

MP4-Ecology and Environment

Content Area: **Science**
Course(s): **Science 6**
Time Period: **Marking Period 4**
Length: **MP 4**
Status: **Published**

Essential Questions

- How do living things affect one another?
- How do energy and matter move through ecosystems?
- How do people use Earth's resources?

Big Ideas

- Living things interact with their environment.

Cross-Curricular Integration

Language Arts Companion Standards:

WHST 6-8.1 Write arguments focused on *discipline-specific content*.

WHST 6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

RST 6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

RST 6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST 6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

RST6-8.9 Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Activity:

Pyramid of Energy: What is the process of energy flow from the sun through tertiary consumers? Based on your background knowledge and evidence from your research about the energy pyramid, could an ecosystem survive when inverted? In an essay, explain the flow of energy in the pyramid. Explain the effects of inverting the ecosystem. Defend your position related to ecosystem survival. Use research and credible evidence to support your claim and opinion.

Diversity Integration

Objective: Students will complete a graphic organizer on a chosen Scientist every month.

Activity:

1. Students are to make a copy of the graphic organizer that they are to complete on the scientists.
2. They will then need to complete the organizer by doing research on the person and their field of science that the scientists work in.
3. After finding information about the scientist, they will then need to write a paragraph on the person and explain to us “Why is this scientist famous? What have they done in their lifetime to help out the world?”

Science and Society

Thomas Malthus

Essays on the Principle of Population

Rachel Carson

American biologist and environmentalist

John Muir

Naturalist

Technology Integration

8.1.8.DA.1 Organize and transform data collected using computational tools to make it usable for a specific purpose.

8.1.8.DA.5 Test, analyze .and refine computational models

Activity:

SWBAT complete a web-based research project on 2 different biomes that make up the Earth's ecosystems and create a Google Slide presentation that they will present to the class.

Enduring Understandings

Next Generation Standards

MS. Human Impacts/Interdependent Relationships in Ecosystems

MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their impact.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

MS-LS2-2 Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems

MS-LS2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Disciplinary Core Ideas

ESS3.A: Natural Resources

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)

ESS3.B: Natural Hazards

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)

ESS3.C: Human Impacts on Earth Systems

- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But Changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)
- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

(MS- ESS3-3),(MS-ESS3-4)

LS2.A: Interdependent Relationships in Ecosystems

- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually Beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)
- Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5)

LS4.D: Biodiversity and Humans

- Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (MS-LS2-5)

ETS1.B: Developing Possible Solutions

- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5)

Crosscutting Concepts

Patterns

Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)

Patterns can be used to identify cause and effect relationships. (MS-LS2-2)

Cause and Effect

Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3)

Cause and effect relationships may be used to predict phenomena in natural or designed systems.

(MS-ESS3-1), (MS-ESS3-4)

Stability and Change

Small changes in one part of a system might cause large changes in another part. (MS-LS2-4)

Focus Areas

Populations and Communities

- An organism gets the things it needs to live, grow and reproduce from its environment.

- Biotic and abiotic factors make up a habitat.
- The levels of organization in an ecosystem are organism, population, and community.
- Populations can change in size when new members join the population or when members leave the population.
- Some limiting factors for populations are weather conditions, space, food, and water.
- Every organism has a variety of adaptations that are suited to its specific living conditions and help it survive.
- Two major types of interactions among organisms are competition and predation.
- The three main types of symbiotic relationships are mutualism, commensalism, and parasitism.
- Unlike primary succession, secondary succession occurs in a place where an ecosystem currently exists.

Ecosystems and Biomes

- Each of the organisms in an ecosystem fills the energy role of producer, consumer, or decomposer.
- Energy moves through an ecosystem when one organism eats another.
- The most energy is available at the producer level of the pyramid. As energy moves up the pyramid, each level has less energy available than the level below.
- The processes of evaporation, condensation, and precipitation make up the water cycle.
- The processes by which carbon and oxygen are recycled are linked. Producers, consumers, and decomposers play roles in recycling both.
- Nitrogen moves from the air into the soil, into living things, and back into the air or soil.
- The six major biomes are desert, rainforest, grassland, deciduous forest, boreal forest and tundra.
- There are two types of aquatic, or water-based, ecosystems: freshwater ecosystems and marine (or saltwater) ecosystems.
- Continental drift, wind, water, and living things are all means of distributing species. Other factors, such as physical barriers, competition and climate can limit species dispersal.

Resources and Living Things

- Environmental issues fall into three main categories: Resource use, population growth, and pollution.
- To balance opinions, decision makers weigh the cost and benefits of a proposal.
- Natural resources include organisms, water, sunlight, minerals, and oil.
- Humans depend on Earth's natural resources for survival and for development.
- Biodiversity has both economic value and ecological value within an ecosystem.
- Factors that affect biodiversity include climate, area, niche diversity, genetic diversity, and extinction.
- Biodiversity can be negatively or positively affected by the actions of humans.

Science and Engineering Practices

Analyzing and Interpreting Data

- Analyze and interpret data to determine similarities and differences in findings. (MS-ESS3-2)

Constructing Explanations and Designing Solutions

- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS3-1)
- Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3)
- Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)

Engaging in Argument from Evidence

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-ESS3-4)
- Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. (MS-LS2-5)

Resources

Scientific Inquiry

MS-LS2-1 (5.3.8.C.1) *Human Population Growth*, p. 87
MS-LS2-2 (5.3.8.C-D) *Ecosystem Food Chains*, p. 43-47