and the exploration, colonization, and settlement of different regions of the world, as exemplified by being able to
 - ▶ Describe the Columbian exchange of plant and animal resources and explain how this exchange changed patterns of food consumption around the world (e.g., the introduction of cattle and beef consumption throughout the Americas, the introduction of potatoes as a staple food across northern Europe and parts of Asia, the introduction of corn as a staple food across southern Africa).
 - ▶ Identify different types of resources (e.g., precious metals, spices, animal products) that drove the 15th- to 20th-century European process of exploration and colonization in North America, Africa, and Asia, and explain how this process influenced the spatial distribution of European colonies on those continents.
 - ▶ Describe and explain how the prospect of gaining access to resources in the Arctic and Antarctic regions creates competition among countries with territorial claims.
- B. Explain how globalization and higher standards of living affect the meaning and use of resources, as exemplified by being able to
 - ▶ Explain why mass consumption associated with globalization requires enormous amounts of resources worldwide (e.g., energy to ship raw materials and finished goods worldwide, emerging consumer markets increase in demand for energy due to increased ownership and use of electrical devices).
 - ▶ Explain fluctuations in world petroleum prices as a function of global changes in supply and demand (e.g., disruptions in supply due to political tensions, new suppliers such as Angola, environmental disasters such as oil leaks and spills).
 - ▶ Explain how and why per-capita consumption of resources (e.g., petroleum, coal, electricity, steel, water, food) differs between developed and developing countries now and in the past.

Map credit: University of North Alabama/Lisa Keys-Matthews



Solar energy is a flow resource that is increasingly being captured and used for electrical power in certain regions of the contiguous United States. The darker areas represent locations with greater solar potential. Data source: NREL/US Department of Energy.

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4th GRADE

the student knows and understands:

Location and Distribution of Resources

2. The spatial distribution of types of resources

Therefore, the student is able to:

- A. Identify the locations of examples of each type of resource, as exemplified by being able to
- ▶ Identify the locations on a US map of various types of renewable, nonrenewable, and flow resources.
 - ▶ Identify the locations of examples of each of the three types of resources that are found in the student's state or region.
 - ▶ Identify which US states might be good locations for the production of hydroelectric, geothermal, solar, and wind energies.

8th GRADE

the student knows and understands:

Location and Distribution of Resources

2. The formation and spatial distribution of types of resources

Therefore, the student is able to:

- A. Describe the physical processes that influence the formation and therefore spatial distribution of renewable, nonrenewable, and flow resources, as exemplified by being able to
- ▶ Explain how physical processes played a role in the formation and location of nonrenewable resources such as coal, petroleum, and diamonds.
 - ▶ Describe the physical conditions necessary to generate electricity from flow resources (e.g., water, geothermal, solar, wind) and then identify on a US map potential locations for the generation of electricity from these flow resources.
 - ▶ Describe the physical processes that support the quantity and quality of renewable resources and how the resulting distribution may make them more or less useful.
- B. Explain the location and uses of major resources in the world, as exemplified by being able to
- ▶ Construct a map that identifies the ten leading petroleum-producing countries and the ten leading petroleum-consuming countries and then identify where overlap occurs.
 - ▶ Identify countries in which resources (e.g., fossil fuels, minerals, agricultural products) are the primary source of export earnings and describe the advantages and disadvantages of this interdependency.
 - ▶ Describe different types of vegetation used in biofuel production (e.g., corn, sugarcane, switch grass) and identify countries that have or can have an abundance of vegetation that may be used for this type of fuel source.

12th GRADE

the student knows and understands:

Location and Distribution of Resources

2. The spatial distribution of resources affects patterns of human settlement and trade

Therefore, the student is able to:

- A. Analyze and explain the relationships between the spatial patterns of settlement and resources, as exemplified by being able to
- ▶ Describe and analyze various thematic maps to understand the relationship between the distribution of resources (e.g., water, agricultural, mineral, and energy resources) and patterns of human settlement.
 - ▶ Analyze and explain the growth and/or decline of US towns that have relied on nonrenewable fossil fuel extraction (e.g., petroleum, coal, natural gas) or flow resource energy production (e.g., hydroelectric, geothermal, solar, wind).
 - ▶ Construct a map and explain how the spatial distribution of resources influences human migration patterns (e.g., guest workers in southwestern Asian petroleum-exporting countries, historic gold rushes and land grabs, hunters following animal migrations).
- B. Analyze and evaluate patterns of trade in resources, as exemplified by being able to
- ▶ Analyze the positive and negative economic, social, and environmental consequences of extracting and/or using specific resources to trade in foreign markets (e.g., timber, coal, petroleum, uranium).
 - ▶ Compare the per-capita incomes of countries that lead the world in the export of luxury crops (e.g., coffee, tea, tobacco, cacao) with countries that lead the world in the consumption of these crops and evaluate the positive and negative consequences of these trade relationships.
 - ▶ Identify countries that lead the world in petroleum production and explain how petroleum wealth influences international economic and political relationships.



Image credit: University of North Alabama/Lisa Keys-Matthews

Large reserves of natural gas are found under much of Wyoming. In this satellite image of Jonah Field, located in the Green River Basin in Sublette County, the sites of the gas wells are visible as dots connected by a road network. Data source: NASA Landsat, 2006.

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4th GRADE

the student knows and understands:

Sustainable Resource Use and Management

3. The sustainable use of resources in daily life

Therefore, the student is able to:

- A. Identify the ways in which different types of resources can be conserved, reused, and recycled, as exemplified by being able to
- ▶ Identify the advantages and disadvantages of recycling and reusing materials made from resources that people value.
 - ▶ Identify how much and what kinds of waste are or can be recycled in the school cafeteria.
 - ▶ Identify specific ways in which household water and electricity usage can be reduced.

8th GRADE

the student knows and understands:

Sustainable Resource Use and Management

3. Humans can manage resources to sustain or prolong their use

Therefore, the student is able to:

- A. Explain how renewable resources can be continuously replenished through sustainable use, as exemplified by being able to
- ▶ Describe and explain how sustainable management techniques can be applied in farming, forestry, and fishing (e.g., soil banks and contour plowing, sustainable timber harvesting practices, aquaculture).
 - ▶ Describe and explain how international agreements or policies provide for limited and therefore sustainable fishing practices (e.g., whale harvesting, tuna harvesting, seasonal fishing limitations).
 - ▶ Explain how petroleum-based consumer products can be replaced by renewable resources (e.g., plastic bags, eating utensils, diapers replaced by corn- or bamboo-based materials).
- B. Explain how humans can use technology to prolong the supply of nonrenewable resources and utilize flow resources, as exemplified by being able to
- ▶ Construct a world map showing energy consumption per capita and describe how the use of alternative energy technologies may change the spatial patterns of energy consumption.
 - ▶ Explain how the development and use of technological advances, such as hybrid engines in cars, can extend the supply of nonrenewable resources.
 - ▶ Explain how the development of new technologies can maintain or prolong the supply of nonrenewable resources (e.g., deep-water ocean drilling platforms, advanced oil recovery techniques for oil-shale deposits).

Although this map is posted in Knoxville, Tennessee, communities across the country are using similar visuals to illustrate the importance of location in managing water resources since actions in upstream locations can affect water quality and quantity downstream.

12th GRADE

the student knows and understands:

Sustainable Resource Use and Management

3. Policies and programs that promote the sustainable use and management of resources impact people and the environment

Therefore, the student is able to:

- A. Explain and compare the costs and benefits of using various types of renewable, nonrenewable, and flow resources, as exemplified by being able to
- ▶ Compare the advantages and disadvantages of using alternative energy resources (e.g., electricity generated from coal fire, diesel turbines, hydroelectric dams, nuclear power, wind turbines, solar panels, geothermal heat, methane gas from landfills or animal waste) and then rank them based on criteria such as availability, sustainability, pollution, and expense.
 - ▶ Describe and explain the costs and benefits of Organization of Petroleum Exporting Countries (OPEC) policies on oil for both the producing and consuming countries.
 - ▶ Analyze the efforts of countries with emerging global economies (e.g., China, India, Brazil) to develop and use renewable and flow energy resources and evaluate the economic and environmental costs and benefits of these efforts.
- B. Evaluate policy decisions regarding the sustainable use of resources in different regions and at different spatial scales in the world, as exemplified by being able to
- ▶ Evaluate the effect of efforts by the United Nations or other supranational organizations (e.g., World Bank, International Monetary Fund [IMF], Organization of American States [OAS], European Union [EU]) to promote sustainable development.
 - ▶ Compare government policies and programs to promote sustainability (e.g., reducing fossil-fuel dependency, recycling, conserving water) in developed and developing countries.
 - ▶ Compare the recycling programs of several local municipalities and evaluate the costs and benefits of each program.

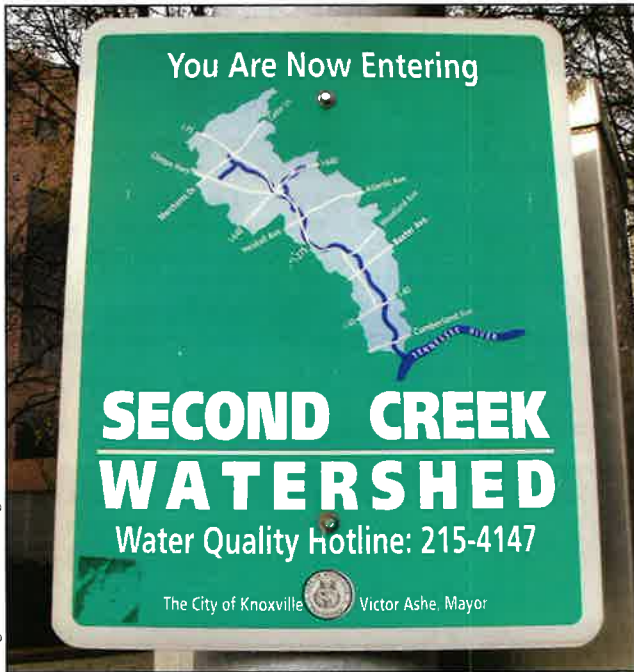


Image credit: D. J. Zeigler