Organisms require resources to live and grow. The needs and wants of human beings are provided for by such resources. No doubt, some of these resources are very important to you. Just think about what you need each day of your life!

Objective:

1. Define and identify types of natural resources.
2. Distinguish between renewable and nonrenewable natural resources.
3. Explain the difference between inexhaustible and exhaustible resources.
4. Explain the concept of interdependent relationships.

Key Terms:

- exhaustible natural resources
- fossil fuel
- hyperaccumulators
- inexhaustible natural resources
- mineral
- natural resources
- nonrenewable natural resources
- phytoextraction
- renewable natural resources
Meaning and Kinds of Natural Resources

**Natural resources** are the features and products of the earth that support all life and satisfy the needs and wants of people. Some resources we often think about; others rarely get our attention, and we take them for granted. If we fail to have those that we need, we experience a shortage that may affect our well-being.

There are many kinds of natural resources. Some, such as soil, water, air, and wildlife, are part of our natural environment. Others, such as minerals and fossil fuels, must be mined or obtained in other ways.

Renewable and Nonrenewable Natural Resources

Some natural resources can be renewed, improved, or used again. Other natural resources are gone forever once they have been used, and we need to conserve their use so we won’t run out.

**RENEWABLE NATURAL RESOURCES**

**Renewable natural resources** are those resources that can be replaced or restored once they have been used. Depending on the resource, renewing can take a long time. Examples of renewable natural resources are soil, water, air, and wildlife.

Soil is renewed by the decomposition of dead plants and animals and the breakdown of minerals. Some renewal processes take only a few years; others require many years. A short-term example is the decay of crop remains in a field to add organic matter to soil. A long-term example is the gradual weathering of rock to form soil.

Water poses an interesting renewal situation. The amount of water on the earth is constant, but the states and purity of water vary. Water can sometimes become so polluted that renewal is a difficult and long-term process. Our goal should be to prevent extreme water pollution.

FIGURE 1. Practices have been used on this farm to protect natural resources and prevent loss. ( Courtesy, Natural Resources Conservation Service, USDA)
Air renewal involves taking steps to reduce and prevent the release of gases and other materials that damage air quality. Reducing the release of exhausts and other substances helps minimize air pollution and damage.

Wildlife can usually be renewed. Action can be taken to restore wildlife to an area, such as has been done to restore wolves to Yellowstone National Park. Of course, the wildlife must not be used to the extent of becoming extinct. Once a species of wildlife is extinct, it cannot be renewed.

Even with renewable resources, careful and wise use is needed to assure that we do not run out of them. We need to prevent pollution and degradation to assure that water, air, and other renewable resources are of sufficient quality to use.
Nonrenewable natural resources are those resources that, once used, cannot be restored. Careful use can be made to conserve the supplies of these resources so that they will last a long time. Some can be used again, or recycled. Minerals and fossil fuels are the two major types of nonrenewable natural resources.

A mineral is a natural inorganic substance that occurs on or near the surface of the earth. Minerals are nonliving substances and have never lived. Common minerals are those used to make iron, copper, aluminum, gold, and silver. Some of these valuable metals are refined from low-grade minerals that produce only a small percentage of metal. Metals can often be recycled. Recycling involves processing used metals into new metal products.

A fossil fuel is a nonrenewable natural resource used as a source of energy. Fossil fuels were formed over many years from previously living plants and animals. Most of the energy in fossil fuels is from sunlight that has been stored through a process in plants known as photosynthesis. Common fossil fuels include coal and petroleum. Once used, they cannot be renewed. For example, coal that is burned is gone!

Inexhaustible and Exhaustible Resources

Some natural resources can be replenished as they are used. Some require a great deal of time to be replenished. Others cannot be replenished. The concepts associated with replenishing a resource relate to exhaustibility.

Inexhaustible natural resources are those that are continually being replaced and are usually in large supply on the earth. The supply will last indefinitely and, if not used, may disappear and be gone forever. Three inexhaustible natural resources are wind and air, water, and sunlight.

Wind, or air movement, is lost if it is not captured and used when it occurs. Wind continually moves and changes in the atmosphere. The power afforded by wind can be captured with windmills to pump water, to generate electric power, and for other purposes.

Water is an inexhaustible resource. It can be dirtied and made unfit for use, but continual restoration is naturally underway on the surface and within the earth. Water also provides power when it is flowing in streams and stored behind levees. Such power can be used to generate electric power and for other purposes. If the power in flowing water is not captured, it is lost forever in its current form.

Sunlight is the most important inexhaustible natural resource. The energy from the sun is the source of much of the energy used on the earth. Plants use light from the sun in manufacturing food. This energy is stored in decayed plants and products from plants. The energy in
fossil fuel is actually energy that began as plants used sunlight and stored the nutrients produced.

**EXHAUSTIBLE NATURAL RESOURCES**

Exhaustible natural resources are those that are available in limited amounts and can be used up if not used wisely. Some minerals and fossil fuels are exhaustible natural resources. Once some of them have been used, they cannot be replaced at all—they are gone forever! Others must be used cautiously so that their supply is sustained for many years into the future.

Sometimes the word irreducible is used when describing exhaustible natural resources. This means that, once used, they cannot be replaced. An example is a fossil fuel such as coal. Once it is all used, it is irreducible. Of course, there are those who say more fossil fuel might form over many centuries far into the future. We need to use exhaustible natural resources carefully to sustain their use indefinitely.

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**FURTHER EXPLORATION...**

**ONLINE CONNECTION: Plants Remove Pollution**

Soil is sometimes polluted with heavy metals, such as lead, cadmium, mercury, and arsenic. These materials may be taken up by the roots of crop plants and stored in the roots, stems, and/or leaves. Humans may consume food plants containing traces of these dangerous metals.

It is wise to prevent heavy metals from getting into soil. Improper disposal of industrial wastes can lead to soil pollution with heavy metals. Some fertilizers may contain small amounts of these substances and should be avoided.

Once soil has become polluted, how is a heavy metal removed? Scientists have investigated a number of approaches. One approach being used to rid soil of a heavy metal is phytoextraction.

Phytoextraction is the process of growing selected, nonfood plant species in soil containing a heavy metal. These plants take up the heavy metal and translocate it into the stems and leaves. The mature plants can be cut, raked up, and hauled away to a disposal site.

The plants used are known as hyperaccumulators. What are hyperaccumulators? What species of plants are included? Hint: genus *Thlaspi* (pennycress). (Others may also be used.)

To find out more about phytoextraction and hyperaccumulators, visit the link below:


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An agronomist is checking the roots of a Thlaspi plant in a growth chamber to determine its ability to remove heavy metals from soil. (Courtesy, Agricultural Research Service, USDA)
Interdependent Relationships

Interdependent relationships are found between all aspects of the earth’s environment. Plants, animals, and other living things depend on natural resources to live and grow. They look to resources for support in meeting life needs. Interdependent relationships show that organisms may depend on each other or that the well-being of the environment depends on the activities of living organisms. Several examples of relationships between living things, natural resources, and the environment follow.

ENVIRONMENTAL QUALITY

In many ways, living organisms must have a quality environment. A degraded environment causes disease and results in organisms failing to thrive. Pollution of soil, water, or air causes great harm. Some processes, particularly those of microscopic bacteria, promote decay of wastes and help heal damage caused by pollution. Excessive degradation may be more than these tiny organisms can handle, or at least it may cause them to take more time than usual to do their work.

WATER QUALITY

Human life, as well as the life of other living organisms, requires water. The water must meet the needs of life processes. It should be relatively free of harmful substances. If water is damaged by pollution or other factors, it may fail to support life and contribute to disease and lack of productivity. Likewise, some organisms help remove impurities from water and, by doing so, help restore water quality. Movement of water into the earth removes impurities—cleans it—and prepares it for use again.

SOIL FORMATION

Soil is largely made up of minerals and organic matter. Weathering and decomposition result in new soil being formed from rock and decaying organic matter. The process helps clean the land of dead plants and animals and generates more soil. Soil contains some moisture. Water is cleaned as it infiltrates soil and moves downward to form aquifers (streams or pools of underground water). This benefits both the soil and the water.

WEATHER FRONTS

Weather fronts cause wind (air movement) and force polluted air away. A weather front is a condition that occurs in the atmosphere when warm and cold air meet. Variations in air pressure result in one front pushing another. For example, a cold front travels across the North
American continent from a northwestern direction toward the southeast. As the front progresses, it creates wind that moves polluted air away from cities and other areas. This action brings in air that is less polluted and more healthful to living things.

**Summary:**

Natural resources are important to the well-being and productivity of living things on the earth. Some natural resources are renewable, such as soil. Other natural resources are nonrenewable, such as fossil fuel. Natural resource supplies may be exhaustible or inexhaustible. Exhaustible natural resources are those that are available in limited quantities and may be used up so that they are gone. Inexhaustible natural resources are available in large supplies that are not readily used up.

The relationships between natural resources are complex. The well-being of living things and the quality of the environment often depend on the availability of particular natural resources. Actions by living things as well as by natural chemical processes help restore some natural resources.

**Checking Your Knowledge:**

1. What is a natural resource?
2. Distinguish between renewable and nonrenewable natural resources and give two examples of each.
3. What is an exhaustible resource? Give an example.
4. How are interdependent relationships important between natural resources?

**Expanding Your Knowledge:**

Using print media and/or the Internet to gather information, prepare a report on the meaning and importance of natural resources.

**Web Links:**

The Illinois Department of Natural Resources
http://www.dnr.state.il.us/

The Natural Resources Defense Council
http://www.nrdc.org