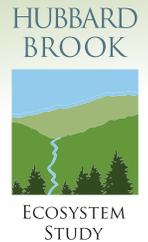


WaterViz
LESSON
—
Summary
of Lessons
1-4



How does the water cycle work in a forest? In what ways are humans affecting the water cycle?

WaterViz is an online tool that integrates science, art and music to enable students to visualize and examine the water cycle based on data gathered at the USDA Forest Service Hubbard Brook Experimental Forest in New Hampshire. Teachers can choose from among these four lessons, which are designed for high school or advanced middle school students. When time allows, begin with Lesson 1 and progress through the rest in order. The visualization can be found at the WaterViz homepage, <https://waterviz.org/>. You can find the four lessons and teacher notes under the Teaching Tools tab at this website. The WaterViz animation uses Unity WebGL and is compatible with most browsers but is not currently compatible with mobile devices.

Lesson 1. Slideshow Introducing Hubbard Brook Experimental Forest

Objectives: Students will be able to explain the mission of the Hubbard Brook Experimental Forest and the value of long term data collection and ecological system monitoring.

Time needed: One 50-minute class period.

Resources needed: Computers with Internet connectivity for each student or pair of students.

Activity: Have students complete “HBEF Slideshow Student Worksheet” while they view the slides, accessed with the other materials for Lesson 1 under the Teaching Tools tab on the WaterViz website.

Lesson 2. Meet WaterViz

Objectives: Students will be able to explain how WaterViz is a simplified model that represents the water cycle. They will be able to demonstrate how this visualization of data can be used. Students will be able to navigate around the visualization and the WaterViz website and explain the variables depicted in the visualization.

Time needed: One 50-minute class period.

Resources needed: Computers with Internet connectivity for each student or pair of students.

Activity: Play WaterViz visualization on a large screen for the class, found at <https://waterviz.org/>. Play the visualization in silence for two minutes. Ask students to write down their thoughts and questions as they watch. Part way through you can prompt them by asking: What do they think it is depicting? What are the components of the visualization? What is moving around? If the classroom cannot be darkened enough for students to watch this on the classroom screen, have them watch on individual computers.

Then, debrief the class, discuss their reactions. Explain that WaterViz is an artistic representation of the water cycle at Hubbard Brook, the New Hampshire mountain stream introduced in Lesson 1. Explain that the visualization is a model, which is a simplified version of a complex system. Students will be using the model to help them understand how the watershed works. The model was developed by scientists working at the Hubbard Brook Experimental Forest.

Next, have them proceed to complete the worksheet for Lesson 2 while they watch the visualization on their computers. Discuss results with the class. See the Teachers' Notes for Lesson 2.

Lesson 3. Using WaterViz to Understand the Water Cycle and Human Impacts

Objectives: Students will apply what they have learned from the WaterViz model to answer questions about human and climate interactions with the water cycle. Students will be able to explain the meaning of the variables in the visualization and how they respond to weather events.

Time needed: 50 minutes of work time plus 20 minutes for class discussion of the results.

Resources needed: Computers with Internet connectivity for each student or pair of students. Supply each group of students with a color copy of the water cycle that you can print from the US Geological Survey website <https://water.usgs.gov/edu/watercycle-kids-adv.html>.

Activity: Students will form a team of four, with each person focusing on one of the following variables: precipitation, streamflow, soil water/snowpack, and evapotranspiration. Have students complete their section of the Lesson 3 worksheet for their variable while they are exploring the WaterViz model at <https://waterviz.org/>. Then, members of the group will reconvene to share findings and answer the remaining questions.

Lesson 4. Line-graph Analysis of WaterViz Data

Objectives: Students will be able to recognize patterns in data; learn the difference between correlation and causation of water cycle phenomena; develop predictions; use data to create line graphs; and analyze evidence from the line graphs to support or refute their predictions.

Time needed: One 50-minute class period, depending on familiarity with creating line graphs.

Resources needed: Computers with Internet connectivity for each pair of students.

Activity: Students will form a team of 2-3 and complete the worksheet for the lesson, including line graphs.

Optional Water Cycle Refresher Lesson

Teacher Note: If your students need a refresher on the water cycle before beginning the WaterViz Lessons, go to <https://water.usgs.gov/edu/watercycle-kids-adv.html>. Beginner, intermediate and advanced versions of the interactive water cycle are available on the US Geological Survey website. Print out the water cycle for each student and have them annotate the meaning of each step of the water cycle.

For more information about these lessons, contact sthorne@hubbardbrookfoundation.org.