

Interactions Between Populations and Resources

Activity 3.1
Engage

What factors should you consider when purchasing fish to eat?

Students begin the chapter thinking about fishing as an example of human use of natural resources. Students start considering how the health of one population might affect the ecosystem it lives in.

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Activity 3.2
Explore

Can fishing limits prevent the overuse of an ecosystem?

Students explore how fishing limits can change the effect of human natural resource use, and examine how changes to the surrounding ecosystem can be a compounding factor. This allows students to investigate their initial ideas about natural resource use and about how multiple factors can affect populations.

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Activity 3.3
Explain

What effect have humans had on the health of fisheries?

Students transition from analyzing their own data about a fictitious fishery to an analysis of long-term data from three real fisheries. Students use this analysis to develop an initial explanation about humans' effect on fisheries and a formal argument about the health of one fishery.

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Activity 3.4
Elaborate

How do humans affect the size of dead zones?

Students expand on their understanding of human disruption of ecosystems by looking at a more complex problem: the creation and expansion of dead zones. Students use their analysis of a variety of data to inform a debate on limiting human use of fertilizers to prevent dead zones.

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Activity 3.5
Evaluate

How do increases in the human population affect the resources available to organisms?

Students conclude the chapter with an investigation that examines the effects of fishing and dead zones on the Chesapeake Bay Oyster fishery. This allows for the evaluation of students' understanding of the effects of resource availability on organisms and populations of organisms as well as how increases in the human population impact the Earth's systems. This also prepares them to investigate another complex ecosystem disruption, invasive species, in the next chapter.

Chapter 3 Overview

Activities	Science Concepts	Science Practices	Science Vocabulary	Teaching Periods
<p>Engage</p> <p>3.1 Shopping for Fish</p> <p>Guiding Question: What factors should you consider when purchasing fish to eat?</p> <p>In this activity, students analyze data about purchasing fish in a grocery store. They use this data to decide what fish they would buy, and what other information they would want to have before making their decision. The class discusses the factors they think are important to consider when deciding what fish to purchase.</p>	<p>MS LS2.A.1 Cause & Effect Science Knowledge Describes Consequences</p>	<p>Analyzing & Interpreting Data</p>	<p>overfished</p>	<p>1</p>
<p>Explore</p> <p>3.2 Gone Fishin'</p> <p>Guiding Question: Can fishing limits prevent the overuse of an ecosystem?</p> <p>Students model resource consumption and overuse through a game that models fisheries. In the first game students are able to overfish the available fish populations. In the second game the fishing limits are set such that the fish populations are able to survive and increase. In the third game students model the effect of changes in ecosystem conditions.</p>	<p>MS LS2.A.1 Cause & Effect</p>	<p>Analyzing & Interpreting Data</p>	<p>overfished</p>	<p>1-2</p>
<p>Explain</p> <p>3.3 Three Fisheries</p> <p>Guiding Question: What effect have humans had on the health of fisheries?</p> <p>Students analyze data about three fisheries. They then use the data to try and identify the fisheries based on short text passages that describe each fishery, their historical and current fishing limits and practices, and key regulation dates. Students use their analysis to construct an argument about the health of a fishery.</p>	<p>MS LS2.A.2 MS ESS3.C.2 Consequences of Human Activity</p>	<p>Analyzing & Interpreting Data Engaging in Argument from Evidence</p>	<p>overfished</p>	<p>2</p>

Activities	Science Concepts	Science Practices	Science Vocabulary	Teaching Periods
<p>Elaborate</p> <p>3.4 Dead Zones</p> <p>Guiding Question: How do humans affect the size of dead zones?</p> <p>Students analyze data about nitrogen input, streamflow, and the size of dead zones. They use this data and additional evidence from a video to construct an explanation about the effect of these factors on the size of the dead zone in the Gulf of Mexico. They then gather additional evidence from a short reading to inform a debate on fertilizer use and dead zones.</p>	<p>MS LS2.A.1 MS ESS3.C.2 Cause & Effect Consequences of Human Activity Science Knowledge Describes Consequences</p>	<p>Analyzing & Interpreting Data Constructing Explanations Engaging in Argument from Evidence</p>	<p>dead zones</p>	<p>2</p>
<p>Evaluate</p> <p>3.5 Chesapeake Bay Oysters</p> <p>Guiding Question: How do increases in the human population affect the resources available to organisms?</p> <p>Students learn about the Chesapeake Bay ecosystem and the oyster harvests in the Bay. They analyze and interpret data about the nitrogen run-off, dead zone size, and oyster harvests to develop an argument about the effect of the human population on the Chesapeake Bay oysters.</p>	<p>MS LS2.A.1 MS LS2.A.2 MS LS2.A.3 MS ESS3.C.2</p>	<p>Engaging in Argument from Evidence</p>	<p>dead zones argument</p>	<p>2</p>

Assessment Overview

Embedded Formative Assessment	Activity 1 Engage	Activity 2 Explore	Activity 3 Explore	Activity 4 Explain	Activity 5 Elaborate
Disciplinary Core Ideas (DCI)					
MS LS2.A.1*	Analysis 3	P&P 4, 5, 7	P&P 7	P&P 4, Analysis 1 & 2	
MS LS2.A.2*			P&P 9		
MS LS2.A.3*					
DMS ESS3.C.2**			P&P 9	P&P 4, Analysis 2	
Science and Engineering Practices (SEP)					
Constructing Explanations and Designing Solutions			P&P 7	P&P 4	
Engaging in Argument from Evidence*			P&P 9	P&P 7	
Analyzing and Interpreting Data		P&P 4, 5, 7	P&P 2-6 Analysis 1	P&P 2 & 3	
Crosscutting Concepts (CCC)					
Cause and Effect*	Analysis 3	P&P 4, 5, 7		P&P 3 & 4 Analysis 1	
Connections to Engineering, Technology and Applications of Science**			P&P 7 & 9 Analysis 1	P&P 7	
Connections to Nature of Science**	Analysis 3			P&P 7	

* Primary PE and supporting elements

** Secondary PE and supporting elements

Embedded Formative Assessment	Activity 1 Engage	Activity 2 Explore	Activity 3 Explore	Activity 4 Explain	Activity 5 Elaborate
Performance Expectations (PE)					
LS2-1*					P&P Analysis 1
ESS3-4**					P&P 6
CCSS ELA					
RST.6-8.1					P&P 6
RST.6-8.7				Analysis 3	Analysis 1
WHST.6-8.1					P&P 6
WHST.6-8.9			P&P 5 & 6		P&P 6

* Primary PE and supporting elements **Secondary PE and supporting elements

PE	LS2-1 : Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
	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.
DCI	LS2.A.1 : Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors.
	LS2.A.2 : In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
	LS2.A.3 : Growth of organisms and population increases are limited by access to resources.
	ESS3.C : 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.

SEP	EAE: 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.
	AID: Analyze and interpret data to provide evidence for phenomena.
CCC	C&E: Cause and effect relationships may be used to predict phenomena in natural or designed systems.
	(CET&S): All human activity draws on natural resources and has both short- and long-term consequences, positive as well as negative, for the health of people and the natural environment.
	(CNoS): Science knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.
CCSS ELA	RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts.
	RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
	WHST.6-8.1: Write arguments focused on discipline-specific content.
	WHST.6-8.9: Draw evidence from informational texts to support analysis, reflection, and research.