Water Cycle Lesson: Climate Change

Water Cycle Unit, Lesson 1 of 4

Created By	Grades	Subjects	Duration
Mallory Swafford	6th, 7th, 8th	Science	≅105 minutes

Lesson Overview

Essential Questions	• Why is water important? • What is the water cycle? • Can climate change impact the water cycle?
Learning Outcomes	Students will be able to: • Explain why water is important in their daily life. • Explain how the water cycle works. • Determine if climate change can impact the water cycle.
Summary	In this lesson, students learn about the water cycle and how climate change impacts its patterns. **Inquire:** Students contemplate their relationship with water and observe a demonstration to determine if climate change affects the water cycle. **Investigate:** Students explore an interactive diagram about the water cycle. **Inspire:** Students watch a video and complete a series of questions in their student journals.

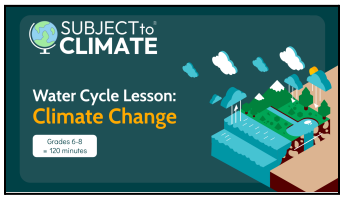
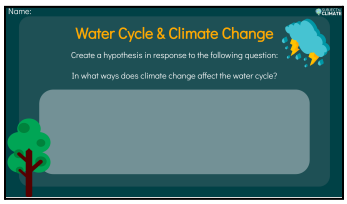
Instructions

Inquire
≅ 15 minutes
	• Using the Teacher Slideshow, students participate in a class discussion about how they use water.
	• Students watch a video from an Indigenous perspective on water.
	  ○ Before the lessons, teachers tape different emotions (empowered, scared, hopeful, thoughtful, sad, angry, surprised, etc.) around the room.
	  ○ Students start with a paper and pencil. When they hear something that changes the way they feel, they move to the word in the room that best matches their emotion and write down a quick note about what was said that made them feel that way.
	• Using the Teacher Slideshow, students reflect on two questions in a think-pair-share.

Investigate
≅ 60 minutes
	• Students create a hypothesis in response to the question: In what ways does climate change impact the water cycle? Students record their hypotheses in their digital or printable student journals.
	• Students participate in and observe a classroom demonstration that shows different climate situations and how this affects the water cycle.
	• Demonstration Setup Instructions:
	  ○ Place a bowl under a heat source.
	  ○ Using a pitcher filled with water, pour water into the bowl until it is about ¼ full.

	○ Place a mug in the center of the bowl (making sure to keep it dry). ○ Cover the top of the bowl tightly with plastic wrap and use a rubber band to secure the plastic wrap into place (a small dip in the center of the plastic wrap will aid in showing students how the water cycle works). ○ Observe the water evaporate, condense at the cling wrap, and then "rain" into the plastic mug over time. ● Demonstration Instructions: ○ One water cycle demonstration shows a control system with a "normal" amount of water and sunlight (heat lamps are recommended but the sun may be used outside on a hot sunny day if desired). ○ One water cycle demonstration shows a system with much less water than "normal" (simulating a drought situation). This system should have equal heat and light sources to the control system. ○ One water cycle demonstration shows a system with "normal" water but far above normal heat and light (simulating global warming). This can be shown by doubling the heat and light with an additional heat lamp or amplifying the sun's energy with something like a magnifying glass. ○ Students should view that a system with much less water does affect the water cycle as there is less water available to evaporate and condense in the system compared to the control and that a system with much more heat will evaporate and condense more quickly, also affecting the processes of the water cycle compared to the control demonstration. ○ Allow for approximately 20 minutes (or more depending on results) to view the comparison between systems. ● Students complete a lab write-up in their Student Journal to explain the findings of the classroom demonstration. ● Students participate in a short think-pair-share followed by a whole group discussion to make sense of the demonstration. ● Students view this interactive diagram to solidify their understanding of the water cycle. ○ Students reflect on their takeaways from the interactive diagram and ask any remaining questions they have about the water cycle. ○ Students think-pair-share using the question, "What role does gravity play in the water cycle?" This can be used as a formative assessment.
Inspire ≅ **30 minutes**	● Students watch chapter two (1:12-2:33) of this video on climate change and the water cycle. ● Students participate in an SEL-focused think-pair-share about the video. ● Students determine if their hypothesis regarding the link between climate change and the water cycle is supported or not using clear reasons and relevant evidence. ● Students address the following journal prompts in their Student Journal. ○ What is a body of water near you? ○ How is that body of water connected to the water cycle? ○ How is climate change impacting the body of water? ○ Can you think of any actions you or others can take to mitigate the problem?

Accompanying Materials

Teacher Slideshow	Student Document	Emotions Board
		

Teaching Tips

Suggestions	• The Investigate and Inspire sections can be completed on consecutive days or class periods. • Students share diverse perspectives and ideas using the journal prompts which encourage action. • Students build on their unit journal with each additional lesson in the unit. • Students participate in multiple interactive and hands-on learning activities to engage in kinesthetic, auditory, and visual learning.

Prerequisites	• This is lesson 1 of 4 in our 6th-8th grade Water Cycle Unit
	• Prior set-up is necessary for the Inquire section.
	• Materials required for the demonstration include the following:
	  ○ 4 heat lamps (on a hot sunny day you can use the sun along with a way to amplify the sun's rays)
	  ○ 3 bowls
	  ○ 3 mugs or cups
	  ○ plastic wrap
	• A recommended heat lamp can be purchased here.
	• Previous student knowledge of the water cycle and climate change will be beneficial in this unit. This interactive game can help students learn about the water cycle.

Differentiation	• Students may use the Emotions Board for vocabulary support as they watch the video in the Inquire section. • The demonstration may be completed in lab groups with each group experimenting with a different system (control, drought, global warming). • Students may be placed in mixed-ability lab groups to aid in understanding. • Interactive diagrams can be differentiated based on ability. • Journal prompts can be used for whole group discussions.

Learning Standards

Primary Standards
Next Generation Science Standards (NGSS)

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 State Standards - 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.