Chapter 4 Earth’s Resources

Summary

4.1 Energy and Mineral Resources

- A renewable resource can be replenished over fairly short time spans such as months, years, or decades.
- By contrast, a nonrenewable resource takes millions of years to form and accumulate.
  - Population growth and a higher standard of living are depleting existing resources.

- Fossil fuels include coal, oil, and natural gas.
  - A fossil fuel is any hydrocarbon used as a source of energy.

- Some energy experts believe that fuels derived from tar sands and oil shales could become good substitutes for dwindling petroleum supplies.
  - Mining tar sand has significant environmental drawbacks.
  - Oil shale has less heat energy than crude oil and is costly to process.

- Some of the most important mineral deposits form through igneous processes and from hydrothermal solutions.
  - Ore is a useful metallic mineral that can be mined at a profit.
  - Gold, silver, copper, mercury, lead, platinum, and nickel are examples of metallic minerals produced by igneous processes.
  - Most hydrothermal deposits are formed by hot, metal-rich fluids left by magma.
  - Placer deposits are formed when eroded heavy minerals settle quickly from moving water.

- Nonmetallic mineral resources are extracted and processed either for the nonmetallic elements they contain or for their physical and chemical properties.
  - Nonmetallic mineral resources are useful for building materials, industrial minerals, and manufacturing chemicals and fertilizers.

4.2 Alternate Energy Sources

- Solar energy has two advantages: the “fuel” is free, and it’s nonpolluting.
- In nuclear fission, the nuclei of heavy atoms such as uranium-235 are bombarded with neutrons. The uranium nuclei then split into smaller nuclei and emit neutrons and heat energy.
  - About 7% of U.S. energy needs are met by nuclear power.
Although it was once believed that nuclear power would be a safe and clean energy source, cost and safety are obstacles to expanded nuclear power. Fears about radioactive materials were realized in 1986, when a reactor at Chernobyl caused two explosions.

Some experts estimate that in the next 50 to 60 years, wind power could meet between 5 to 10 percent of the country’s demand for electricity.

Wind energy is a promising source of energy, but technological advances are needed to fully realize its potential.

The water held in a reservoir behind a dam is a form of stored energy that can be released through the dam to produce electric power.

Hydroelectric power, which is generated by falling water, drives turbines that produce electricity. About 5% of the country’s electricity comes from hydroelectric power. Limited usable sites and the finite lifetime of hydroelectric dams are both obstacles to further expansion.

Hot water is used directly for heating and to turn turbines to generate electric power.

Geothermal energy is harnessed by tapping natural underground reservoirs of steam and hot water. Geothermal power is nonpolluting but reservoirs are easily depleted.

Tidal power is harnessed by constructing a dam across the mouth of a bay or an estuary in coastal areas with a large tidal range. The strong in-and-out flow that results drives turbines and electric generators.

Each day, people use fresh water for drinking, cooking, bathing, and growing food.

Less than one percent of Earth’s water is usable fresh water. Point source pollution is pollution that comes from a known and specific location. Nonpoint source pollution is pollution that does not have a specific point of origin. Runoff is the water that flows over the land rather than seeping into the ground. It often carries nonpoint pollution. Water pollution can have serious health effects for humans.

The chemical composition of the atmosphere helps maintain life on Earth.
Pollution can change the chemical composition of the atmosphere and disrupt its natural cycles and functions.

Global warming, caused by increased carbon dioxide in the atmosphere, is the unnatural warming of the lower atmosphere.

Earth’s land provides soil and forests, as well as mineral and energy resources.

Removing and using resources from Earth’s crust can damage the environment.

4.4 Protecting Resources

Starting in the 1970s, the federal government passed several laws to prevent or decrease pollution and protect resources.

Although they comprise only 6% of the world’s population, Americans use about one third of the world’s resources.

Conservation is the careful use of resources.

In 1970, Congress passed the Clean Air Act, the nation’s most important air pollution law.

The Clean Air Act limited the amount of pollutants allowed in the air, resulting in improved air quality.

Protecting land resources involves preventing pollution and managing land resources wisely.

Farmers are using new soil conservation practices to prevent the loss of topsoil.

Some farmers and gardeners use fewer pesticides and inorganic fertilizers.

Compost is partly decomposed organic material that is used as fertilizer.

Better landfill management and disposal techniques prevent waste seepage.

Recycling is the collecting and processing of used items so they can be made into new products.