

Topic Area of Interest: Water Runoff & Erosion

Grade Level: Grade 5

Brainstorming - What do I want my students to learn about?		
Phenomena	Anticipated Student Questions	Data & Resources students need
Phenomena #1 <i>Rill Erosion</i>	- How does water runoff cause the land to erode? - What is happening on the land? What is causing the land to look like this? - Why does the land change? - Are humans responsible or is this a natural occurrence?	Interactive soils map Watershed report card Model My Watershed National Geographic Watersheds ELA Component: https://www.readworks.org/
Phenomena #2 <i>Anthropogenic Eutrophication (excessive fertilizers causing algae blooms)</i>	- Why does algae grow so much? - What are some ways that humans contribute to the development of algae blooms? - Do fertilizers on my lawn contribute to this? - Why do the organisms in the water die? - Where do the fertilizers come from? - How do the fertilizers get on the land?	Watershed Report Card River Runner Critical Zones Terminology Runoff Model
Phenomena #3 <i>Dead Zone in the</i>	Why do living things die?	Virtual Great Lakes to Gulf

Planning with NGSS

2

Gulf of Mexico	• How do the chemicals get there? • What can be done to help solve the problem? • Where does the polluted water come from? • Does this hurt humans?	National Water Dashboard EPA Gulf of Mexico Hypoxic Zone SERC Gulf of Mexico Dead Zone Smithsonian Dead Zone
----------------	--	---

Narrow down student questions to ONE driving question that can be used in all the sections (this is to preserve teacher sanity!)

Driving Question (Objective)	How does water runoff impact the land and water around us?
-------------------------------------	--

What do students already know? How do I know this?

Where is this storyline in the sequence of learning? Pre-assessment Ideas	Students will create a concept web to show what they know about water runoff and how it is connected to the phenomena.
--	---

Connecting to the NGSS: 5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a

system.] [Assessment Boundary: Assessment is limited to the interactions of two systems at a time.]	
SEPs: Developing and Using Models	Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. Develop a model using an example to describe a scientific principle.
DCIs: ESS2.A: Earth Materials and Systems	Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth’s surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.
CCCs: Systems and System Models	A system can be described in terms of its components and their interactions.

Connecting to the NGSS: 5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment.	
SEPs: Obtaining, Evaluating, and Communicating Information	Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods. Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.
DCIs: ESS3.C: Human Impacts on Earth Systems	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.
CCCs:	Science findings are limited to questions that can be answered with empirical

Science Addresses Questions About the Natural and Material World.	evidence.
---	-----------

Creating the Storyline - The 5E model of instruction directs students' efforts & keeps them focused on the phenomena. (This is not a linear process.)		
	How will you facilitate this?	What will students be doing?
Engage - Introduce the Phenomena	Stream table, river runner, Video: Where do we get our drinking water from?	Students go on an environmental galley walk
Explore - Develop questions through discussion; students identify the resources they need to answer their questions; students collect and analyze data and evidence	Students will work in small groups and participate in discussions about the phenomenon and their wonderings. Have students use these wonderings to develop questions.	Students will go on virtual scavenger hunts to collect data to use to ask the questions that they develop.
Explain - Students begin formulating explanations using their data and evidence; these explanations are shared with each other to get feedback	Break students into small groups and provide feedback/needed instruction as well as any materials. Exit tickets as formative assessment.	In small groups, students formulate explanations using the data and evidence of a particular phenomenon and share their findings with the larger group.

Elaborate - Students compare their evidence with each other to see what kinds of similarities and differences there are; they may want to extend their research to other places or phenomena to understand it better; they identify the limitations of their research and data collection	Have students continue in their small groups to compare/contrast their evidence with other groups and revise and expand as needed.	Continue with the small groups and expand their formulations of explanations, data, and evidence of their phenomenon.
Evaluate - Students present their research and results, get and give feedback. Students demonstrate the skills they have gained, the content they have learned, and make connections to the broader community of science.	A rubric will be used for the model and presentations.	Students will develop their own model that demonstrates rill erosion. Students will present their findings in various ways: podcast, scientific poster, newscaster, skit, painting with illustrations. Civics Extension: Letters to elected officials Environmental Stewardship: Storm Drain Art - https://bluewaterbaltimore.org/learn/programs-and-projects/storm-drain-art/

5. Mapping it all out		
Day of Unit	Activity	Notes/Rationale/etc.
Day 1	Read, discuss, and watch videos for Phenomenon #1	
Day 2	Read, discuss, and watch videos for Phenomenon #1	
Day 3	Read, discuss, and watch videos for Phenomenon #2	
Day 4	Read, discuss, and watch videos for Phenomenon #2	
Days 5 & 6	Students work in small groups to develop a model of a critical zone.	SEPs: Developing and Using Models
Day 7	Read, discuss, and watch videos for Phenomenon #3	
Day 8	Read, discuss, and watch videos for Phenomenon #3	
Day 9	Review Phenomena #1-3. Students work in groups on models	
Day 10	Students work in groups on models	
Day 11 & 12	Student presentations of critical zone models. Students explain Earth's major systems and how interactions affect Earth's materials and processes.	