

Englewood Public School District

Environmental Science

First and Second Marking Periods

Unit 1: Introduction to Environmental Science

Overview: In this unit of study, *planning and carrying out investigations, analyzing and interpreting data, developing and using models, and engaging in arguments from evidence* are key practices to explore the dynamic nature of environmental science and Earth systems. Students apply these practices to illustrate how human impact and Earth's interacting systems cause feedback effects on other Earth systems. The crosscutting concepts of *energy and matter, structure and function, and stability and change* are called out as organizing concepts for these disciplinary core ideas.

Time Frame: 25 to 30 Days

Enduring Understandings:

We can use science to study and understand the complex interactions between humans and their environments.

Essential Questions:

How do scientists uncover, research, and solve environmental problems?

How can we best balance our own interests and needs with the health of the environment?

How do the nonliving parts of Earth's systems provide the basic materials to support life?

Standards	Topics and Objectives	Activities	Resources	Assessments
HS-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. MP.2 Reason abstractly and quantitatively. (HS-ESS2-6) HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas;	Topics	Students will complete the text and digital activities:	Text: <i>Environmental Science: Your World, Your Turn</i>	Student needs will be evaluated after completing <i>Quick Labs, Go Outside Investigations, Map It and Real Data Activities</i> .
	Introduction to Environmental Science	1. Central Case Studies 2. 3-D Geo Tours 3. Quick Labs		
	Economics and Environmental Policy	4. Go Outside Investigations 5. Map It and Real Data Activities	Materials: For Quick Labs and Go Outside Investigations: • See Teacher Edition p. 28	Students will receive a grade for the following lab activity conclusions: Green vs. Conventional Cleaners, Working Trees, and The Effect of CO ₂ on Plants.
	Earth's Environmental Systems	6. Unit Projects 7. Lab: Green vs. Conventional Cleaners	For Lab: Green vs. Conventional Cleaners • Spray bottle of green glass cleaner A (¼ c white vinegar, ½ tsp liquid dish soap, 2 c water) • Paper towels, newspapers,	Student portfolios will be used to monitor progress.
	Twenty-First Century Themes and Skills include: • The Four C's • Life and Career Skills	8. Lab: Working Trees 9. Lab: The Effect of CO ₂ on Plants		

choose and interpret the scale and the origin in graphs and data displays. (HS-ESS2-6)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-ESS2-6)

MP.4 Model with mathematics. (HS-ESS2-6)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-ESS2-6)

- Information and Media Literacy
- Global Awareness
- Environmental Literacy

Objectives

Explain the focus of environmental science.

Describe the recent trends in human population and resource consumption.

Explain what science is and describe the scientific process.

Explain the study of environmental ethics.

Explain the relationship between economics and the environment.

Evaluate the past and future direction of U.S. and international environmental policy.

Explain the role of matter in the environment.

Describe the major ways that Earth's systems interact.

Students will watch Bellringer Videos to introduce topics and [Crash Course Ecology](#) videos to reinforce concepts

Student will watch [Environmental Engineering](#) to highlight how environmental engineers use biology, chemistry, and physical sciences.

Students will explore environmental policy in the lesson [Take A Poll, Debate the Issue: Environmental Policy](#)

Students model the carbon cycle in the [Earth Systems Activity](#) and its connection with Earth's climate.

Students will work through the content of the [Carbon Connections](#) module, which includes numerous models and interactives to gain a deeper understanding of the role of carbon in the climate system.

Student will watch [The Carbon Cycle](#) and [Feedback Loops: How Nature Gets Its Rhythms](#) and participate in an online quiz and discussion.

Enrichment Activity: Students will select satellite datasets using the [MY NASA DATA](#) interactive website to answer questions related to system interactions and feedbacks.

or clean cloths

- Spray bottle of green glass cleaner *B* (¼ c white vinegar, ¼ c water, 1 tbsp. cornstarch)
- Safe-to-test surfaces to be cleaned
- Spray bottle of ammonia-based conventional glass cleaner

Websites:

- <http://www.pearsonrealize.com/>
- [Take A Poll, Debate the Issue: Environmental Policy](#)
- [Earth Systems Activity](#)
- [Carbon Connections](#)

Videos:

- <http://www.pearsonrealize.com/>
- [Crash Course Ecology](#)
- [Environmental Engineering](#)
- [The Carbon Cycle](#)
- [Feedback Loops: How Nature Gets Its Rhythms](#)

Enrichment Lesson Plans:

See [MY NASA DATA](#)

A Common Formative Assessment will be given at the close of this unit to assess students' mastery of the skills identified.

Unit 2: Ecology

Overview: In this unit of study, students formulate answers to the question: "How and why do organisms interact with each other (biotic factors) and their environment (abiotic factors), and what affects these interactions?" Secondary ideas include the interdependent relationships in ecosystems and dynamics of ecosystems. Students use *mathematical reasoning* and *models* to make sense of factors affecting biodiversity and populations. The crosscutting concepts of *scale, proportion, and quantity* and *stability and change* are called out as organizing concepts for the disciplinary core ideas. Students are expected to use *mathematical reasoning* and *models* to demonstrate proficiency with the disciplinary core ideas.

Time Frame: 25 to 30 Days

Enduring Understandings:

Life on Earth depends on interactions among organisms and between organisms and their environments.

Essential Questions:

How do changes in population size relate to environmental conditions?

How do organisms affect one another's survival and environment?

How does the environment affect where and how an organism lives?

Why is it important to protect biodiversity?

Standards	Topics and Objectives	Activities	Resources	Assessments
HS-LS2-4 Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. NJSLSA.R1 Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. RST.11-12.1 (HS-LS2-1),(HS-LS2-2),(HS-LS2-6)	Topics	Students will complete the text and digital activities:	Text: <i>Environmental Science: Your World, Your Turn</i>	Student needs will be evaluated after completing Quick Labs, Go Outside Investigations, Map It and Real Data Activities.
	Population Ecology Evolution and Community Ecology Biomes and Aquatic Ecosystems Biodiversity and Conservation Twenty-First Century Themes and Skills include: <ul style="list-style-type: none"> The Four C's Life and Career Skills Information and Media literacy 	1. Central Case Studies 2. 3-D Geo Tours 3. Quick Labs 4. Go Outside Investigations 5. Map It and Real Data Activities 6. Unit Projects 7. Lab: Mark-and-Recapture 8. Lab: Yeast Population Growth 9. Lab: Simulating Adaptations 10. Lab: Collecting Climate Data 11. Lab: Overharvesting Students will watch Bellringer	Materials: For Quick Labs and Go Outside Investigations: <ul style="list-style-type: none"> See Teacher Edition p. 28 For Lab: Yeast Population Growth <ul style="list-style-type: none"> Yeast culture Microscope Stirring rod Graduated cylinder (10 mL) Dropper pipettes (3) Test tubes (2) 	Students will receive a grade for the following lab activity conclusions: Mark-and-Recapture, Yeast Population Growth, Simulating Adaptations, Collecting Climate Data, and Overharvesting. Student portfolios will be used to monitor progress. A Common Formative

<p>NJSLSA.R7 Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. RST.11-12.7 (HS-LS2-6)</p> <p>NJSLSA.R8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence. RST.11-12.8 (HS-LS2-6)</p> <p>NJSLSA.W2 Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content. WHST.9-12.2 (HS-LS2-1),(HS-LS2-2) MP.2 Reason abstractly and quantitatively. (HS-LS2-1),(HS-LS2-2), (HS-LS2-4), (HS-LS2-6) MP.4 Model with mathematics. (HS-LS2-1),(HS-LS2-2), (HS-LS2-4), HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in</p>	<ul style="list-style-type: none"> • Global Awareness • Environmental Literacy <p>Objectives</p> <p>Describe the different levels of organization studied by ecologists.</p> <p>Explain the difference between biotic and abiotic factors.</p> <p>Discuss how an organism's habitat relates to its survival.</p> <p>Explain how and why populations are studied.</p> <p>Describe the factors that influence a population's growth rate.</p> <p>Explain how evolution, speciation, and extinction affect the diversity of life on Earth.</p> <p>Discuss the factors that influence an organism's niche.</p> <p>Compare and contrast different types of symbiotic relationships.</p> <p>Explain the role of energy flow in an ecosystem.</p> <p>Describe what happens to a community after a disturbance.</p>	<p>Videos to introduce topics and Crash Course Ecology videos to reinforce concepts</p> <p>Students use the data presented in the African Lions Activity to make a prediction regarding the zebra population during the periods of increase rainfall.</p> <p>Students will explore the Building Biodiversity , PREDICTS project, and GLOBIO project websites to develop an understanding of how computational models of the impacts on biodiversity are created.</p> <p>Student will watch The Microbial Jungles All Over The Place (And You), Phenology and Nature's Shifting Rhythms, and Why is Biodiversity So Important participate in an online quiz and discussion.</p> <p>Enrichment Activity: Students collect data during the Bunny Population Growth Activity simulation and use it to support their explanation of natural selection in a rabbit population and how populations change over time when biotic or abiotic factors change.</p>	<ul style="list-style-type: none"> • Coverslips (3) • Test-tube rack • Dissecting probe • Graph template (in lab) or graph paper <p>For Lab: Simulating Adaptations</p> <ul style="list-style-type: none"> • Each of various simulated beaks (tongs, test tube holder, chopsticks, spatula, medicine dropper, dissecting needle—or similar tools as available) • Simulated foods (liquid, marbles, pennies, sliced banana, sand, beans—or alternatives) • 6 dissecting pans • 6 large paper cups • Cardboard • 6 balances • Stop watch or watch with second hand • Graph template (in lab) or graph paper • Tape <p>For Lab: Collecting Climate Data</p> <ul style="list-style-type: none"> • Thermometer • Global biome map • Access to daily weather news source <p>For Lab: Overharvesting</p> <ul style="list-style-type: none"> • 20 red kidney beans • Small jar with lid • 25 white great northern beans 	<p>Assessment will be given at the close of this unit to assess students' mastery of the skills identified.</p>
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graphs and data displays. (HS-LS2-1),(HS-LS2-2), (HS-LS2-4)

HSN.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-LS2-1),(HS-LS2-2), (HS-LS2-4)

HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-LS2-1),(HS-LS2-2), (HS-LS2-4)

HSS-IC.A.1 Represent data with plots on the real number line. HSS-ID.A.1 (HS-LS2-6)

Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (HS-LS2-6)

Explain the conditions necessary for a species to become invasive.

Explain how organisms adapt to the conditions of their biomes.

Compare and contrast different types of aquatic ecosystems.

Explain how biodiversity varies and the economic benefits of biodiversity.

Determine the major causes of biodiversity loss and develop strategies to protect against it.

- Small paper cup
- 5 pinto beans
- Fork
- 30 rice grains
- Stopwatch or clock with second hand
- Shallow dish or bowl

Websites:

- <http://www.pearsonrealize.com/>
- [African Lions Activity](#)
- [Building Biodiversity](#)
- [PREDICTS project](#)
- [GLOBIO project](#)

Videos:

- <http://www.pearsonrealize.com/>
- [Crash Course Ecology](#)
- [The Microbial Jungles All Over The Place \(And You\)](#)
- [Nature's Shifting Rhythms](#)
- [Why is Biodiversity So Important](#)

Enrichment Lesson Plans:

See [Bunny Population Growth Activity](#)

Modifications:

- New Jersey Department of Education – Instructional Supports and Scaffolds
- Suggested Strategies for English Language Learners
- Enrichment activities were created to allow for greater personalized learning to meet the needs of all learners including students with gifts and talents.