

CLASSROOM ACTIVITY

Tackling Environmental Challenges with Innovative Solutions

OBJECTIVES

Students will be able to:

- **Discover** the role that technology plays in how water and energy resources are managed around the globe.
- **Identify** the connection between human use of natural resources and global environmental issues.
- **Design** a plan that uses technology to help mitigate and solve major global environmental concerns.

OVERVIEW

In this teacher-led activity, the driving question for students is “how might technology and innovation be used to help solve societal and environmental challenges that threaten our global biodiversity?” Students will begin by viewing a short video clip (from the Internet of Things: Infinite Possibilities Virtual Field Trip) that shows how streetlights were automated to dim when not needed to reduce light interference for hatching sea turtles in Florida. Next, they will be asked to think about the resources we use, such as water, electricity, and fossil fuels and how they might be managed, monitored, or changed to help solve global environmental concerns. Student groups will work together to create an action plan and digital poster that identifies things such as the goal, stakeholders, technology used, and steps for success. Groups will present their action plans to the class in a simulated conference.

NATIONAL STANDARDS**Science**

Next Generation Science Standards

- **MS-ESS3-2 Earth and Human Activity**
Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- **MS-ETS1-2 Engineering Design**
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

BACKGROUND INFO

Technology is a key part of the world that we live in today and used to help improve our daily lives in our homes, jobs, and the communities where we live, work and play. Innovative companies and people that create new technologies work to utilize their technology and data to help solve many of the global and environmental challenges that we face now and in the future. Technology that monitors the use of water and energy can help communities facing climate related drought and water shortages, eliminate waste by using leak detection technology, and empower consumers with the use of applications that track and monitor personal water use. Innovations in clean energy and conservation help lessen the impact of fossil fuel usages contributing to the climate changes that are already negatively impacting species and ecosystems globally. Technology is an important and impactful tool in better managing the Earth's most precious resources and creating a more resourceful and sustainable future.

MATERIALS

- Devices with internet access (1 per student)
- “Tackling Environmental Threats with Tech—Action Plan” Student Sheet

Optional:

- Poster board (1 per group)
- Markers/Colored Pencils
- Various modeling materials (hot glue, glue guns, household materials, tape, paint, etc.)

PROCEDURE

1. The teacher should begin by playing the video clip [“Threat of Coastal Light Pollution on Sea Turtles PSA—Sea Turtle Conservancy”](#) on the front screen for students. Follow the video clip by asking students to share their reactions to the video with the class. What is the problem being identified in the video? How are sea turtles threatened by artificial lighting at night? Students should identify that artificial lighting, such as streetlights, can disrupt sea turtle hatchling survival as the hatchlings use the moonlight to help them navigate their way to sea. Write the problem on the front board or display on the overhead screen.
2. Ask students to form pairs or small groups with those sitting near them to discuss ideas on how this problem could be mitigated or solved. Ask students to report back their ideas with the class. Create a list of ideas on the board or screen as student groups share. Students will likely come up with a solution of turning off lights near turtle nesting and hatching areas. Ask students to identify practical issues and challenges with this general solution: How can you be sure that all stakeholders will turn off lights at the right times? Could turning artificial light off for sea turtles be regulated somehow in the large areas of beach that the turtles occupy?
3. Show a short clip from the [Internet of Things Virtual Field Trip](#) (18:33–19:13) that explains how thousands of street lights lining beaches in Florida cities are now remotely controlled to dim or turn off at specific times of the year when sea turtles are hatching. The instructor can also give a copy of the

article [Saving Sea Turtles with Streetlights](#) to students or project it and read it aloud to give students more information about the project.

4. hearing about this solution that uses [Itron's networked streetlights](#), ask students to think about the driving question "How might technology and innovation be used to help solve other problems that threaten the global environment and biodiversity?"
5. Explain to students that for this activity, their group will choose one environmental threat that is connected to human action. They will work together to complete research to gain an understanding of the issue, and create an action plan that implements technology, such as networked systems and energy and water innovations, to help solve this problem.
6. Ask students to form small groups of three. Each group should have devices such as laptops or iPads with access to the internet. Direct students to go to the World Wildlife Organization's [Tackling Threats That Impact The Earth](#) website on their devices.
7. Each group should choose or be assigned one of the six following threats on the site: bycatch, deforestation, threats of climate change, oil and gas development, soil erosion, and water scarcity.
8. Give each group a copy of the "Tackling Environmental Threats with Tech Action Plan" student sheets. Ask students to use the [Tackling Threats That Impact The Earth](#) website to complete the RESEARCH section. Students should click on their assigned threat and read through the information section. They should add information to their research sheet as they view the information about the overview, causes, and impacts of their environmental threat.
9. Next, students should begin brainstorming types of technology that could help create solutions for the issues they researched. They should think about the type of energy involved in the threat and how things like "smart" versions of the technology or ways of monitoring or collecting data could be utilized to help solve the problem.
10. Students should use the "Brainstorming" section of the student sheet to identify the type of resource they will focus on (water, energy, etc.) and write down ideas on ways to use technology to better manage the use of it or gather data and monitor it.

If students are struggling, you may want to give them the example of air quality and pollution, a problem that the U.S. has struggled with recently. You can play students the video [Air Quality Management](#) from Itron and direct students to their [Use Case Portfolio](#) page to help them search and get ideas of technology that may be useful for their environmental threat.

11. When the group has identified the type of technology they will use, they will move to Part 3 of the student sheet to design their action plan. Students will first outline their action plan on the student sheet and then use [Canva](#) to create a digital poster that displays their action plan in a way they could post in a community or send via email or text to spread awareness. They should follow the steps in the student sheet to design and create their poster with their action plan.

EXTENSION

As an extension of this lesson if time allows, students will participate in a mock environment and technology conference. Each group will display their action plan poster at a “booth” (location in the classroom) and should make a 2-D or 3-D prototype model of the technology that they will be using as a visual aid. Each group will have the opportunity to present their action plan and describe the technology they will be using to the whole group for feedback and to learn about all of the potential ways that technology can help us solve global problems and challenges.

PART 1: Research

Overview

Summarize the problem in 2–3 sentences.

How does this threat impact people?

How does this threat impact wildlife and ecosystems?

State 3 statistics or facts that are evidence that this is a threat.

Causes

What human actions are contributing to this threat?

What types of energy sources or human energy needs (water, electricity, fossil fuels) contribute to this threat?

Impacts

List and describe the impacts of this environmental threat.

PART 2: Brainstorming Tech

Use the space below to write down your ideas about types of technology that might be used to help combat your ecological threat.

Types of Resources/Energy associated with this threat (Ex: water, fossil fuels)	Technology that can be used in this field	Ways this technology could be used to help this problem

PART 3: Action Plan Outline

Once you have completed your outline, your group will create a digital poster on Canva that will give the viewer information about the action plan you have designed.

Identify the environmental threat	
List facts and statistics related to this threat (from your research or other credible sources)	
What groups of people, communities, wildlife, and ecosystems this threat impacts. (Who are the stakeholders?)	
The overall goal of your action plan	
Your proposed solution and the technology that will be involved	
Create steps for action (What steps will be taken to implement your solution individually, locally, globally?)	
Create a timeline for your action plan—when should each step be completed? (In a week, month, year?)	