

Environmental Science – Unit 3

Environmental Science Unit 3- Populations

Unit Overview: This unit is composed of three chapters- *Understanding Populations*, *The Human Population*, and *Biodiversity*. Students will start out this unit by gaining a deeper understanding of the properties of a population and what factors, such as reproductive rate can affect populations. Students will study human populations and make predictions about population trends based on age structure. Students will learn about problems associated with human population growth and the difference between population growth in more-developed countries as opposed to less developed countries. Lastly, students will learn about the variety of species on Earth as well as the ways that biodiversity is important to ecosystems and humans.

Essential Questions:

Chapter 8- Understanding Populations

- What are the three main properties of a population?
- What is exponential growth?
- Describe how nature regulates population size.

Chapter 9-The Human Population

- How has the size and growth rate of the human population changed in the last 200 years?
- What are the four stages of demographic transition?
- What are some strategies countries may use to reduce population growth?
- Describe three problems associated with population growth.

Chapter 10- Biodiversity

- Can you list and describe three levels of biodiversity?
- What are some examples of endangered and threatened species?
- Which areas of the world have the highest biodiversity?
- Can you explain the advantages of protecting entire species rather than individual species?

Environmental Science – Unit 3

Living Environment Core Curriculum- MST Standards

Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

1.1 Explain how diversity of populations within ecosystems relates to the stability of ecosystems

Key Idea 6: Plants and animals depend on each other and their physical environment.

6.1 Explain factors that limit growth of individuals and populations

6.2 - Explain the importance of preserving diversity of species and habitats.

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

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

7.2 Explain the impact of technological development and growth in the human population on the living and nonliving environment.

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

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-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

Environmental Science – Unit 3

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 8 - Understanding Populations Section 1-How populations change</p> <ul style="list-style-type: none"> Describe the three main properties of a population Describe exponential population growth Describe how reproductive behavior can affect the growth rate of their population Explain how population sizes in nature are regulated <p>Section 2- How species interact with each other</p> <ul style="list-style-type: none"> Explain the difference between niche and habitat Give examples of parts of a niche Describe the five major types of interactions between species Explain the difference between parasitism and predation 	<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. Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. 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. 	<p>Text Resource <i>Environmental Science – Holt Chapter 8 - pp. 197-209</i></p> <p>Video Resources – All videos are in Nearpod format.</p> <p>Exponential Growth – This video explains how populations experience exponential growth. Population growth is modeled in rabbits through four generations.</p> <p>Habitat and Niche – This video looks at how habitats and niches are different but both are important for a healthy environment.</p> <p>Parasitism - This video is an overview of the symbiotic relationship of parasitism.</p> <p>Mutualism – This video explores the concept of mutualism.</p> <p>Z Space Activity: (code) Exploring Predator-Prey Relationships - Group Behavior (E445) Students will explore two environments with predator-prey relationships—one on land and one in the water. Students will consider how group behavior impacts individual and species’ chances of survival. Teacher Resource pdf - zip file Student Resource pdf</p>	<p>Environmental News Summary Students research and summarize two current event articles. Environmental News Summary Student Resource Unit 3</p>	<p>Environmental News Summary Students research and summarize two current event articles. Environmental News Summary Student Resource Unit 3</p>

Environmental Science – Unit 3

<p>Chapter 9- The Human Population Section 1-Studying human populations</p> <ul style="list-style-type: none"> Describe how the size and growth rate of the human population has changed in the last 200 years Define four properties that scientists use to predict population sizes Make predictions about population trends based on age structure <p>Section 2- Changing population trends</p> <ul style="list-style-type: none"> Describe three problems caused by rapid human population growth Compare population growth problems in more developed countries and less developed countries Analyze strategies countries may use to reduce their population growth Describe worldwide population projections into the next century 	<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. Thus, 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>Text Resource <i>Environmental Science</i> – Holt Chapter 9 - pp. 219-231</p> <p>Student Resources World Population – Video demonstrates human population growth from 1 CE through present day to 2050 projections.</p> <p>The People Connection* – Background information on population trends, population demographics, overpopulation, meeting people’s needs, migration, and solutions to population stabilization and preservation of the environment.</p> <p>Teacher Resources World of 7 Billion – High School lesson plans of various topics related to human populations.</p>	<p>7 Billion - Where Do You Stand? Students take a position on a contemporary environmental issue and prepare a 5-minute oral presentation. Teacher Resource Student Resource Sign Cards</p> <p>Quick Trip to 7.6 Billion After analyzing the timeline poster - A Quick Trip to 7.6 Billion, students will complete a graphic organizer related to timeline events and respond to an essay prompt. Teacher Resource Student Resource A Quick Trip to 7.6 Billion timeline poster A Quick Trip to 7.6 Billion Part 1 Nearpod</p>	<p>7 Billion – Where Do You Stand? Students take a position on a contemporary environmental issue. Students will write a persuasive essay supporting their claim and prepare a 5-minute oral presentation for peer evaluation. Teacher Resource Student Resource Sign Cards</p> <p>Quick Trip to 7.6 Billion After analyzing the timeline poster - A Quick Trip to 7.6 Billion, students will complete a graphic organizer related to timeline events then create a new timeline focused on one topic or event. Teacher Resource Student Resource A Quick Trip to 7.6 Billion timeline poster A Quick Trip to 7.6 Billion Part 1 Nearpod</p>
<p>Chapter 10- Biodiversity Section 1- What is Biodiversity?</p> <ul style="list-style-type: none"> Describe the diversity of species types on Earth, relating the difference between known numbers and estimated numbers List and describe three levels of biodiversity Explain four ways in which biodiversity is important to ecosystems and humans <p>Section 2- Biodiversity at Risk</p> <ul style="list-style-type: none"> Define and give examples of endangered and threatened species Describe several ways that species are being threatened with extinction globally Explain which types of threats are having the largest impact on biodiversity List areas of the world that have high levels of biodiversity and many threats to species 	<ul style="list-style-type: none"> Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). 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. Thus, sustaining biodiversity so that ecosystem functioning and productivity are maintained 	<p>Text Resource <i>Environmental Science</i> – Holt Chapter 10 - pp. 241-257</p> <p>Teacher Resources Ocean Tracks – Getting Started – Instructions and tutorial videos to assist teachers with Ocean Tracks map interface.</p> <p>Z Space Activity: (code) Invasive Species (A279) Describe how the introduction of invasive species can disrupt an ecosystem, Construct an explanation that evaluates how the introduction of invasive species impacts overall environmental stability Student Resource pdf</p>	<p>Saving Sharks – Exploring Marine Protected Areas (MPA) Students will describe an MPA and its importance in shark conservation; describe how humans impact ocean environments; and understand how scientists seek out to protect endangered marine animals. PowerPoint Student Resource</p>	<p>Saving Sharks – Proposing a New Marine Protected Area (MPA) Students will describe an MPA and its importance in shark conservation, describe how humans impact ocean environments, and understand how scientists seek out to protect endangered marine animals. Students will complete a project researching and creating a proposal for an MPA for shark conservation. PowerPoint Student Resource Business Letter Example</p>

Environmental Science – Unit 3

<p>Section 3- The Future of Biodiversity</p> <ul style="list-style-type: none"> List and describe four types of efforts to save individual species Describe the advantages of protecting entire ecosystems rather than individual species Describe the main provisions of the Endangered Species Act 	<p>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"> 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. 			
--	--	--	--	--

Unit 3 Evidence of Learning	Ticket Out • Think-Pair-Share • Formative Assessment • Weekly Quiz • Unit Test • Homework • Review Questions			
Unit 3 Materials	<p>7 Billion - Where Do You Stand?</p> <ul style="list-style-type: none"> Copy and create 5 sign cards (strongly agree, agree, ?, disagree, strongly disagree), masking tape, paper 			
Unit 3 Vocabulary	<p><u>Chapter 8</u> carrying capacity commensalism competition density dispersion exponential growth growth rate mutualism niche parasitism population predation reproductive potential symbiosis</p>	<p><u>Chapter 9</u> age structure arable land demographic transition demography fertility rate infrastructure least developed countries life expectancy migration survivorship urbanization</p>	<p><u>Chapter 10</u> biodiversity Biodiversity Treaty ecotourism endangered species Endangered Species Act endemic species exotic species gene habitat conservation plan keystone species poaching threatened species</p>	

Environmental Science – Unit 3

<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 <u>visual thinking strategies</u> to set the lens for learning. ● Video to review or introduce a topic – use <u>closed captioning</u> 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 <u>reading/speaking</u> ● 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 <u>closed captioning</u> 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>The water cycle is...</i> or <i>I think that water cycle 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 <u>approved bilingual glossaries</u> from NYS in each subject
---	--	---	--	---	---

Environmental Science – Unit 3

<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>		