Water Cycle Lesson: Deforestation

Water Cycle Unit, Lesson 3 of 4

Created By	Grades	Subjects	Duration
Mallory Swafford	6th, 7th, 8th,	Science	≅ 70 minutes

Lesson Overview

Essential Questions	• How does deforestation affect climate change? • How does erosion affect climate change? • How do deforestation and erosion affect the water cycle?
Learning Outcomes	Students will be able to: • Define deforestation and erosion. • Create a diagram that demonstrates cause and effect relationships. • Explain how deforestation and erosion affect the water cycle and climate change.
Summary	In this lesson, students learn how climate change and deforestation are linked to the water cycle. **Inquire:** Students view an Indigenous perspective on deforestation and learn how climate change can lead to deforested areas. **Investigate:** Students complete a hands-on activity to investigate the effects of deforestation on erosion and watch a video on deforestation and climate change. **Inspire:** Students create a cause-and-effect diagram about erosion and the water cycle.

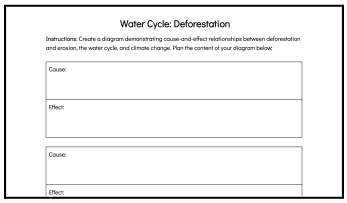
Instructions

Inquire
≅ 20 minutes
	• Students visualize or draw a quick sketch of a tree.
	• Teacher asks the following questions:
	  ○ What are some components of a tree?
	  ○ What purpose do you think these components serve for the tree and its ecosystem?
	  ○ What do you think happens to the ecosystem when lots of trees are removed from an area at once?
	• Students watch a video about deforestation in Brazil's Indigenous land and write down any thoughts or feelings that come up as they are watching.
	  ○ Teachers may want to pause the video after portions with subtitles to recap for students who need support following along.
	  ○ Teachers should note that the political situation in Brazil may be different when students watch this video, but the focus should be on the impacts deforestation can have on communities, cultures, and ecosystems.
	• Using the Teacher Slideshow, students think-pair-share three questions:
	• Students share predictions about climate change's impact on forests. Teacher guides a short discussion based on student predictions.

Investigate
≅ **30 minutes**
	• Students complete this hands-on erosion activity that shows the effects of deforestation on erosion. The activity involves two boxes of soil: one without simulated root systems and one with simulated root systems to demonstrate how root systems reduce erosion.
	• After the activity, teacher asks the following questions. *Note: Answers are listed in the speaker notes of the Teacher Slideshow.*
	  ○ What do the forks represent in this activity?
	  ○ What are the effects of erosion?
	  ○ Did you find more soil was washed away from the box with the forks or bare soil?
	  ○ Can you explain why you think this happened?
	• Teacher reads the Observations and Results section of the activity page.
	• Students watch the following video to link the processes of deforestation and erosion to the water cycle and reflect on how Earth's systems are interconnected. Teacher can pause to ask comprehension questions and review key concepts as a class after the video.

Inspire
≅ **20 minutes**
	• Students create a diagram that demonstrates cause and effect relationships between deforestation and erosion, the water cycle, and climate change.
	• Teacher reads the diagram goal and diagram steps for the class.
	  ○ Teachers may decide to brainstorm cause-and-effect relationships with the class before they work in groups or independently.
	  ○ Teachers can review any resources covered in the lesson that may be useful.
	  ○ The Student Document can support students as they outline their cause-and-effect relationships and diagrams.
	• Students review the information they learned throughout the lesson and brainstorm cause-and-effect relationships for their diagrams.
	• Students design their diagrams. Students can include visuals and should be able to explain the connecting lines in their diagrams. This can be used as a formative assessment.
	• Students ask a classmate for feedback on their diagrams and make adjustments.
	• Students share their diagrams. Students plan out a public display for their cause-and-effect diagrams to educate the wider public. Students should be thinking about the following questions:
	  ○ Who would you like to educate about deforestation and erosion, the water cycle, and climate change?
	  ○ How can you most effectively share your learning?
	  ○ Who could you share your diagram with that could impact change and make positive improvements to the ecosystems in your community?

Accompanying Materials

Teacher Slideshow	Student Document
	

Teaching Tips

Suggestions	• Students participate in multiple interactive and hands-on learning activities to engage in kinesthetic, auditory, and visual learning. • Students continue to better their understanding of how Earth's natural systems are interconnected and dependent on each other.

Prerequisites	• This is lesson 3 of 4 in our 6th-8th grade Water Cycle Unit.
	• Materials required for the erosion model activity include the following:
	  ○ Scissors or sharp knife
	  ○ Clean, empty one-gallon container with a lid (such as a plastic milk jug)
	  ○ Water
	  ○ Two aluminum bread pans
	  ○ Dirt
	  ○ Two aluminum, 9-by-13-inch cake pans
	  ○ 12 to 14 plastic forks
	  ○ Two blocks, shallow plastic containers, or other items of the same height to prop up the aluminum bread pans
	  ○ Outdoor test area with a flat, level surface where it is easy to clean spilled water and soil

Differentiation	• The erosion activity may be completed as a hands-on activity in lab groups or as a demonstration by the teacher. • Lab groups may have mixed abilities to aid in understanding. • Teachers can prepare examples of diagrams for students to reference during the Inspire section. • Students can extend their learning by reading this article about how climate change could lead to mass deforestation due to subpar growing conditions.

Learning Standards

Primary Standards
Next Generation Science Standards (NGSS) PS, LS, ESS, ETS
MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
Supporting Standards
Common Core English Language Arts Standards (CCSS.ELA)
CCSS.ELA-LITERACY.W.6.1 Write arguments to support claims with clear reasons and relevant evidence.
CCSS.ELA-LITERACY.W.7.1 Write arguments to support claims with clear reasons and relevant evidence.
CCSS.ELA-LITERACY.W.8.1 Write arguments to support claims with clear reasons and relevant evidence.

CCSS.ELA-LITERACY.W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS.ELA-LITERACY.W.7.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.
CCSS.ELA-LITERACY.W.8.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.