

Tick one box per statement: ☐ not yet ☐ nearly ☐ confident. / /

1. The Living World: Ecosystems

1.1 Introduction to Ecosystems

☐☐☐ Explain how the availability of resources influences species interactions.

1.2 Terrestrial Biomes

☐☐☐ Describe the global distribution and principal environmental aspects of terrestrial biomes.

1.3 Aquatic Biomes

☐☐☐ Describe the global distribution and principal environmental aspects of aquatic biomes.

1.4 The Carbon Cycle

☐☐☐ Explain the steps and reservoir interactions in the carbon cycle.

1.5 The Nitrogen Cycle

☐☐☐ Explain the steps and reservoir interactions in the nitrogen cycle.

1.6 The Phosphorus Cycle

☐☐☐ Explain the steps and reservoir interactions in the phosphorus cycle.

1.7 The Hydrologic (Water) Cycle

☐☐☐ Explain the steps and reservoir interactions in the hydrologic cycle.

1.8 Primary Productivity

☐☐☐ Explain how solar energy is acquired and transferred by living organisms.

1.9 Trophic Levels

☐☐☐ Explain how energy flows and matter cycles through trophic levels.

1.10 Energy Flow and the 10% Rule 10%

☐☐☐ Determine how the energy decreases as it flows through ecosystems.

1.11 Food Chains and Food Webs

☐☐☐ Describe food chains and food webs, and their constituent members by trophic level.

2. The Living World: Biodiversity

2.1 Introduction to Biodiversity

☐☐☐ Explain levels of biodiversity and their importance to ecosystems.

2.2 Ecosystem Services

☐☐☐ Describe ecosystem services.

☐☐☐ Describe the results of human disruptions to ecosystem services.

2.3 Island Biogeography

☐☐☐ Describe island biogeography.

☐☐☐ Describe the role of island biogeography in evolution.

2.4 Ecological Tolerance

☐☐☐ Describe ecological tolerance.

2.5 Natural Disruptions to Ecosystems

☐☐☐ Explain how natural disruptions, both short- and long-term, impact an ecosystem.

2.6 Adaptations

☐☐☐ Describe how organisms adapt to their environment.

2.7 Ecological Succession

☐☐☐ Describe ecological succession.

☐☐☐ Describe the effect of ecological succession on ecosystems.

3. Populations

3.1 Generalist and Specialist Species

☐☐☐ Identify differences between generalist and specialist species.

3.2 K-Selected and r-Selected Species Kr

☐☐☐ Identify differences between K- and r-selected species.

3.3 Survivorship Curves

☐☐☐ Explain survivorship curves.

3.4 Carrying Capacity

☐☐☐ Describe carrying capacity.

☐☐☐ Describe the impact of carrying capacity on ecosystems.

3.5 Population Growth and Resource Availability

☐☐☐ Explain how resource availability affects population growth.

3.6 Age Structure Diagrams

☐☐☐ Explain age structure diagrams.

3.7 Total Fertility Rate

☐☐☐ Explain factors that affect total fertility rate in human populations.

3.8 Human Population Dynamics

☐☐☐ Explain how human populations experience growth and decline.

3.9 Demographic Transition

☐☐☐ Define the demographic transition.

4. Earth Systems and Resources

4.1 Plate Tectonics

☐☐☐ Describe the geological changes and events that occur at convergent, divergent, and transform plate boundaries.

4.2 Soil Formation and Erosion

☐☐☐ Describe the characteristics and formation of soil.

4.3 Soil Composition and Properties

☐☐☐ Describe similarities and differences between properties of different soil types.

4.4 Earth’s Atmosphere

☐☐☐ Describe the structure and composition of the Earth’s atmosphere.

4.5 Global Wind Patterns

☐☐☐ Explain how environmental factors can result in atmospheric circulation.

4.6 Watersheds

☐☐☐ Describe the characteristics of a watershed.

4.7 Solar Radiation and Earth’s Seasons

☐☐☐ Explain how the sun’s energy affects the Earth’s surface.

4.8 Earth’s Geography and Climate

☐☐☐ Describe how the Earth’s geography affects weather and climate.

4.9 El Nino and La Nina

☐☐☐ Describe the environmental changes and effects that result from El Niño or La Niña events (El Niño–Southern Oscillation).

5. Land and Water Use

5.1 The Tragedy of the Commons

☐☐☐ Explain the concept of the tragedy of the commons.

5.2 Clearcutting

☐☐☐ Describe the effect of clearcutting on forests.

5.3 The Green Revolution

☐☐☐ Describe changes in agricultural practices.

5.4 Impacts of Agricultural Practices

☐☐☐ Describe agricultural practices that cause environmental damage.

5.5 Irrigation Methods

☐☐☐ Describe different methods of irrigation.
☐☐☐ Describe the benefits and drawbacks of different methods of irrigation.

5.6 Pest Control Methods

☐☐☐ Describe the benefits and drawbacks of different methods of pest control.

5.7 Meat Production Methods

☐☐☐ Identify different methods of meat production.
☐☐☐ Describe the benefits and drawbacks of different methods of meat production.

5.8 Impacts of Overfishing

☐☐☐ Describe causes of and problems related to overfishing.

5.9 Impacts of Mining

☐☐☐ Describe natural resource extraction through mining.
☐☐☐ Describe ecological and economic impacts of natural resource extraction through mining.

5.10 Impacts of Urbanization

☐☐☐ Describe the effects of urbanization on the environment.

5.11 Ecological Footprints

☐☐☐ Explain the variables measured in an ecological footprint.

5.12 Introduction to Sustainability

☐☐☐ Explain the concept of sustainability.

5.13 Methods to Reduce Urban Runoff

☐☐☐ Describe methods for mitigating problems related to urban runoff.

5.14 Integrated Pest Management

- ☐☐☐ Describe integrated pest management.
- ☐☐☐ Describe the benefits and drawbacks of integrated pest management (IPM).

5.15 Sustainable Agriculture

- ☐☐☐ Describe sustainable agricultural and food production practices.

5.16 Aquaculture

- ☐☐☐ Describe the benefits and drawbacks of aquaculture.

5.17 Sustainable Forestry

- ☐☐☐ Describe methods for mitigating human impact on forests.

6. Energy Resources and Consumption

6.1 Renewable and Nonrenewable Resources

- ☐☐☐ Identify differences between nonrenewable and renewable energy sources.

6.2 Global Energy Consumption

- ☐☐☐ Describe trends in energy consumption.

6.3 Fuel Types and Uses

- ☐☐☐ Identify types of fuels and their uses.

6.4 Distribution of Natural Energy Resources

- ☐☐☐ Identify where natural energy resources occur.

6.5 Fossil Fuels

- ☐☐☐ Describe the use and methods of fossil fuels in power generation.
- ☐☐☐ Describe the effects of fossil fuels on the environment.

6.6 Nuclear Power

- ☐☐☐ Describe the use of nuclear energy in power generation.
- ☐☐☐ Describe the effects of the use of nuclear energy on the environment.

6.7 Energy from Biomass

- ☐☐☐ Describe the effects of the use of biomass in power generation on the environment.

6.8 Solar Energy

- ☐☐☐ Describe the use of solar energy in power generation.
- ☐☐☐ Describe the effects of the use of solar energy in power generation on the environment.

6.9 Hydroelectric Power

- ☐☐☐ Describe the use of hydroelectricity in power generation.
- ☐☐☐ Describe the effects of the use of hydroelectricity in power generation on the environment.

6.10 Geothermal Energy

- ☐☐☐ Describe the use of geothermal energy in power generation.
- ☐☐☐ Describe the effects of the use of geothermal energy in power generation on the environment.

6.11 Hydrogen Fuel Cell

- ☐☐☐ Describe the use of hydrogen fuel cells in power generation.
- ☐☐☐ Describe the effects of the use of hydrogen fuel cells in power generation on the environment.

6.12 Wind Energy

- ☐☐☐ Describe the use of wind energy in power generation.
- ☐☐☐ Describe the effects of the use of wind energy in power generation on the environment.

6.13 Energy Conservation

- ☐☐☐ Describe methods for conserving energy.

7. Atmospheric Pollution

7.1 Introduction to Air Pollution

- ☐☐☐ Identify the sources and effects of air pollutants.

7.2 Photochemical Smog

- ☐☐☐ Explain the causes and effects of photochemical smog and methods to reduce it.

7.3 Thermal Inversion

- ☐☐☐ Describe thermal inversion and its relationship with pollution.

7.4 Atmospheric CO2 and Particulates

- ☐☐☐ Describe natural sources of CO₂ and particulates.

7.5 Indoor Air Pollutants

- ☐☐☐ Identify indoor air pollutants.
- ☐☐☐ Describe the effects of indoor air pollutants.

7.6 Reduction of Air Pollutants

- ☐☐☐ Explain how air pollutants can be reduced at the source.

7.7 Acid Rain

- ☐☐☐ Describe acid deposition.
- ☐☐☐ Describe the effects of acid deposition on the environment.

7.8 Noise Pollution

☐☐☐ Describe human activities that result in noise pollution and its effects.

8. Aquatic and Terrestrial Pollution

8.1 Sources of Pollution

☐☐☐ Identify differences between point and nonpoint sources of pollution.

8.2 Human Impacts on Ecosystems

☐☐☐ Describe the impacts of human activities on aquatic ecosystems.

8.3 Endocrine Disruptors

☐☐☐ Describe endocrine disruptors.

☐☐☐ Describe the effects of endocrine disruptors on ecosystems.

8.4 Human Impacts on Wetlands and Mangroves

☐☐☐ Describe the impacts of human activity on wetlands and mangroves.

8.5 Eutrophication

☐☐☐ Explain the environmental effects of excessive use of fertilizers and detergents on aquatic ecosystems.

8.6 Thermal Pollution

☐☐☐ Describe the effects of thermal pollution on aquatic ecosystems.

8.7 Persistent Organic Pollutants (POPs)

☐☐☐ Describe the effect of persistent organic pollutants (POPs) on ecosystems.

8.8 Bioaccumulation and Biomagnification

☐☐☐ Describe bioaccumulation and biomagnification.

☐☐☐ Describe the effects of bioaccumulation and biomagnification.

8.9 Solid Waste Disposal

☐☐☐ Describe solid waste disposal methods.

☐☐☐ Describe the effects of solid waste disposal methods.

8.10 Waste Reduction Methods

☐☐☐ Describe changes to current practices that could reduce the amount of generated waste and their associated benefits and drawbacks.

8.11 Sewage Treatment

☐☐☐ Describe best practices in sewage treatment.

8.12 Lethal Dose 50% (LD₅₀)

☐☐☐ Define lethal dose 50% (LD_{50}).

8.13 Dose Response Curve

☐☐☐ Evaluate dose response curves.

8.14 Pollution and Human Health

☐☐☐ Identify sources of human health issues that are linked to pollution.

8.15 Pathogens and Infectious Diseases

☐☐☐ Explain human pathogens and their cycling through the environment.

9. Global Change

9.1 Stratospheric Ozone Depletion

☐☐☐ Explain the importance of stratospheric ozone to life on Earth.

9.2 Reducing Ozone Depletion

☐☐☐ Describe chemicals used to substitute for chlorofluorocarbons (CFCs).

9.3 The Greenhouse Effect

☐☐☐ Identify the greenhouse gases.

☐☐☐ Identify the sources and potency of the greenhouse gases.

9.4 Increases in the Greenhouse Gases

☐☐☐ Identify the threats to human health and the environment posed by an increase in greenhouse gases.

9.5 Global Climate Change

☐☐☐ Explain how changes in climate, both short- and long-term, impact ecosystems.

9.6 Ocean Warming

☐☐☐ Explain the causes and effects of ocean warming.

9.7 Ocean Acidification

☐☐☐ Explain the causes and effects of ocean acidification.

9.8 Invasive Species

☐☐☐ Explain the environmental problems associated with invasive species and strategies to control them.

9.9 Endangered Species

☐☐☐ Explain how species become endangered and strategies to combat the problem.

9.10 Human Impacts on Biodiversity

☐☐☐ Explain how human activities affect biodiversity and strategies to combat the problem.