

Deadly Encounters

African Dust and Coral Reefs

“Waiting for rains that never fall, West African farmers watch soil turn to gray dust, too powdery to grip plant roots. On the other side of the Atlantic Ocean, scientists are pondering why coral reefs in the Caribbean are dying. Could the two environmental disasters – 4,800 km (3,000 mi) apart – be related?”



The world's coral reefs are dying. Approximately 10% of the world's coral reefs may already be beyond saving. Scientists studying the Caribbean coral reefs are linking part of the problem to dust from the Sahara Desert. They are also investigating the effect that warming ocean waters are having on coral. Should we be worried? What other environmental issues may be related? How might this affect our local environment? What impact might this have on our lives?



What can you do to help? What recommendations would you make as to future actions on the part of your state or national government or some other organization? Pick your audience, design your solution, and pitch your idea.

Deadly Encounters: Causal Map Rubric

	<i>Novice</i>	<i>Apprentice</i>	<i>Practitioner</i>	<i>Expert</i>
Number of Events	fewer than 5 different events/situations	5 – 7 different events/situations	8 – 10 different events/situations	more than 10 different events/situations
Content	events beginning with the Sahara Desert leading to the damage of coral reefs	- comprehensive chain of events detailing cause-and-effect chain from dust in the Sahara to damage of the coral reefs - includes events with multiple effects	- comprehensive chain of events detailing cause-and-effect relationships - includes events with multiple effects, with chains continuing from each - includes predictions as to the effects of the death on the coral reefs to the environment and people	all of <i>Practitioner</i> plus: includes other contributing factors at various points in the chain
Arrows	arrows point from cause to effect	- arrows point from cause to effect - comments on arrows to describe relationships	- arrows point from cause to effect - comments on arrows to describe relationships - arrows are differentiated by color according to strength of relationship, e.g. major cause vs. contributing cause (includes key)	all of <i>Practitioner</i> plus: arrows showing introduction of other contributing factors
Story-Telling	diagram tells a partial story of the events surrounding the problem	diagram tells a story of the events surrounding the problem, from dust in the Sahara to compromised coral reefs in the Caribbean	diagram: - is easy to read and follow - tells a clear story of the events leading to the problem	all of <i>Practitioner</i> plus: images used to enhance the message

Deadly Encounters: Solution Statement Rubric

	<i>Novice</i>	<i>Apprentice</i>	<i>Practitioner</i>	<i>Expert</i>
Problem Development	includes opinion statement as to the coral reef – Saharan dust connection	includes: • clear claim stated in opening and closing paragraphs case for the coral reef – Saharan dust connection • includes supporting evidence from at least three different sources	• builds a case for the coral reef – Saharan dust connection and/or other environmental threats to coral reefs • includes relevant, supporting evidence from at least three different credible sources • includes timelines to show progression • explains how coral anatomy and life functions are being affected • projects effects over the next 10 years	all of <i>Practitioner</i> plus: • projects effects over the next 50 years • references several of the ocean literacy principles related to the claim
Content Focus	includes effects on the Earth's atmosphere, biosphere, geosphere, and/or hydrosphere	includes current and future effects on the Earth's atmosphere, biosphere, geosphere, and/or hydrosphere with plans for rectifying any damage	details current and future effects on the Earth's atmosphere, biosphere, geosphere, and hydrosphere with plans for rectifying any damage to each	all of <i>Practitioner</i> plus: offers a systems perspective of how threats to the coral reef affect the four spheres
Opposing Claims	includes one counterclaim	includes one counterclaim and evidence to refute it	includes: • at least two counterclaims • evidence to refute all counterclaims introduced • use of multiple valid sources to refute counterclaims	all of <i>Practitioner</i> plus: offers reasoning behind counterclaims
Solution	one action that will positively affect the situation	2 different actions that: • are feasible • will positively affect the situation	3 or more different actions that: • are feasible • are financially possible • will positively affect the situation • are broken down into actionable steps	all of <i>Practitioner</i> plus: all actions will positively affect the situation both short-term and long-term
Writing Structure and Style	• logical sequencing of ideas • transitions between supporting information	• use of domain specific vocabulary • logically organized reasons and evidence • cited, credible sources	• formal writing style • use of academic and domain specific vocabulary • logically organized reasons and evidence • properly cited, credible sources • words, phrases, and clauses used to create cohesion	all of <i>Practitioner</i> plus: deliberate use of figurative language and transitions to make the message more powerful

Deadly Encounters: The Pitch Rubric

	<i>Novice</i>	<i>Apprentice</i>	<i>Practitioner</i>	<i>Expert</i>
Components	fewer than 5 of the 7 items listed in <i>Practitioner</i>	5-6 of the 7 items listed in <i>Practitioner</i>	- causal map - position statement - supporting information - action plan - data graphs - maps - images	all of <i>Practitioner</i> plus: additional components such as relevant sound or video clips
Screens	at least 5 screens used	- at least 7 screens used - each screen focuses on a message	- at least 7 screens used - each screen focuses on a specific message	all of <i>Practitioner</i> plus: all components on each screen enhance the message
References	includes facts, graphed data, and images	- cited facts - cited anecdotal stories - cited graphed data	- cited facts - cited anecdotal stories - cited graphed data - cited images, sound clips, and/or video clips - includes referenced items for claims and counterclaims	all of <i>Practitioner</i> plus: personally-gathered data
Theme	consistent use of colors and fonts	consistent use of colors, fonts, and/or graphics to create a theme	consistent use of colors, fonts, and graphics to create a theme that supports the position statement	all of <i>Practitioner</i> plus: - a theme statement repeated throughout - different colors used for different sections
Style and Mechanics	no errors in spelling, capitalization, punctuation or grammar	- concise writing or script - no errors in spelling, capitalization, punctuation or grammar	- concise yet comprehensive writing or script - no errors in spelling, capitalization, punctuation or grammar - use of various features to strengthen presentation	all of <i>Practitioner</i> plus: employs compositional risks

How-to Sheets - Read a flowchart - Create a flowchart	Interactive Websites - Cause and Effect Game - Life on the Coral Reef - Name the Ecosystem		Learning Centers - Analyze cause and effect text structure - Identify key locations on a globe/map - Understand the Coriolis Effect - Distinguish fact from speculation
Homework - Access relevant sources - Locate examples of cause and effect in daily life	Deadly Encounters <i>Scaffold for Learning</i> <i>(Week 1 Sample)</i> 		Peer Tutoring Understand fact and opinion
Group Tasks - Analyze cause and effect text structure - Model the Coriolis Effect - Illustrate Earth's wind patterns - Characterize Earth's spheres			Podcasts/Screencasts - Understand what makes wind - Earth's Spheres
Benchmark Lessons - What is Wind? - Earth's Spheres - Cause and Effect	Small-Group Mini-Lessons - Analyze cause and effect text structure - Connect text features (flowcharts) with text	Individual Tasks - Identify key locations on a globe/map - Identify Earth's wind patterns	Technology Uses - Access maps - Identify Earth's wind patterns

Deadly Encounters Facilitation Grid (Week 1 Sample)

Teacher Material

[illegible]

Deadly Encounters *Facilitation Questions*

COMPREHENSION <i>Ask questions that ensure students understand content and skills needed to solve the problem.</i>	• What is a scientific explanation? • What is the coral reef? • What are the characteristics of the coral reef habitat? • Which environmental factors impact the coral reef? • What resources do coral reefs need to survive?
APPLICATION <i>Ask questions that ensure the ability of students to apply learning to new situations.</i>	• How does a change in environment impact the coral reef? • Why is it not possible to attribute coral reef death to dust from western Africa? • How might one explain the lack of rain in western Africa? • How can you determine a causal link between one event and another?
CONNECTION <i>Ask questions that ensure the ability of students to apply learning to their lives.</i>	• What impact does coral reef destruction have on your life? • What impact does your daily life have on the lack of rain in western Africa and coral reef depletion?
SYNTHESIS <i>Ask questions that encourage students to create new information from existing data.</i>	• What organisms may contribute to the decline in coral reefs? • What change(s) need to occur to increase rain in western Africa? What possible impact would that have on the coral reef? • What impacts could the lack of rain in western Africa have on ecosystems other than the coral reef?
METACOGNITION <i>Ask questions which prompt students to think about their own thinking process</i>	• What was the most difficult aspect of this task? • What challenges did you encounter and how did you overcome them? • How did you receive and apply feedback from others? • If you were to change one aspect of your product, what would it be and why?

Deadly Encounters *Transfer Task*

You considered how a drought in one part of the world could impact the coral reef 4,800 km (3,000 mi) away. Now think about what a flood in the same area might do! Trace the possible impact of a rainy season in western Africa. What ecosystems would be affected? What changes would occur for plants and wildlife?

Identify an ecosystem that would be adversely affected by prolonged flooding of western Africa. Create a causal map with at least five events/situations. Explain the possible impact on the environment.

In your solution, be sure to:

- Identify cause and effect relationships in the causal map; indicate directionality of relationship with arrows and strength of relationship with color coding
- Predict the impact on the environment including how the atmosphere, biosphere, geosphere, and hydrosphere would be affected
- Accurately cite sources and provide text evidence to support your statements

Deadly Encounters Teacher Notes Guide

Unit Overview	
In this unit, students will explore the interconnected nature of our world. They will understand how changes in one ecosystem, such as reduced rainfall in western Africa, may impact ecosystems thousands of miles away, like the Caribbean coral reef. Students will create a causal map highlighting the impact of Saharan dust on the coral reef. They will develop a solution to the problem and select an appropriate audience with whom to share their ideas.	
Common Core State Standards Addressed:	
CCSS.ELA-LITERACY.RST.6-8.1; CCSS.ELA-LITERACY.RST.6-8.2; CCSS.ELA-LITERACY.RST.6-8.4; CCSS.ELA-LITERACY.RST.6-8.5; CCSS.ELA-LITERACY.RST.6-8.7; CCSS.ELA-LITERACY.RST.6-8.8	
National Standards/Content Addressed: Next Generation Science Standards	
MS-LS1-5; MS-LS2-1; MS-LS2-2; MS-LS2-3; MS-LS2-5; MS-ESS2-1; MS-ESS2-5; MS-ESS2-6;	
Enduring Understandings	Essential Questions
- Human actions have an impact on the world around us. We have the ability to help and hurt our environment. - The Earth is comprised of many interrelated systems. - Small changes in one system may cause changes in another. - Cause and effect descriptions can be helpful in predicting future events.	- How can people influence positive environmental change? - How are ecosystems across the world related to one another? - How can you trace cause and effect relationships among environmental events?
21 st Century Skills Addressed	
<i>Core Content and Interdisciplinary Themes</i> - Subject Area Mastery - Global Awareness - Environmental Literacy <i>Learning and Innovation</i> - Critical Thinking and Problem Solving - Creativity and Innovation - Communication and Collaboration	<i>Information and Media Literacy</i> - Information Literacy - Information and Communication Technology <i>Life and Career</i> - Flexibility and Adaptability - Initiative and Self-Direction - Productivity and Accountability - Leadership and Responsibility