

Englewood Public School District

Environmental Science

Third Marking Period

Unit 4: Earth's Resources

Overview: In this unit students *construct an explanation based on evidence* for how the availability of natural resources are connected to human activity. Additionally, while students are exploring this idea they apply scientific and engineering ideas to *design, evaluate, and refine* a device that can be used to minimize the impacts of natural hazards. They create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity, and create or revise a simulation to test a solution to mitigate adverse impacts of human activity. They use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity, and evaluate or refine a technological solution that reduces impacts of human activities on natural systems. The crosscutting concepts of *cause and effect, stability and change, systems and system models* are called out as an organizing concept for these disciplinary core ideas.

Time Frame: 40 to 45 Days

Enduring Understandings:

We need to use Earth's finite resources in a sustainable way.

Essential Questions:

How can we use Earth's resources sustainably?

How can we balance our growing demand for food with our need to protect the environment?

At what point do the costs of mining outweigh the benefits?

Why are we running out of water?

How can we ensure everyone has clean air to breathe?

Standards	Topics and Objectives	Activities	Resources	Assessments
HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	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.
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural	Forestry and Resource Management	1. Central Case Studies	Materials: For Quick Labs and Go Outside Investigations • See Teacher Edition p. 28 For Making Recycled Paper	Students will receive a grade for the following lab activity conclusions: Making Recycled Paper, How Much
	Soil and Agriculture	2. 3-D Geo Tours		
	Mineral Resources and Mining	3. Quick Labs		
		4. Go Outside Investigations		
		5. Map It and Real Data Activities		
		6. Unit Projects		
		7. Lab: Making Recycled		

<p>resources, occurrence of natural hazards, and changes in climate have influenced human activity.</p> <p>HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.</p> <p>HS-LS4-6 Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.</p> <p>HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</p> <p>HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.</p> <p>HS-ETS1-3 Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety,</p>	<p>Water Resources</p> <p>The Atmosphere</p> <p>Twenty-First Century Themes and Skills include:</p> <ul style="list-style-type: none"> • The Four C's • Life and Career Skills • Information and Media literacy • Global Awareness • Environmental Literacy 	<p>Paper</p> <p>8. Lab: How Much Lumber?</p> <p>9. Lab: Testing Soil Properties</p> <p>10. Lab: Local Planting Conditions</p> <p>11. Lab: Mineral Identification</p> <p>12. Lab: The Water You Drink</p> <p>13. Lab: Testing Water Quality</p> <p>14. Lab: Acid Rain and Seeds</p> <p>15. Lab: What is in the Air?</p> <p>16. Lab: Using Your UV Index</p>	<ul style="list-style-type: none"> • Small pieces of several types of paper (copier paper, paper towel, brown paper bag, newspaper, tissue), each about 5 cm × 5 cm • Water • Dissecting microscope or hand lens or magnifying glass • Large plastic container • Wire hanger • Metric ruler • One leg from a pair of nylons • Sink • Newspaper • Twine or string long enough to reach across the room • Extra newspaper for drying area • Measuring cup • Computer with Internet access, or other reference sources about paper recycling • Blender 	<p>Lumber?, Testing Soil Properties, Local Planting Conditions, Mineral Identification, The Water You Drink, Testing Water Quality, Acid Rain and Seeds, What is In the Air?, Using Your UV Index.</p>
	<p>Objectives</p> <p>Explain the importance of managing specific renewable resources and describe three resource management approaches.</p> <p>Describe how erosion, desertification, and soil pollution affect the productivity of soil.</p> <p>Explain the importance of industrial agriculture and the green revolution.</p> <p>Explain why the world needs to grow more food and to grow it sustainably.</p> <p>Describe the negative impacts of mining on the environment and society and ways that mineral use can become more responsible.</p> <p>Discuss how fresh water can</p>	<p>Students will watch Bellringer Videos to introduce topics and Crash Course Ecology videos to reinforce concepts.</p> <p>Students will simulate maintaining good soil quality in the Land Management Model.</p> <p>Students will create and run an investigation using USGS Real-time Water Data to determine the relationship between streamflow and precipitation data, or another parameter.</p> <p>Students explore the Greenhouse Effect simulation to model the atmosphere during the Ice Age and today.</p> <p>Students will explore what impacts air quality in the interactive Air Pollution Model (aerial) and Air Pollution Model (Cross-Section).</p> <p>Students will explore Conservation Maps for a global perspective of land use and</p>	<p>For Lab: How Much Lumber?</p> <ul style="list-style-type: none"> • 12 inch rulers (2) • 100ft measuring tape • Masking tape • Calculator <p>For Lab: Testing Soil Properties</p> <ul style="list-style-type: none"> • Soil samples: clay, loam, sand, and silt (200 mL plus one spoonful each) • Microscope 	<p>Student portfolios will be used to monitor progress.</p> <p>A Common Formative Assessment will be given at the close of this unit to assess students' mastery of the skills identified.</p>

<p>reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.</p> <p>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-ESS3-1),(HS-ESS3-4)</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-ESS3-4), (HS-ETS1-3)</p> <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-ETS1-3)</p> <p>NJSLSA.R9 Analyze and reflect on how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. RST.11-12.9 (HS-ETS1-3).</p>	<p>be both renewable and limited.</p> <p>Describe strategies for addressing water depletion.</p> <p>Discuss the sources and effects of major water pollutants.</p> <p>Explain the causes of air pollution and the effect on human health.</p> <p>Evaluate measures that can limit and prevent pollution of the atmosphere.</p>	<p>conservation efforts</p> <p>Student will complete the environmental study project Land and People: Finding a Balance to consider real environmental dilemmas concerning water use and provide solutions to these dilemmas.</p> <p>Student will watch Reforestation: Impact on Climate, Should We Eat Bugs?, The Haber Process, Where We Get Our Fresh Water and Fresh Water Scarcity: An Introduction to the Problem and participate in an online quiz and discussion.</p> <p>Enrichment Activity: Students explore how cost-benefit analysis is applied to water sanitation in order to apply this model to design solutions related to human sustainability.</p>	<ul style="list-style-type: none"> • Paper plate • Marker • Spoon • 4 pieces of cheesecloth • Hand lens or magnifying glass • 4 rubber bands • Dropper • 100 mL graduated cylinder • Water • 4 large plastic cups • 4 large paper cups • 4 large funnels • Pencil • Stopwatch <p>For Lab: Local Planting Conditions</p> <ul style="list-style-type: none"> • Computer with internet access • Plant hardiness zone map • Graph paper • Tape measure or meter sticks • Seed catalogs <p>For Lab: Mineral Identification</p> <ul style="list-style-type: none"> • 3-5 unidentified mineral samples • Penny • Ceramic tile • Steel nail • Hand lens or magnifying glass • Vinegar <p>For Lab: Testing Water Quality</p> <ul style="list-style-type: none"> • Large jar and cover (2) • Waterproof marker • Thermometer
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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-ESS3-1)

NJSLSA.W5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. WHST.9-12.5 (HS-LS4-6)

NJSLSA.W7 Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation. WHST.11-12.7 (HS-ESS2-5), (HS-LS4-6)

MP.2 Reason abstractly and quantitatively. (HS-ESS3-1),(HS-ESS3-3),(HS-ESS3-4),(HS-ESS3-6),(HS-ETS1-3)

MP.4 Model with mathematics. (HS-ESS3-3),(HS-ESS3-6),(HS-ETS1-3)

HSN-Q.A.1 Use units as a way to understand problems

- Full range (0-14) pH strips and chart
- Medicine dropper
- Meter stick
- Hand sanitizer

For Lab: Acid Rain and Seeds

- Vinegar solutions (5)
- Dried beans (50)
- pH paper (5 pieces)
- Paper towels (5)
- pH color chart
- Re-sealable plastic sandwich bags (5)
- Dropper
- Hand lens or magnifying glass
- Jar containing distilled water
- Graph paper
- Marking pen

For Lab: What is in the Air?

- Unlined Index card or cardboard
- Metric ruler
- Scissors
- Single-hole punch
- 2 m length of string
- Paper towel
- Petroleum jelly
- Hand lens, magnifying glass, or dissecting microscope

For Lab: Using Your UV Index

- Computer with internet access or pre-printed UV listings
- Graph template (in lab) or

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 graphs and data displays. (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

HSN-Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

HSN-Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-ESS2-5), (HS-ESS3-1),(HS-ESS3-4),(HS-ESS3-6)

graph paper

Websites:

- <http://www.pearsonrealize.com/>
- [Land Management Model](#)
- [USGS Realtime Water data](#)
- [Greenhouse Effect](#)
- [Air Pollution Model \(aerial\)](#)
- [Air Pollution Model \(Cross-Section\)](#)
- [Conservation Maps](#)

Videos:

- <http://www.pearsonrealize.com/>
- [Crash Course Ecology](#)
- [Reforestation: Impact on Climate](#)
- [Should We Eat Bugs?](#)
- [The Haber Process](#)
- [Where We Get Our Fresh Water](#)
- [Fresh Water Scarcity: An Introduction to the Problem](#) and

Enrichment Lesson Plans:

See [water sanitation](#)

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.