

## EarthComm: Earth's Natural Resources

A typical day would not be possible without mineral resources to make the products we use, water resources to sustain our lives, keep clean, and cook our food, or energy resources to drive around and to provide our electricity. All these resources exist in abundance on our planet, but none will last forever without careful planning and management. While water is a renewable resource, if it is polluted it is not usable. Mineral resources are nonrenewable. Even given enough time, the Earth is not capable of making some types of deposits any more. Most of the energy resources we use are nonrenewable. We can find ways to use renewable sources such as the sun and wind but on a large scale we are still dependent on coal, oil, and gas. This module explores how we use these resources, where they come from, how they exist in our community, and how our use of resources affects the environment in our community. It includes numerous inquiries into aspects of resources that affect our use of them everyday.

### Themes

Through their inquiry in this module, students develop understandings of the complex Earth systems associated with Earth's natural resources. The major themes addressed include the following portions of the National Science Education Standards for Grades 9-12:

- Humans use resources in the environment in order to maintain and improve their existence.
- Earth does not have infinite resources. Increasing population places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.
- Every day people make decisions and conduct activities that affect their environment and Earth systems.
- The Earth system contains a fixed amount of each stable element. Each element can exist in several different chemical reservoirs and moves among reservoirs as part of geochemical cycles.

## Energy Resources and Your Community

In this chapter, students are challenged to evaluate energy consumption and use in the community relative to a hypothetical population growth of 20% and to suggest realistic alternatives to avoid an energy-supply shortage. Students are asked to write a report, aimed at a general audience, that explains the different types of energy resources, how they work, and how they are formed, discovered, and processed. Students begin the chapter with a review of energy concepts, including heat transfer processes and the conversion of mechanical energy into heat. Students determine which energy resources are used most for electricity generation in throughout the world, the United States, and within their own state. Students learn how coal is formed, where it is distributed in the United States, how coal deposits are discovered and mined, how coal is used as a source of energy, and the environmental impacts of using coal as an energy resource. Students analyze the dependence of today's society on petroleum. They learn how petroleum and natural gas are formed, how oil and gas deposits are discovered, and how oil and gas are extracted from a reservoir. Finally, students explore renewable energy sources, focusing on the potential for solar and wind energy as sources of power generation.

## Mineral Resources and Your Community

The Chapter Challenge for Mineral Resources and Your Community is for students to help a local company use mineral resources from the community to design a beverage container. Students are asked to prepare a report that explains what mineral resources are, how they are used and extracted, and what impact their use has on the environment, all relative to the proposed beverage container. Students begin the chapter by surveying the materials that are currently being used for beverage containers in their community. Students learn to identify minerals. They learn how mineral resources are found, extracted, and processed for use, and explore the environmental impacts of these activities. By the end of the chapter, students are better prepared to understand what makes minerals a valuable resource and how the use of mineral resources impacts the other Earth systems.

## Water Resources and Your Community

The Chapter Challenge for Water Resources and Your Community is for students to prepare a report that will help their community leaders to determine how the water resource needs of the community would change with the development of an industrial park, mini-mall, and residential area in the community. Students use an Earth systems approach to investigate the hydrologic cycle and global biogeochemical cycles (nitrogen cycle) within the context of community water resources and development. Students identify the human and natural factors which determine the "income and expenditure" of water resources. They determine how to measure domestic usage and obtain information on the quantity of water used by industry and agriculture. These activities help them to identify methods used to conserve water. They determine how rainfall, temperature, and other natural factors affect proper management and usage. They investigate how water resources are vulnerable to pollution by both human use and natural cycles or processes, and make models of water treatment processes. By the end of the chapter, students are better prepared to understand potential water quality problems and efficiently manage this precious and vital resource.

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