

**DIGITAL LESSON BUNDLE**

# Water Crisis: The Way We Manage Water and Energy Will Define Our Future

## OBJECTIVES

Students will

- **summarize** a news story that deals with the growing water crisis in the United States.
- **engage** in a range of collaborative discussions to discuss how our changing climate and aging infrastructure affects the well-being of individuals, businesses, and society.
- **develop** a community conservation plan by researching effective ways technology can be used to monitor and decrease the consumption of water.

## GRADE RANGE

6–8

## DURATION

Two class sessions of approximately 45 minutes each

## OVERVIEW

With this set of resources, students will learn how our changing climate and aging infrastructure are impacting the energy-water nexus and how conservation efforts combined with the use of technology to monitor, detect, and determine trends can help reduce water waste, power outages and improve access to safe and reliable water around the United States and around the world. Students will work together to identify a problem, brainstorm possible solutions, research solutions they may not have considered, and develop a community conservation plan to share with the class.

## BACKGROUND

As pollution, aging infrastructure, population growth, and climate change pose challenges to freshwater quality and quantity in America, the safety and reliable access to water in parts of the United States is a growing concern. According to the United States Environmental Protection Agency, the population of the United States has doubled over the past fifty years, while our need for water has tripled. Over ninety percent of the water in America is used to grow the food we eat, generate energy, and manufacture clothes and other goods. As the West Coast of the United States continues to get hotter and drier, the Eastern states are getting more intense rainfall which leads to flooding due to outdated and aging infrastructure. At least forty states are anticipating water shortages by 2024. The need to conserve water is critical.

## **MATERIALS**

### ALL SESSIONS

- Computer with ability to project, one for educator

### SESSION 1

- Video Clip—[Thirst for Power: Trailer 1](#)
- Student Resource: That Sums it Up—one per student
- Student Resource: Jigsaw Activity Graphic Organizer—one per student
- Student Resource: 3-2-1 Exit Ticket—one per student
- News Articles
  - [Fearing E. Coli, West Baltimore Boils Water in Latest Crisis](#)
  - [40 Million People Rely on the Colorado River, It's Drying Up Fast](#)
  - [US considers imposing Colorado River water cuts to western states](#)
  - [Dallas is only the latest flood disaster: How cities can learn from today's climate crises to prepare for tomorrow](#)
  - [Great Salt Lake set to vanish in 5 years, experts warn Utah lawmakers](#)
  - [A Water System So Broken That One Pipe Leaks 5 Million Gallons a Day](#)
  - ['All of a Sudden, It's Undrinkable': Why an Entire U.S. City Has No Clean Water](#)

### SESSION 2

- Digital Lesson Bundle Video—Sustainable Communities: Water Conservation
- Student Resource: Community Conservation Plan—one per student
- Highlighters—one per student

## **USING THIS GUIDE**

The goal of this guide is to give educators a complete set of resources for facilitating lessons on environmental quality. It provides slide-by-slide instructions to ensure educators are prepared to explain, discuss, and facilitate the hands-on content in the presentation. The presentation is designed to cover two class sessions, but it can be flexible depending on the students' needs and the time available. However, sessions should be presented in order.

The accompanying presentation was created with PowerPoint so that it can be used in a variety of classrooms. If you are using a laptop with a projector, simply progress through the PowerPoint by clicking to advance. All the interactive aspects of the presentation are set to occur on click. This includes images, text boxes, and links which will appear in your web browser. If you are using an interactive whiteboard, tap each slide with your finger or stylus to activate the interactive aspects of the presentation. Notes for each slide provide information on how to proceed.

**PROCEDURE**

# SESSION 1 (Slides 1–5)

**Overview:** Students will read a current event article on how the energy-water nexus is being impacted around the United States. Students will perform a jigsaw activity to become experts on their assigned article and will teach others in their home group what they have learned.

**Slide 3**

- Provide students with the graphic organizer, That Sums it Up. Explain that they will be working in a series of steps, independently and with a partner, to complete the graphic organizer.
- Play the video clip [Thirst for Power: Trailer 1](#), pausing frequently. At each pause, provide students time to list their observations (4–6) in the appropriate section of the graphic organizer.
- Play the video again, without pausing. Ask students to put an asterisk next to three of the most important ideas needed to understand the video.
- Next, students will work with a partner to share their list. Together, they consolidate their lists into one and add their ideas to the graphic organizer.
- Based on the top three lists, partners work together to write a 1–2 sentence summary.
- Next, ask students to write a word or phrase for the main idea. Challenge them to get creative while still identifying the main idea.
- Have students share their summary or main idea with the class.

**Slides 4–6**

- Place students into groups of four, which will be their home group. Each student in the home group will be assigned a different news article describing how the energy-water nexus is being impacted around the United States.
- Students will leave their home group and join an expert group with students who were assigned the same article. Each student in the expert group should read the article independently. When students are finished reading, the expert group will discuss their article and complete the expert group section of their jigsaw activity graphic organizer.
- Experts will rejoin their home group and teach the other group members what they have learned. Students will complete the home group section of the jigsaw activity graphic organizer to summarize each article.

**Slide 7**

- To assess what students have learned, distribute the 3-2-1 exit ticket to each student.
- Collect each ticket as the students leave. Before the next session, review each exit ticket so you can answer the students' questions and address any misconceptions they might have.

## SESSION 2 (Slides 8–14)

**Overview:** Students will develop a community conservation plan for one of the cities mentioned in the news articles they read. Working collaboratively, they will define the problem and review the article to determine how climate change and aging infrastructure contributed to the problem. Each small group will research and propose solutions on how technology can be used to monitor and detect the problem facing their assigned city. They will present their conservation plan to the class to gather feedback and make any necessary revisions to their plan.

### Slide 9

- Use the exit tickets from session one to review main ideas, share common things that might have been shocking, and discuss the questions that students posed.
- Share with students that they are going to watch a video about a teenager from Charlotte, North Carolina who won a national award for his concept of using a smartphone app to promote water conservation. The video clip also features Itron, a company that promotes water conservation efforts through the innovative use of technology. Press the play button to start the video.
- After watching the video, have students turn to an elbow partner and share one reason why water conservation is so important, encourage students to provide at least one piece of evidence from the articles they summarized yesterday. Encourage students to use their jigsaw activity graphic organizer to find evidence.
- Next, ask students to consider how new technologies might impact water and energy conservation using the information they have learned.

### Slide 10–14

- Organize students into small groups of three or four. Assign each group one of the news articles from yesterday. Explain that they will be working together to develop a Community Conservation Plan.
- Provide each group with a copy of the news article they were assigned. Have students independently read the article while they highlight and annotate sections of the article that reference climate and infrastructure.
- Provide each student a copy of the community conservation plan student resource. Have groups discuss and define the problem facing the city in their article first.
- Then, each group member will take turns sharing what they highlighted or annotated in their article. The groups should record the common ideas shared and discussed in the climate and infrastructure sections of the conservation plan.
- Next, each group member will research and propose one way technology can be used to monitor, detect, or improve the problem facing their assigned city. Provide group members with time to share a solution they found from their research. Groups should record these solutions in the monitor and detect section of the conservation plan. To scaffold this part of the conservation plan, you can provide students with the following websites to find information: [EPA—Water Sense](#), [Itron—Water Solutions](#), or [EPA—Water Science](#). If students require additional help, provide some technology examples that include leak sensors placed strategically throughout a water distribution network, remote disconnects and reconnects, water quality and temperature measurement, contaminant identification, high-flow alarms, and integrated shut-off valves.

- Finally, groups will brainstorm ways the community can conserve water by synthesizing what they have learned about their city and their research.
- To close the lesson, have each group present their plan to the class. Build in time to allow student questions and feedback.

## **CONTENT AREA STANDARDS**

### **STEM**

Next Generation Science Standards (NGSS):

- [MS-ESS3-3](#): Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- [MS-ESS3-4](#): Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Common Core State Standards (CCSS):

- [ELA-LITERACY.RST.6-8.2](#): Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
- [ELA-LITERACY.W.8.1.B](#): Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
- [ELA-LITERACY.SL.8.1](#): Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

### **Science and Engineering Practices:**

- [Asking questions and defining problems](#)
- [Constructing explanations and designing solutions](#)

Framework for Social Studies State Standards:

- [D2.Eco.1.6-8](#): Explain how economic decisions affect the well-being of individuals, businesses, and society.
- [D2.Geo.12.6-8](#): Explain how global changes in population distribution patterns affect changes in land use in particular places.
- [D2.Geo.9.6-8](#): Evaluate the influences of long-term human-induced environmental change on spatial patterns of conflict and cooperation.

**Observations:** Watch the video, pausing frequently to record your observations below. Watch the video a second time without pausing and put a star next to the three most important things to understand from the video.

**Our Key Ideas:** Compare your list of top five key ideas with a partner. Work together to consolidate your ideas into a single list and record below.

1.
2.
3.

**Summary:** Work with your partner and use your list of key ideas to create a one to two sentence summary.

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**Main Idea:** Use your summary to create a word or phrase that identifies the main idea.

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Article Title: \_\_\_\_\_

<b>My Expert Group</b>
What are the main ideas from the article?
Which ideas should I share with my home group?
How was the energy-water nexus impacted?
<b>My Home Group</b>
What are the main ideas shared by my home group members?
What are three things that I learned from my home group?
How does each article connect to the energy-water nexus?

Reflect on what you have learned about how the energy-water nexus has been impacted around the United States by completing the 3-2-1 summary.

**3**

**Describe three things you learned today.**

**2**

**Discuss two things that shocked you.**

**1**

**Ask one question you have about today's topic.**



Define the **problem**.

How is **aging infrastructure** contributing to the problem?

How is a **changing climate** contributing to the problem?xa

How can technology be used to **monitor and detect** these issues?

Brainstorm ways the community can **conserve** the use of water.