

Teek and Tom Episode 5
Our Planet is Changing and We Can All Help!

LESSON 10
**Taking Care
of Earth**

All URLs were reviewed and accurate at the time of this lesson's publication. If you should come across a non-operational link, contact NOAA Ocean Service Education at oceanserviceseducation@noaa.gov. All images are credited to NOAA unless otherwise noted.

Introduction

In this series of videos and lessons with Teek and Tom, we learned how ocean and atmosphere interactions affect weather and climate and how humans influence the system. Along the way, we discussed severe weather and the impacts of climate change. Knowing the facts and taking action either personally or with others helps eliminate the fear of these issues which are frequently colored by doom and gloom in the public arena. People need a strong knowledge base around the causes of a warming climate, but also the opportunity to develop a strong set of skills to apply their knowledge in the real world, including problem-solving, critical thinking, teamwork, coping with uncertainty, empathy, and negotiation.

Educating children and early adolescents about global problems within local, regional, and national contexts helps them develop skills in making informed decisions and motivating action. It can have a consequential impact on students' daily behaviors and decision-making

that reduces their overall lifetime carbon footprint. Here are some simple methods educators can implement in the classroom to promote positive experiences surrounding climate education:

1. Encourage your students to develop a care for the environment. Outside activities and investigations are important for students to learn more about the natural world and help them connect with nature regardless of where they live. People with strong connections to nature are more likely to engage in planet-friendly actions like recycling.
2. Encourage students to take collective action. While students can make significant environmental impacts through individual actions, focus on how their efforts can be magnified when they work with their families, their friends, and others in the community. Encourage them to join a club or connect with a local organization to create campaigns or take actions that will have a local impact.

3. Help students investigate how to make simple choices to save energy on their own, with their families at home, as well as at school. This will help to reduce greenhouse gases and the consequences of global warming.
4. Work with your students to convince the people around you to save energy. This includes reusing and recycling, which reduces the need for new manufacturing.
5. Encourage your students to keep learning to be responsible stewards of planet Earth and to make good decisions.

The hardest part of becoming an environmental steward is coming up with ideas to take action. NOAA Planet Stewards (<https://oceanservice.noaa.gov/education/planet-stewards/psep-supporting.html>) provides teachers with resources to design their own projects. These programs support educators to carry out hands-on projects that conserve, restore, and protect human communities and natural resources with federal funding. You can find more information on getting started with the *Planet Stewards Project Development Guide* (<https://oceanservice.noaa.gov/education/planet-stewards/Planet-Stewards-Project-Development.pdf>) and examples of *Planet Stewards Successful Projects* (<https://oceanservice.noaa.gov/education/planet-stewards/earthscientists/>).

Lesson Summary

Students will have an opportunity to demonstrate what they have learned about the connections between the ocean and atmosphere from previous lessons through a report or presentation to an imaginary Milky Way Galactic Council.

Objectives

- Students will be able to explain how the changes to Earth's atmosphere and ocean affect weather and climate.
- Students will be able to give examples of how climate change impacts humans and other species.
- Students will be able to provide several ways that humans can reduce the stress on the ocean and the atmosphere.

Estimated Time

It is estimated that three 45-minute class periods are needed for this lesson. Students will need one or two class periods to prepare and one class period for the presentations. This does not include the time required to view Episode 5 of Teek and Tom, "Our Planet is Changing and We Can All Help!", 13:13 minutes (<https://oceantoday.noaa.gov/teekandtom/episode-5.html>).

Education Standards

The lessons that accompany the Teek and Tom series were designed for upper elementary and middle school students. The standards addressed are abbreviated here. A full list of standards is available in Appendix A (<https://oceantoday.noaa.gov/teekandtom/educators-guide/appendix-a.pdf>).

Next Generation Science Standards

- **3-ESS3-1: Earth and Human Activity.** Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
- **5-ESS3-1: Earth and Human Activity.** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

- [MS-ESS3-3: Earth and Human Activity](#). Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- [ESS3.C: Human Impacts on Earth Systems](#). Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things.

[Common Core English and Language Arts:](#)

Writing Standards Grades 4-5

[Common Core Mathematics:](#) Measurement and Data - Represent and interpret data.

[College, Career, and Civic Life \(C3\) Framework for Social Studies:](#) Geographic Representations

Materials

For a class of 30

- Printouts of the student record sheet will need to be provided to the students to help them organize their reports. It is located at the end of this lesson.
- Depending on the format of the report or presentation that you have the students employ, they may need materials to develop visuals, such as large paper, poster board, markers, and scissors.
- The rubrics used in the activity are available as a slide set to project or present while teaching these activities. (<https://oceanoday.noaa.gov/teekandtom/educators-guide/slide-set-10.zip>)

Preparation

There is no special preparation needed for this activity other than gathering materials that students may need to create visuals for their presentation.

InvesTeekation Pathway



There is no new content for this lesson. Students are asked to prepare and present a report about what they have learned to an imaginary Milky Way Galactic Council. They are asked to use a creative method to showcase their knowledge about the ocean and atmosphere connections to weather and climate and how the changes affect humans. Finally, they report on potential actions that could be taken to address climate change.

Presentation to the Milky Way Galactic Council

A scenario has been designed to challenge your students to present what they have learned to the Milky Way Galactic Council using one of several methods. Depending on your students' capabilities and your classroom's composition, assign the work individually, in pairs, or in small groups. You can ask your students to use various formats for their reports. It is up to you whether to allow them to use any of the options below or to just use one strategy. Consider limiting the students to 10 minutes of presentation time.

- Presentation with slides or visual aids
- News update similar to what you would see on TV
- Poster
- Storyline or comic book

Regardless of the strategies that the students use, ask several other staff to be part of the review team (the Milky Way Galactic Council representatives) for the completed project reports. This will give students an authentic audience and an opportunity to showcase their

knowledge. Discuss possible ways that students can measure the effectiveness of their actions. This might include reviewing their family's electricity bill over several months after starting reduction strategies, increasing recycling, or

starting to compost at home and seeing how it affects their weekly garbage production. Ask students to determine ways to measure the impact of their efforts by quantifying the amount of recycling, composting, or energy savings.

Questions	Student Responses
<p>What are the causes of current changes to Earth's atmosphere and ocean?</p>	<p><i>People started burning fossil fuels for electricity, heat, transportation, and manufacturing. This released greenhouse gases, especially carbon dioxide, into the atmosphere, causing increased land and ocean temperatures. This increase in air and water temperature increases the moisture in the atmosphere and fuels changes in climate and weather.</i></p>
<p>How are the changes in the ocean and atmosphere affecting weather and climate?</p>	<p><i>Higher ocean temperatures are causing many problems on our planet, such as sea level rise, rapid melting of massive glaciers and ice sheets, changes in weather patterns leading to drought and flooding, and increases in extreme weather like heat waves and heavy rain. Over time, changes in weather lead to changes in overall climate.</i></p>
<p>How are these changes impacting plants and animals, including people, on the planet?</p>	<p><i>Warming sea surface temperatures are forcing populations of ocean animals like the lobster to shift to higher latitudes. Coral reef systems are affected by large-scale bleaching, which damages or kills the corals and causes devastating effects on the whole ecosystem. Land plant and animal species habitats are all being affected. Increased heat waves, rising sea levels, and an increase in severe weather like flash floods, more severe hurricanes, and drought affect humans all over the planet.</i></p>
<p>What actions can communities like schools, states, and countries take to reduce the stress on the atmosphere and the ocean?</p>	<p><i>Increase green spaces and trees in urban places. Plants remove carbon dioxide from the air naturally, and trees are especially good at storing CO₂. Reduce deforestation in tropical countries. Switch to renewable energy sources such as solar, wind, or hydroelectric. Reduce dependence on fossil fuel vehicles and increase use of mass transportation. Reduce plastic use. Retrofit buildings to be more energy efficient.</i></p>
<p>What actions can you personally take to reduce the stress on the atmosphere and the ocean?</p>	<ul style="list-style-type: none"> • <i>Walk or ride your bike to school or events if it is safe</i> • <i>Use car pools or mass transportation</i> • <i>Use reusable water bottles instead of plastic water bottles</i> • <i>If you bring lunch, use reusable containers or food wrapping</i> • <i>If you buy lunch, encourage the use of bamboo or metal silverware rather than disposable.</i> • <i>Recycle paper, clothing, aluminum, and food scraps</i> • <i>Reduce energy, take short showers rather than a bath</i> • <i>Consider eating less meat and relying more on a vegetable or grain-based diet</i>

The rubric below may be used to provide students with feedback on their reports. You can decide if the other invited members of the review team are expected to give feedback as

well. It is especially important for any reviewers to provide comments on the reports to help students understand where they excelled and where they can improve.

Student(s) Names _____

Reports/presentations cannot be longer than 10 minutes and must address the following questions.

1. What are the causes of current changes to Earth's atmosphere and ocean?
2. How are the changes to Earth's atmosphere and ocean affecting weather and climate?
3. How are these changes impacting plants and animals, including people, on the planet?
4. What actions can communities like schools, states, and countries take to reduce the stress on the atmosphere and the ocean?
5. What actions can **you** personally take to reduce the stress on the atmosphere and the ocean?

Report/Presentation Rubric				
Points	3	2	1	Total
Subject Knowledge	Answered all five required questions clearly and completely	Answered 2-3 of the required questions	Had difficulty answering the questions or omitted 2-4 of the required questions	
Content	Presented major points and fully supported them with convincing arguments, ideas, and data	Presented major points and partially supported them with convincing arguments, ideas, and data	Important information is left out	
Organization	Presented complete information in a logical, interesting way	Presented most of the information in a logical sequence that the audience could follow	Audience had difficulty following the presentation	
Use of Slides/Props or Visual Aids	Added significant value and information to the report	Reason for use was clear, and its contribution was worth the time to introduce it	Visuals not present or did not add value	
Effective Use of Time	Time allocated effectively	Finished on time but seemed rushed or incomplete	Did not finish on time or did not use the time well	
Total Points:				/15
How was this report/presentation successful?				
How might this report/presentation be improved?				



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Extensions

There are many participatory science and stewardship projects that provide a local or regional focus on a wide variety of science fields. This encourages people of all ages to participate in scientific research. Projects are designed to crowdsource information, collecting data from volunteers across large areas and over long timescales — something a single researcher could never do on their own. Teachers can use participatory science projects to show students they can work together to learn more about climate change and take collective action.

1. CoCoRaHS (<https://www.cocorahs.org/>) is an acronym for the Community Collaborative Rain, Hail, and Snow Network, a unique, nonprofit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail, and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive website, the aim is to provide the highest quality data for natural resources, education, and research applications. They are now in all fifty states.
2. An Ocean Guardian School (https://sanctuaries.noaa.gov/education/ocean_guardian/) makes a commitment to the protection and conservation of its local watersheds, the world's ocean, and special ocean areas, like national marine sanctuaries. The school makes this commitment by proposing and then implementing a school- or community-based conservation project. It is managed by NOAA's Office of National Marine Sanctuaries.
3. At the NOAA Water Level Reporter (<https://noaa.maps.arcgis.com/apps/MapSeries/index.html?appid=8e4a278576964f47b4fc050e51f344ca>), anyone can submit a water level report from their mobile device. Observations you and your students share will be used to map water levels (flooded, normal, and low) regionally. Flooding or other elevated water level impacts from storm events, such as hurricanes and inland floods, can be reported. Weather forecast offices will use the contributions to help communicate impacts and potential risks for future storm events.

4. The National Phytoplankton Monitoring Network (PMN) (<https://coastalscience.noaa.gov/monitoring-and-assessments/pmn/>) is a community-based network of volunteers monitoring marine phytoplankton and harmful algal blooms. The PMN helps NOAA respond to the growing threat posed by these microorganisms by collecting important data about species and their distribution in coastal waters, the Great Lakes and inland waters, and on tribal lands.
5. The GLOBE (Global Learning and Observations to Benefit the Environment) project (<https://www.globe.gov/>) is an international science and education program that focuses on increasing environmental awareness and contributing to increased scientific understanding of the Earth. The GLOBE Observer allows users to contribute to the measurement databases about clouds, mosquito habitat, land cover, and trees.

Earth Curiosities

Earth's Place in Space

The Milky Way is a large spiral galaxy dominated by just two arms wrapping off the ends of a central bar of stars. The major arms consist of many young and old stars. The smaller arms are mostly filled with gas and pockets of star-forming activity. Our sun lies near a small, partial arm called the Orion Spur, which lies between the Sagittarius and the Perseus arms. The Earth is part of the Solar system that orbits the sun and consists of a group of eight planets. The solar system also includes numerous comets, asteroids, and dwarf planets that orbit the sun.



This image is an artist's conception of the Milky Way Galaxy. NASA/JPL-Caltech/R. Hurt (SSC/Caltech)

Student Record Sheet

To: Planet Earth Members

From: The Milky Way Galactic Council

Special Request: Update about Planet Earth



Earth and Queloz lie within the Milky Way galaxy and have been automatically added to the Galactic Federation because of the presence of intelligent beings. The Milky Way Galactic Council oversees the conditions of each planet to make sure that the planets are not changed by their intelligent species to the point that living things cannot survive. It has come to our attention that your planet, Earth, is experiencing stress related to conditions of the ocean and atmosphere. We are requesting that you provide a report about this situation to members of the Milky Way Galactic Council so that you can stay a valued member of the Federation. Your report should respond to the questions in the table below.

Questions	Student Responses
What are the causes of current changes to Earth's atmosphere and ocean?	
How are the changes in the ocean and atmosphere affecting weather and climate?	
How are these changes impacting plants and animals, including people, on the planet?	

Questions	Student Responses
<p>What actions can communities like schools, states, and countries take to reduce the stress on the atmosphere and the ocean?</p>	
<p>What actions can you personally take to reduce the stress on the atmosphere and the ocean?</p>	

