

Environmental Science Unit 5- Resources- Mineral Resources, Nonrenewable Energy, & Renewable Energy

Unit Overview: This unit is composed of four chapters- *Mining and Mineral Resources*, *Nonrenewable Energy*, *Renewable Energy*, and *Waste*. In unit 5, students will learn about minerals - types of minerals, how they form, how humans extract minerals from the Earth through different types of mining, and the potential impacts and consequences of mining. Students will also gain a deeper understanding of nonrenewable resources, such as fossil fuels and nuclear energy as well as renewable resources such as solar energy and hydroelectricity. In the final chapter of this unit, students will study waste - types of waste produced by humans, how to reduce solid waste, and the types of hazardous waste.

Essential Questions:

Chapter 16- Mining and Mineral Resources

- What is a mineral?
- What are the uses for minerals?
- Can you describe the environmental consequences of mining?
- Can you describe different mining regulations and explain why they were put in place?

Chapter 17- Nonrenewable Energy

- What are fossil fuels and how do they form?
- What are the advantages and disadvantages of using fossil fuels?
- What is nuclear energy and how does it work?
- What are the advantages and disadvantages of nuclear energy?

Chapter 18- Renewable Energy

- Can you list forms of renewable energy and compare the advantages/disadvantages for using each form?
- Explain the difference between energy efficiency and energy conservation
- List 3 ways that you can conserve energy in your daily life

Chapter 19- Waste

- Describe how landfills work. What is a problem caused by landfills?
- How can you produce less waste?
- What are the benefits to composting?
- What are the steps that an item must go through to be recycled?

Living Environment Core Curriculum- MST Standards

Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

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7.1 - Describe the range of interrelationships of humans with the living and nonliving environment.

7.3 - Explain how individual choices and societal actions can contribute to improving the environment.

Earth Science Core Curriculum- MST Standards

Key Idea 2: Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

2.2 - Explain how incoming solar radiation, ocean currents, and land masses affect weather and climate

Key Idea 3: Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity.

3.1 - Explain the properties of materials in terms of the arrangement and properties of the atoms that compose them.

New York State Science Learning Standards Performance Expectations

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions but changing conditions may result in a new ecosystem.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

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.

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Environmental Science Content	NYSSLS Disciplinary Core Ideas	Additional Resources	Project Based Resources and Activities - Version 1 Scaffolded with Supports	Project Based Resources and Activities - Version 2
<p>Chapter 16- Mining and Mineral Resources Section 1-Minerals and Mineral Resources</p> <ul style="list-style-type: none"> Define a mineral Explain the difference between a metal and a nonmetal, give examples of each Describe the three processes by which ore minerals form <p>Section 2- Mineral Exploration and Mining</p> <ul style="list-style-type: none"> Describe the manner in which mining companies explore for new mineral deposits Describe three methods of subsurface mining Define placer deposit and explain how they form Describe the steps that take place in smelting an ore <p>Section 3- Mining Regulations and Mine Reclamation</p> <ul style="list-style-type: none"> Describe seven important potential environmental consequences of mining Name and describe four federal laws that relate to mining and reclaiming mined land Define reclamation Describe two ways in which state governments regulate mining 	<ul style="list-style-type: none"> Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. Carrying capacity results from the availability of biotic and abiotic factors and from challenges such as predation, competition, and disease. A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of 	<p>Text Resource <i>Environmental Science – Holt Chapter 16 - pp. 411 - 425</i></p> <p>Teacher Resources USMIN Mineral Deposit Data Base – Detailed descriptions of mineral mines and deposits with the United States.</p> <p>Rocks and Minerals – What are Minerals? Resource from School Energy & Movement explaining what minerals are.</p> <p>Mineral Resources – Source for educational articles on minerals, mineral properties, and common mineral types.</p> <p>Earth Materials – The Rock Forming Minerals – Online literacy resource for information on minerals and mineral resources.</p> <p>What are minerals? – This online resource provides examples of minerals and discusses properties of minerals.</p> <p>Mineral Identification Guide – This guide includes information and photographs regarding a variety of minerals. Information in the guide includes the minerals physical characteristics, location of collection, and everyday uses.</p> <p>Mineral Identification Chart – This common mineral identification chart identifies minerals based on streak, hardness, and cleavage/fracture.</p>	<p>Environmental News Summary Students research and summarize a current event article. Environmental News Summary Student Resource Unit 5</p> <p>Innovations in Mining Part 1 Students will learn about the costs associated with operating a mine and how technology can help to reduce the cost. In Part 1 students explore the costs associated with the mining industry. Teacher Resource Innovations in Mining Part 1 Student Resource Sheet 1: The Costs of Mining</p> <p>Innovations in Mining Part 2 Students will form groups where they will research one type of emerging technology and how it can benefit and reduce costs in the mining industry. Teacher Resources Innovations in Mining Part 2 Version 1 Student Capture Sheet – Product Research</p>	<p>Environmental News Summary Students research and summarize two current event articles. Environmental News Summary Student Resource Unit 5</p> <p>Innovations in Mining Part 1 Students will learn about the costs associated with operating a mine and how technology can help to reduce the cost. In Part 1 students explore the costs associated with the mining industry. Teacher Resource Innovations in Mining Part 1 Student Resource Sheet 1: The Costs of Mining</p> <p>Innovations in Mining Part 2 Students will form groups where they will research one type of emerging technology and how it can benefit and reduce costs in the mining industry. Additionally, students will do further research on the future of mining – exploring the possibility of mining in space or the ocean floor. Teacher Resources Innovations in Mining Part 2 Version 2 Student Capture Sheet – Product Research</p>

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invasive species, and climate change. Sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.

- Resource availability has guided the development of human society.
- All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.
- The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources.
- Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities.
- When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
- Minerals are the building blocks of igneous, metamorphic, and sedimentary rocks and can be identified using physical and chemical characteristics. These rock types are evidence of stages of constant recycling of Earth material by surface processes and convection currents in the mantle.

[Mineral Identification Chart](#) – This mineral identification chart identifies minerals based on shape, color, streak, hardness, magnetism, optical properties, chemical properties, and fluorescence.

[Video Resources](#) – All videos are in Nearpod format.

[Introduction to Minerals](#) - This video includes what minerals are and what criteria must be met in order for a substance to be considered a mineral.

[Identifying Minerals](#) – This video is an overview of tests that can help identify a mineral sample.

[Mineral Formation](#) – This video highlights the three main ways minerals are formed and the processes that accompany mineral formation.

[Metals, Nonmetals & Metalloids](#) This video outlines the difference between metals, nonmetals & metalloids.

Is Mining Important? – This video demonstrates the importance of mining in our world.

[Microbial Mining Laboratory Activity – Reaction of Steel Wool with Vinegar](#) – Michael Lovullo, Environmental Science Teacher from PS 198 International Preparatory School (IPrep) demonstrates an oxidation-reduction involving iron.

The Sci Guys explain an oxidation-reduction/exothermic reaction in this video – [Steel Wool in Vinegar](#)

Microbial Mining- Students explore the role biotechnology plays in mining and wastewater treatment. This activity includes researching how microorganisms are used to treat and restore metal-contaminated wastewater through direct and indirect bacterial leaching mediated by chemical reactions and a laboratory activity investigating an oxidation-reduction reaction involving iron.

[Microbial Mining Teacher Resource](#)
[Microbial Mining Student Resource](#)

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[Microbial Mining Teacher Resource](#)
[Microbial Mining Student Resource](#)

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Chapter 17 -Nonrenewable Energy

Section 1-Energy Resources and Fossil Fuels

- Explain how fuels are used to generate electricity in an electric power plant
- Explain how fossil fuels form and how they are used
- Compare the advantages and disadvantages of fossil fuel use

Section 2- Nuclear Energy

- Describe nuclear fission
- Describe how a nuclear power plant works
- Describe the advantages and disadvantages of nuclear energy

- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem.
- Carrying capacity results from the availability of biotic and abiotic factors and from challenges such as predation, competition, and disease.
- Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species.
- Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Sustaining biodiversity so that ecosystem functioning, and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.
- Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere.

Text Resource

Environmental Science – Holt
Chapter 17 - pp. 435 - 447

Student Resources

[Solar Schools](#)- Information on Renewable and Non-Renewable Energy sources.

[U.S. Energy Information Administration](#)

[\(EIA\)](#) – Guide to understanding energy, non-renewable sources, renewable sources, secondary sources, U.S. energy facts, and energy and the environment.

Teacher Resources

[National Geographic Energy Resources Collection](#) – Energy resource collection that includes videos, maps, interactives, and articles.

[U.S. Department of Energy Video Collection](#)

[Library](#) – Collected works of 26 videos that explore fundamental concepts behind renewable energy sources and energy efficiency.

NEED – Carbon Footprint and

Transportation – This activity provides opportunity for students to explain their individual carbon footprint and list ways to reduce carbon footprints.

[Carbon Footprint Teacher Resource](#)

[Carbon Footprint Student Resource](#)

[Carbon Footprint Road Trip Student](#)

[Resource](#)

[Dakota Access Pipeline: What is worth](#)

[fighting for?*](#) – This resource from the BPS Office of CLRI, allows students to critically consider the Dakota Access Pipeline protest in North Dakota.

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	<ul style="list-style-type: none"> • Resource availability has guided the development of human society. • All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. • The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. • Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. • When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. 			
<p>Chapter 18-Renewable Energy Section 1- Renewable Energy Today</p> <ul style="list-style-type: none"> • List six forms of renewable energy and compare their advantages and disadvantages • Describe the current state of wind energy technology • Describe how hydroelectric energy, geothermal energy, and geothermal heat pumps work 	<ul style="list-style-type: none"> • Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. • Carrying capacity results from the availability of biotic and abiotic factors and from challenges such as predation, competition, and disease. • Humans depend on the living world for the resources and other benefits provided by 	<p>Text Resource <i>Environmental Science – Holt Chapter 18 - pp. 457 - 471</i></p> <p>Student Resources Solar Schools- Information on Renewable and Non-Renewable Energy sources.</p> <p>U.S. Energy Information Administration (EIA) – Guide to understanding energy, non-renewable sources, renewable sources, secondary sources, U.S. energy facts, and energy and the environment.</p>	<p><u>ACE Turbine in the Wind Classroom Activity</u> Students build wind turbines out of cardboard, making adjustments to improve upon their design to determine which design is most efficient. Also included is an investigation of real time data on turbines used, reflections on the benefits and drawbacks to wind energy with the opportunity to share their climate story.</p> <p>Teacher Resource Student Resource</p>	<p><u>ACE Turbine in the Wind Classroom Activity</u> Students build wind turbines out of cardboard, making adjustments to improve upon their design to determine which design is most efficient. Also included is an investigation of real time data on turbines used, reflections on the benefits and drawbacks to wind energy with the opportunity to share their climate story.</p> <p>Teacher Resource Student Resource</p>

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<p>Section 2- Alternative Energy and Conservation</p> <ul style="list-style-type: none"> Describe three alternative energy technologies Explain the difference between energy conservation and energy efficiency Identify three ways that you can conserve energy in your daily life 	<p>biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.</p> <ul style="list-style-type: none"> All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors. Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. 	<p>Teacher Resources National Geographic Energy Resources Collection – Energy resource collection that includes videos, maps, interactives, and articles.</p> <p>U.S. Department of Energy Video Collection Library – Collected works of 26 videos that explore fundamental concepts behind renewable energy sources and energy efficiency.</p> <p>NEED – Managing Home Energy Use – This set of 6 lessons with embedded activities explores home energy use.</p> <p>NEED – This Week in Energy Conservation – This activity introduces students to ways of saving energy at home and on the road. This Week in Energy Conservation Teacher Resource</p> <p>This Week in Energy Conservation News Story Starters</p>	<p>Solar Oven Project Students will create and test a solar oven. Students will have the opportunity to reflect on their observations and brainstorm possible improvements to their oven. Teacher Resource Student Resource Student Assessment</p>	<p>Solar Oven Project Students will create and test a solar oven. Students will have the opportunity to reflect on their observations and brainstorm possible improvements to their oven. This version includes a project of creating a Public Service Announcement providing benefits of solar energy and solar oven use. Teacher Resource Student Resource Student Assessment</p>
<p>Chapter 19- Waste Section 1- Solid Waste</p> <ul style="list-style-type: none"> Name one characteristic that makes a material biodegradable Identify two types of solid waste Describe how a modern landfill works Name two environmental problems caused by landfills 	<ul style="list-style-type: none"> Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life 	<p>Text Resource <i>Environmental Science</i> – Holt Chapter 19 - pp. 481 - 499</p> <p>Teacher Resources Trash Trouble in Paradise* Trash Trouble in Paradise Part 2 article: Politics of Waste Management and Environmental Justice in Hawai'i</p>	<p>Trash Trouble in Paradise* As population increases so does the amount of solid waste produced. This creates a dilemma of how and where to equitably dispose of garbage. This activity explores this situation on the island of O’ahu, one of the Hawaiian Islands. Students explore environmental justice</p>	<p>Trash Trouble in Paradise* As population increases so does the amount of solid waste produced. This creates a dilemma of how and where to equitably dispose of garbage. This activity explores this situation on the island of O’ahu, one of the Hawaiian Islands. Students explore environmental justice concerns by</p>

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<p>Section 2- Reducing Solid Waste</p> <ul style="list-style-type: none"> Identify three ways that you can produce less waste Describe how you can use your consumer buying power to reduce solid waste List the steps that an item must go through to be recycled <p>Section 3- Hazardous Waste</p> <ul style="list-style-type: none"> Name two characteristics of hazardous waste Describe one law that governs hazardous waste Describe two ways to treat hazardous waste safely 	<p>on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.</p> <ul style="list-style-type: none"> When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts. 	<p>Trash Trouble in Paradise Community Profile 1 – Wai’anae</p> <p>Trash Trouble in Paradise Community Profile 2 - Kahuku</p> <p>Trash Trouble in Paradise – Community Profile 3 - Kailua</p> <p>Trash Trouble in Paradise – Community Data Sheet</p> <p>Environmental Justice: Opposing a Toxic Waste Landfill*- Video describes the issues of environmental racism and justice over the location of a toxic landfill in Warren county, North Carolina.</p> <p>Environmental Justice in Dallas* Video highlights a community's fight to receive federal Superfund status to clean up damage from a high-polluting lead smelter.</p> <p>Flint Water Crisis* Failing Flint Who knew what and when. This video explores the Flint Water Crisis and who was responsible.</p> <p>Crisis at West Valley 1: An Overview – This video series is a summary of reports focusing on hazardous waste.</p>	<p>concerns by reading and researching information, including role playing as city council members and/or members of a concerned citizens group.</p> <p>Trash Trouble in Paradise – Teacher Resources</p> <p>Trash Trouble in Paradise – Teacher Presentation Google Slide Deck</p> <p>Trash Trouble in Paradise – Student Resource</p> <p>Trash Trouble in Paradise – Student Presentation Google Slide Template</p> <p>Two-Column Notes for Part 2 Article <i>Politics of Waste Management and Environmental Justice in Hawai’i</i></p>	<p>reading and researching information, including role playing as city council members and/or members of a concerned citizens group.</p> <p>Trash Trouble in Paradise – Teacher Resources</p> <p>Trash Trouble in Paradise – Teacher Presentation Google Slide Deck</p> <p>Trash Trouble in Paradise – Student Resource</p> <p>Trash Trouble in Paradise – Student Presentation Google Slide Template</p>
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Unit 5 Evidence of Learning	Ticket Out • Think-Pair-Share • Formative Assessment • Weekly Quiz • Unit Test • Homework • Review Questions
Unit 5 Materials	<p>Microbial Mining</p> <ul style="list-style-type: none"> Chart paper, markers, Post-it notes, steel wool, vinegar, two 250 ml glass beakers or clear plastic cups, parafilm or paper lid, thermometer, gloves, safety goggles, lab apron. <p>ACE Turbine in the Wind Classroom Activity</p> <ul style="list-style-type: none"> 10” x 42” sheet of heavy-duty cardboard, 16” long dowel, 2 small rubber bands, tape, string, hot glue/hot glue gun, box cutters/scissors, cutting mats, ruler, compass, markers, small fan <p>Solar Oven Project</p> <ul style="list-style-type: none"> Cardboard pizza box, box cutters/scissors, aluminum foil, clear tape, plastic wrap or plastic bag, black construction paper, newspapers, ruler/wooden spoon, thermometer

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Unit 5 Vocabulary	Chapter 16 electric generator fossil fuels mineral nuclear energy nuclear fission nuclear fusion oil reserves ore mineral petroleum placer deposit reclamation smelting subsidence subsurface mining surface mining	Chapter 17 electric generator fossil fuels nuclear energy nuclear fission nuclear fusion oil reserves petroleum	Chapter 18 active solar heating biomass fuel alternative energy energy conservation energy efficiency fuel cell geothermal energy hydroelectric energy passive solar heating renewable energy	Chapter 19 biodegradable landfill compost deep-well injection hazardous water leachate municipal solid waste recycling solid waste source reduction surface impoundment
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<p>English Language Learners (ELL) Enhancements</p> <p>To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p><u>Listening</u></p> <ul style="list-style-type: none"> ● <u>Cross- Linguistic Practices:</u> Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates.) ● <u>Build background knowledge</u> ● <u>Activating Prior Knowledge</u> Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content ● <u>Activating Prior Knowledge</u> ● <u>Visuals</u> - GIFs, pictures- will assist students in understanding what they are listening to. Use visual thinking strategies to set the lens for learning. ● Video to review or introduce a topic – use closed captioning to help students see the words and pronunciations while they listen to the content. ● <u>Word stretching / Vowel stretching</u> When instructing allows student to listen closely to the pronunciation of the word ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening. 	<p><u>Speaking</u></p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence - such as <i>The water cycle is...</i> or <i>I think that water cycle is...</i> ● <u>Academic Conversation Starters:</u> Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include- I expect ___ to happen. My data shows that... This helps students have a more science focused dialogue. ● <u>Choral Reading</u> - To build fluency, self-confidence and motivation with reading/speaking ● Create <u>movement</u> to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. 	<p><u>Reading</u></p> <ul style="list-style-type: none"> ● <u>Supplementary Text</u> to help reinforce concepts. If necessarily, use lower Lexile levels to ensure comprehension. ● <u>Visual Aids</u> - Pictures or models to support vocabulary words and concepts ● Video to review or introduce a topic - use closed captioning to help students read along while they listen to the content ● <u>4 Square / Frayer models</u> to help students gain a deeper understanding of vocabulary. ● <u>Highlighting</u> important text to assist students in answering questions after the reading. ● <u>Chunking</u>-Break reading of text into chunks or paragraphs ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. ● <u>Vocabulary Morphology-</u> Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary 	<p><u>Writing</u></p> <ul style="list-style-type: none"> ● <u>Sentence Frames</u> - to begin a sentence- such as <i>Biodiversity is...</i> or <i>An example of competition is....</i> ● <u>Cloze passages</u> with word banks ● <u>Word banks</u> ● <u>Graphic Organizers</u> to help break down the writing process and organize thoughts ● <u>Standards-based sentence stems</u> ● <u>Performance Level Descriptors</u> This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. 	<p><u>Instructional Accommodations (depending on the student’s needs)</u></p> <ul style="list-style-type: none"> ● <u>Extended time</u> for tests in class, projects and assignments ● <u>Directions read.</u> Broken down as necessary ● <u>Model</u> how to complete the activity in the lesson ● <u>Oral simplification</u> of directions or questions ● <u>Translated version</u> of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
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<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><u>Instructional</u></p> <ul style="list-style-type: none"> ● Pre-teach vocabulary ● Use picture vocabulary ● Scaffold Depth of Knowledge questions ● Provide copy of notes/notes in “cloze” form ● Use of Think, Pair, and Share strategy to help process information ● Scaffold written assignments with the use of graphic organizers ● Allow for multiple ways to respond (verbal, written, response board) ● Provide model of performance task ● Modify informational text to fit the needs of the students ● Provide a digital or paper interactive notebook ● Present complex tasks in multiple ways ● Provide mnemonic strategies for Environmental Science concepts 	<p><u>Technology:</u></p> <ul style="list-style-type: none"> ● Audio reading of text ● Text to type functions ● Videos to clarify/visualize Environmental Science concepts ● Record class lecture/discussions and make accessible to student ● Nearpod- interactive presentations of notes ● Playposit - show a video clip about the topic and add your own questions for them to answer as they watch ● Allow students to type answers in chat on Teams <p><u>Other:</u></p> <ul style="list-style-type: none"> ● Arrange seating for maximum engagement and minimum distraction 	<p><u>In Class Assessments</u></p> <ul style="list-style-type: none"> ● Provide review packet or review sheet of concepts covered on the test ● Practice similar questions prior to the test ● Provide multiple options for projects ● Give a timeline of when things are due and remind them of the process often. ● Use of timer in class ● Break all complex tasks into chunks
<p>Step Up to Writing</p> <p>Step Up to Writing materials can be found in BPS Science K-12 Schoology Folder 9-12 Resources Environmental Science Environmental Science Curriculum Materials Step Up to Writing Materials</p>	<p><u>SUTW Strategies</u></p> <ul style="list-style-type: none"> ● Informal Outline ● Color-Coding – Informative/Explanatory Text ● Two-column notes ● I-V-F Topic Sentence progressing to Four Step Summary Paragraph ● CUPS – Capitalization, Usage, Punctuation, Spelling ● Transitions 		
<p>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</p>	<ul style="list-style-type: none"> ● Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications ● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population ● All students are given an opportunity to engage in science discourse ● Teacher demonstrates high expectations for all students <p>CLRT resources which align to Science content are denoted with a *</p>		