

# Environmental Science

## UNIT I: Introduction to Environmental Science

**Goal 1. The student will demonstrate the ability to use scientific skills necessary to identify and analyze environmental issues.**

Objectives - The student will be able to:

- a. Define environmental science as an interdisciplinary science and relate these disciplines to common environmental issues.
- b. Identify and discuss values and beliefs inherent in environmental decision-making.

**Goal 2. The student will demonstrate the ability to analyze the movement of matter and energy through the biosphere.**

Objectives - The student will be able to:

- a. Describe the influence of matter and energy cycles on weather, climate, and the environment.
- b. Explain how matter cycles between living systems and the physical environment.

## UNIT II: Interdependence of Organisms

**Goal 1. The student will demonstrate the ability to describe the structure of an ecosystem and the changes it undergoes.**

Objectives - The student will be able to:

- a. Distinguish between the biotic and abiotic factors in an ecosystem.
- b. Examine how interactions between a species and its environment define the species' niche.
- c. Discriminate between a species and a population and between a community and an ecosystem.
- d. Explain how organisms have adapted to their environments using examples from the diversity of living things.

**Goal 2. The student will demonstrate the ability to analyze and recognize the interrelationships in a food chain and a food web.**

Objectives - The student will be able to:

- a. Trace the flow of energy in a food chain.
- b. Recognize the relationship between diversity and stability in ecosystems.
- c. Identify the different trophic levels in a food pyramid.
- d. Define the term "biomass" and its relationship to a food pyramid.
- e. Describe the major types of interactions between species (e.g., competition, predation, symbiotic relationships).

**Goal 3. The student will demonstrate the ability to describe the major biomes and the impact of human involvement and disruption of these biomes.**

Objectives - The student will be able to:

- a. Construct climatograms of major terrestrial biomes.
- b. Compare the process of ecological succession in terrestrial and aquatic biomes.
- c. Explain how and why some biomes have been intensely exploited.

### **UNIT III: Populations**

**Goal 1. The student will demonstrate the ability to explain the growth of populations and factors that influence them.**

Objectives - The student will be able to:

- a. Describe the factors that limit the growth of a population.
- b. Diagram the three phases of an exponential growth curve and indicate carrying capacity.

**Goal 2. The student will demonstrate the ability to analyze trends in human population growth.**

Objectives - The student will be able to:

- a. Define demography.
- b. Describe the factors that affect the growth of the human population.
- c. Construct age pyramids for an underdeveloped and developed country and analyze population trends.
- d. Describe problems resulting from rapid human population growth.
- e. Analyze strategies countries may use to reduce population growth.

### **UNIT IV: Air Water, and Land Resources**

**Goal 1. The student will demonstrate the ability to explain the effect of human influences on the atmosphere.**

Objectives - The student will be able to:

- a. Identify major air pollutants and their sources.
- b. Describe the impact of air pollutants on human health.
- c. Compare and contrast the effects of acid rain, ozone depletion, and global warming on living and nonliving environments.
- d. Describe the problems caused by noise and light pollution.

**Goal 2. The student will demonstrate the ability to explain the effect of human influences on water supply.**

Objectives - The student will be able to:

- a. Trace the water cycle from land (include groundwater) to sea, to atmosphere, etc.
- b. Identify how water is used in society and how water use affects ecosystems.
- c. List the major water pollutants and their sources and relate them to human and environmental health.
- d. Describe environmental conditions and human activities that cause groundwater pollution.
- e. Relate the importance of wetlands to the health of aquatic ecosystems, especially estuaries.
- f. Discuss the ecological, political, economic, and social issues of the Chesapeake Bay.

**Goal 3. The student will demonstrate the ability to explain the effect of human influences on land.**

Objectives - The student will be able to:

- a. Identify how land is used and how land use affects ecosystems.
- b. Summarize the positive and negative effects of urban planning.
- c. Explain the negative effects of agriculture on the land and the benefits of sustainable agriculture.
- d. Describe the characteristics of soil composition.
- e. Identify underlying reasons for solid waste pollution.
- f. Compare and contrast biodegradable and nonbiodegradable wastes and their significance in landfills.
- g. Identify and explain methods for reducing the volume of waste.

**UNIT V: Energy Resources**

**Goal 1. The student will demonstrate the ability to identify nonrenewable resources and their effect on the environment.**

Objectives - The student will be able to:

- a. Identify and describe the different types of nonrenewable resources.
- b. Describe the most common methods of mining and their environmental consequences.
- c. Describe the nuclear fission process.
- d. List the advantages and disadvantages of the nuclear fission process including safety concerns and radioactive waste disposal.

**Goal 2. The student will demonstrate the ability to identify renewable resources and their effect on the environment.**

Objectives - The student will be able to:

- a. Compare and contrast the advantages and disadvantages of nonrenewable and renewable resources.
- b. List the major types of renewable resources and compare their advantages and disadvantages (solar, wind, water, geothermal, biomass, tidal power, etc.)
- c. Summarize the recent advances in alternative fuel research.



## **UNIT VI: Human Impact on the Environment**

**Goal 1. The student will demonstrate the ability to identify the negative impacts of humans on the environment.**

Objectives - The student will be able to:

- a. Explain habitat destruction and the loss of biodiversity, and how they are related to the endangerment of species.
- b. Distinguish between the natural rate of extinction and the accelerated rate due to human impact.
- c. Identify methods of decreasing the impacts of humans on the rate of extinction.
- d. Explain the causes of deforestation and its effects on biodiversity.

**Goal 2. The student will demonstrate the ability to explain how citizens can affect environmental policy at each level of government (local, state, and national).**

Objectives - The student will be able to:

- a. Research the history of environmental legislation in the U.S.
- b. Interpret state, federal, and international environmental laws (Clean Air Act, Clean Water Act, Endangered Species Act, Kyoto Protocol, etc.)
- c. Recognize impacts of individual choices on the environment.
- d. Define principles of sustainable development and how its implementation can maintain the environment.

**Goal 3. The student will demonstrate the ability to identify career opportunities in the environmental science field and discuss career information related to the environment.**

Objectives - The student will be able to:

- a. List several environmental science careers and their positive impact on the environment.
- b. Identify background knowledge needed for a career in environmental science.