

AP Environmental Science



The following learning targets represent the major concepts studied and assessed in this course.

Semester 1:

Unit 1: The Living World: Ecosystems

- Explain how the availability of resources influences species interactions.
- Describe the global distribution and principal environmental aspects of terrestrial biomes.
- Describe the global distribution and principal environmental aspects of aquatic biomes.
- Explain the steps and reservoir interactions in the carbon, nitrogen, phosphorus, and water cycle.
- Explain how solar energy is acquired and transferred by living organisms.
- Explain how energy flows and matter cycles through trophic levels.
- Determine how the energy decreases as it flows through ecosystems.
- Describe food chains and food webs, and their constituent members by trophic level.

Unit 2: The Living World: Biodiversity

- Explain levels of biodiversity and their importance to ecosystems.
- Describe ecosystem services.
- Describe the results of human disruptions to ecosystem services.
- Describe island biogeography.
- Describe the role of island biogeography in evolution.
- Describe ecological tolerance.
- Explain how natural disruptions, both short and long term, impact an ecosystem.
- Describe how organisms adapt to their environment.
- Describe ecological succession.

Unit 3: Populations

- Identify the differences between generalist and specialist species.
- Identify differences between K and r selected species.
- Explain survivorship curves.
- Describe carrying capacity, and its impact on ecosystems.
- Explain how resource availability affects population growth.
- Explain age structure diagrams.
- Explain factors that affect total fertility rate in human populations.
- Explain how human populations experience growth and decline.
- Define the demographic transition.

Unit 4: Earth Systems and Resources

- Describe the geological changes and events that occur at convergent, divergent, and transform plate boundaries.
- Describe the characteristics and formation of soil.
- Describe similarities and differences between properties of different soil types.
- Describe the structure and composition of the Earth's atmosphere.
- Explain how environmental factors can result in atmospheric circulation.
- Describe the characteristics of a water.
- Explain how the sun's energy affects the Earth's surface.
- Describe how the Earth's geography affects weather and climate.
- Describe the environmental changes and effects that result from El Nino or La Nina events.

Unit 5: Land and Water Use

- Explain the concept of the tragedy of the commons.
- Describe the effect of clearcutting on forests.
- Describe methods for mitigating human impact on forests.
- Describe changes in agricultural practices.
- Describe agricultural practices that cause environmental damage.
- Describe sustainable agricultural and food production practices.
- Describe different methods of irrigation and their benefits and drawbacks.
- Describe the benefits and drawbacks of different methods of pest control.
- Describe integrated pest management and its benefits and drawbacks.
- Identify different methods of meat production and describe their benefits and drawbacks.
- Describe the causes of and problems related to overfishing.
- Describe the benefits and drawbacks of aquaculture.
- Describe natural resource extraction through mining.
- Describe ecological and economic impacts of natural resource extraction through mining.
- Describe the effects of urbanization on the environment.
- Explain the variables measured in an ecological footprint.
- Explain the concept of sustainability.
- Describe methods for mitigating problems related to urban runoff.

Semester 2:

Unit 6: Energy Resources and Consumption

- Identify differences between nonrenewable and renewable energy sources.
- Describe trends in energy consumption.
- Identify types of fuels and their uses.
- Identify where natural energy resources occur.
- Describe the use, methods, and effects of fossil fuels on the environment.
- Describe the use, methods, and effects of nuclear energy in power generation on the environment.
- Describe the effects of the use of biomass in power generation on the environment.
- Describe the use, methods, and effects of solar energy in power generation on the environment.
- Describe the use, methods, and effects of hydroelectricity in power generation on the environment.
- Describe the use, methods, and effects of geothermal in power generation energy on the environment.
- Describe the use, methods, and effects of hydrogen fuel cells in power generation on the environment.
- Describe the use, methods, and effects of wind energy in power generation on the environment.
- Describe methods for conserving energy.

Unit 7: Atmospheric Pollution

- Identify the sources and effects of air pollutants.
- Explain the causes and effects of photochemical smog and methods to reduce it.
- Describe thermal inversion and its relationship with pollution.
- Describe natural sources of CO₂ and particulates.
- Identify indoor air pollutants and describe their effects.
- Explain how air pollutants can be reduced at the source.
- Describe acid deposition and its effects on the environment.
- Describe human activities that result in noise pollution and its effects.

Unit 8: Aquatic and Terrestrial Pollution

- Identify differences between point and nonpoint sources of pollution.
- Describe the impacts of human activities on aquatic ecosystems.
- Describe endocrine disruptors and their effects on ecosystems.
- Describe human activities on wetlands and mangroves.
- Explain the environmental effects of excessive use of fertilizers and detergents on aquatic ecosystems.
- Describe the effects of thermal pollution on aquatic ecosystems.
- Describe the effect of persistent organic pollutants on the ecosystems.
- Describe bioaccumulation and biomagnification and their effects.
- Describe solid waste disposal methods and their effects.
- Describe changes to current practices that could reduce the amount of generated waste and their associated benefits and drawbacks.
- Describe best practices in sewage treatment.
- Define lethal dose 50% (LD_{50}).
- Evaluate dose response curves.
- Identify sources of human health issues that are linked to pollution.
- Explain human pathogens and their cycling through the environment.

Unit 9: Global Change

- Explain the importance of stratospheric ozone to life on Earth.
- Describe chemicals used to substitute for chlorofluorocarbons (CFCs).
- Identify the greenhouse gases their sources and their potency.
- Identify the threats to human health and the environment posed by an increase in greenhouse gasses.
- Explain how changes in climate, both short and long term, impact ecosystems.
- Explain the causes and effects of ocean warming.
- Explain the causes and effects of ocean acidification.
- Explain the environmental problems associated with invasive species and strategies to control them.
- Explain how species become endangered and strategies to combat the problem.
- Explain how human activities affect biodiversity and strategies to combat the problem.