

Environmental Science

Standard 1: Environmental Systems

- Env.1.1 Know and describe how ecosystems can be reasonably stable over hundreds or thousands of years. Consider as an example the ecosystem of the Great Plains prior to the advent of the horse in Native American Plains societies, from then until the advent of agriculture, and well into the present.
- Env.1.2 Understand and describe that if a disaster occurs — such as flood or fire — the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.
- Env.1.3 Understand and explain that ecosystems have cyclic fluctuations, such as seasonal changes or changes in population, as a result of migrations.
- Env.1.4 Understand and explain that human beings are part of Earth's ecosystems and give examples of how human activities can, deliberately or inadvertently, alter ecosystems.
- Env.1.5 Explain how the size and rate of growth of the human population in any location is affected by economic, political, religious, technological, and environmental factors, some of which are influenced by the size and rate of growth of the population.
- Env.1.6 Describe and give examples about how the decisions of one generation both provide and limit the range of possibilities open to the next generation.
- Env.1.7 Recognize and explain that in evolutionary change, the present arises from the materials of the past and in ways that can be explained, such as the formation of soil from rocks and dead organic matter.
- Env.1.8 Recognize and describe the difference between systems in equilibrium and systems in disequilibrium.
- Env.1.9 Diagram the cycling of carbon, nitrogen, phosphorus, and water.
- Env.1.10 Identify and measure biological, chemical, and physical factors within an ecosystem.
- Env.1.11 Locate, identify, and explain the role of the major Earth biomes and discuss how the abiotic and biotic factors interact within these ecosystems.
- Env.1.12 Explain the process of succession, both primary and secondary, in terrestrial and aquatic ecosystems.

Standard 2: Flow of Matter and Energy

- Env.2.1 Understand and describe how layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. Recognize that by burning these fossil fuels, people are passing stored energy back into the environment as heat and releasing large amounts of carbon dioxide.
- Env.2.2 Recognize and explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle organic materials from the remains of dead organisms.
- Env.2.3 Describe how the chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways.
- Env.2.4 Cite examples of how all fuels have advantages and disadvantages that society must question when considering the trade-offs among them, such as how energy use contributes to the rising standard of living in the industrially developing nations. However, explain that

this energy use also leads to more rapid depletion of Earth's energy resources and to environmental risks associated with the use of fossil and nuclear fuels.

- Env.2.5 Describe how decisions to slow the depletion of energy sources through efficient technology can be made at many levels, from personal to national, and they always involve trade-offs of economic costs and social values.
- Env.2.6 Illustrate the flow of energy through various trophic levels of food chains and food webs within an ecosystem. Describe how each link in a food web stores some energy in newly made structures and how much of the energy is dissipated into the environment as heat. Understand that a continual input of energy from sunlight is needed to keep the process going.

Standard 3: Populations

- Env.3.1 Demonstrate and explain how factors such as birth rate, death rate, and migration rate determine growth rates of populations.
- Env.3.2 Demonstrate how resources, such as food supply, influence populations.

Standard 4: Natural Resources

- Env.4.1 Differentiate between renewable and nonrenewable resources, and compare and contrast the pros and cons of using nonrenewable resources.
- Env.4.2 Demonstrate a knowledge of the distribution of natural resources in the U.S. and the world, and explain how natural resources influence relationships among nations.
- Env.4.3 Recognize and describe the role of natural resources in providing the raw materials for an industrial society.
- Env.4.4 Give examples of the various forms and uses of fossil fuels and nuclear energy in our society.
- Env.4.5 Recognize and describe alternative sources of energy provided by water, the atmosphere, and the sun.
- Env.4.6 Identify specific tools and technologies used to adapt and alter environments and natural resources in order to meet human physical and cultural needs.
- Env.4.7 Understand and describe the concept of integrated natural resource management and the values of managing natural resources as an ecological unit.
- Env.4.8 Understand and describe the concept and the importance of natural and human recycling in conserving our natural resources.
- Env.4.9 Recognize and describe important environmental legislation, such as the Clean Air Act and the Clean Water Act.

Standard 5: Environmental Hazards

- Env.5.1 Describe how agricultural technology requires trade-offs between increased production and environmental harm and between efficient production and social values.
- Env.5.2 Understand and explain that waste management includes considerations of quantity, safety, degradability, and cost. Also understand that waste management requires social and technological innovations because waste-disposal problems are political and economic as well as technical.

- Env.5.3 Understand and describe how nuclear reactions release energy without the combustion products of burning fuels, but that the radioactivity of fuels and by-products poses other risks which may last for thousands of years.
- Env.5.4 Identify natural Earth hazards, such as earthquakes and hurricanes, and identify the regions in which they occur as well as the short-term and long-term effects on the environment and on people.
- Env.5.5 Differentiate between natural pollution and pollution caused by humans and give examples of each.
- Env.5.6 Compare and contrast the beneficial and harmful effects of an environmental stressor, such as herbicides and pesticides, on plants and animals. Give examples of secondary effects on other environmental components.