



Sunrise Language School

American Division

Grade 12 Environmental Science Learning Expectations

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.

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

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

Air Water, and Land Recourses

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 non biodegradable wastes and their significance in landfills.
- g.-Identify and explain methods for reducing the volume of waste

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.

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.