



# Earth Day 2019

TeachableMoment Lessons

Morningside Center  
for Teaching Social Responsibility



## Earth Day 2019: A Focus on Climate Change

Climate disruption is an urgent issue for all of us, but especially for young people. How can we help students understand what climate change is, what impact it's having and will have, and what we can do about it? And how can we do all this while encouraging not despair and resignation, but hope and determination to work together to address it? That's a tall order.

Although climate change is almost certain to be a life challenge for every one of our students, teaching on it is still minimal – and mostly limited to science classes. In fact, climate disruption is a political, economic, social, personal, and interpersonal issue that connects to students' lives now. There are endless opportunities to teach on it.

The lessons in this collection, originally published on TeachableMoment, Morningside Center's online teacher resource center, aim to give K-12 teachers ideas and options for teaching on a range of climate change and related environmental issues, from the basic facts and specific climate crises to climate injustice and climate refugees. We also have many lessons on strategies for countering climate change – with a special focus on organizing by young people. In many lessons we emphasize social and emotional skills – such as empathy, kindness, cultural awareness, critical thinking, problem-solving, team-building, and cooperation – that we believe are survival strategies in the age of climate disruption.

Morningside Center will continue to develop and expand its collection of activities and lessons on climate change – and respond in a timely way to climate news and events. Be sure you're signed up for our biweekly newsletter so that you can stay up to date on our latest TeachableMoment lessons. And please spread the word about these free resources!

### Using this Guide

This guide contains 19 interactive lesson plans on climate change and related issues for K-12 classrooms. Lessons are divided into activities for younger students (elementary and middle) and older students (high school). Lessons use many strategies to engage students, from reading and discussion to analyzing photos and tweets, videos, and hands-on activities to demonstrate phenomena such as rising sea levels. All seek to actively engage students in learning about and exploring climate change and other environmental challenges—and invite further engagement.



**How to get around the guide:** All the lessons in the guide are listed, with links, on the following two pages. To navigate to a lesson you're interested in, click on the link. Have a look around.

**How to use the guide in your classroom:** Feel free to adapt lessons to meet the particular needs and interests of your students – or address time constraints. You are also free to copy lessons and handouts for use in your classroom. If you are interested in distributing materials more widely, please contact us for permission.

We welcome your ideas and feedback on these and future lessons. We'd love to hear from you!

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Young people across the country are taking legal action to defend their right to a stable climate and healthy environment. In this activity students learn about the pioneering lawsuit [Juliana v. United States](#), and discuss a short documentary about youth climate activists. *Page 56*

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Young people are suing the U.S. government over climate change, and their case comes before federal court on October 29, 2018. In this lesson, students examine the suit, read the personal testimony of two of the plaintiffs, and consider other strategies that young people are using to affect climate policy. *Page 62*

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Students work together to understand the significance of the rise in atmospheric carbon dioxide and consider different methods for stopping it. This lesson can be adapted for science, writing, or social studies classes. *Page 73*

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This lesson has students look at the devastating impact of Hurricane Maria on Puerto Rico, and consider how around the world, people with the fewest resources are most at risk from climate change. *Page 123*

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# A Climate Change Primer for Elementary School

By [Sarah Outterson-Murphy](#)

This series of lessons helps students (grades 3-5) learn about why is climate change is happening, why it matters, and what they can do about it. (3/20/19)

## To the Teacher

This sequence of readings and activities includes three lessons that can be spread over three or more days:

- Why is climate change happening?
- Why does climate change matter?
- What can young people do about climate change?

For these lessons, you will need one copy of the book *Buried Sunlight: How Fossil Fuels Have Changed the Earth* by Molly Bang and Penny Chisholm (Blue Sky Press, 2014).



Young [plaintiffs](#) in the lawsuit young people have brought against the U.S. to stop climate change.

## I. Why is climate change happening?

Before reading *Buried Sunlight*, discuss with students how we use energy in our daily lives. Ask:

- What makes cars go?
- What heats the classroom?

After students mention gasoline and heating oil, introduce the term “fossil fuels” and write it on the board. Explain that today students will learn about where fossil fuels come from and how they can have a big effect on our planet.

### **Read & Discuss the Book**

Read *Buried Sunlight* aloud to students. As you read, ask students to explain what they see in the pictures. Help students recognize that the yellow dots on each page represent sunlight-energy in its various forms. As you read, pause to notice and discuss each page, including the suggestions below. Allow students to discuss in pairs before sharing with the group.

- “I am your sun”: Draw students’ attention to the tiny Earth in the bottom right hand corner of the page. Ask them to notice how huge the sun is compared to the Earth. Ask them to notice the yellow dots coming out of the sun. What do those dots mean?
- “They captured light I shined on Earth millions of years ago.” Invite students to explain what they see underground in the picture. Ask them what the picture shows about where the energy in the coal, gas, and oil came from.
- “This is the Cycle of Life.” Ask students to explain what the big arrows on the page mean. What does the O<sub>2</sub> arrow mean when it goes from plants to animals? What does the CO<sub>2</sub> arrow mean when it goes from animals to plants?
- “Fossil fuels—my ancient buried sunlight.” Ask students to explain what is happening in the picture as the tree falls over. Where is its sunlight-energy going and what is it turning into in the picture?
- “Now you use my ancient sunlight-energy to power your world.” Ask students to explain what all the sunlight-energy is doing now (point to the city, outlined in red).

After reading the book, ask students to discuss with you:

- What are fossil fuels? Where can they be found? Where does their energy come from?
- How long did it take for the earth to make fossil fuels? How long have we been burning them?
- How does burning fossil fuels change our planet's climate? What does a blanket of CO<sub>2</sub> do to our planet?

### Hands-on activity

After reviewing the page about the greenhouse effect ("So this: CO<sub>2</sub> is part of a 'blanket' of gases around Earth"), conduct a [demonstration \(video here\)](#) of how CO<sub>2</sub> traps heat by using two plastic bottles, Alka-Seltzer tablets, a light source, and two thermometers. Explain that the Alka-Seltzer tablets release carbon dioxide bubbles.

See this University of Colorado site for a [more detailed version of the demonstration](#).

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## II. Why does climate change matter?

Write the words "weather" and "climate" on the board. Ask:

- What was the weather today? Write it down under the word "weather."
- What was the weather three months ago? What was the weather six months ago? How about several years ago?

Discuss how weather changes. Then explain to students that "climate" means what a place's weather is usually like over many years. Explain that today they will learn about how changes in the climate might affect their lives.

Use *Buried Sunlight* to review the concept of how climate has changed over time. Re-read aloud the section of the book beginning with the greenhouse effect ("So this: CO<sub>2</sub> is part of a "blanket" of gases around Earth") and continue through to the graph of CO<sub>2</sub> over time.

- “When they increase in the blanket, Earth warms.” Ask how this warming affects Earth’s climate.
- “Your Earth has begun to feel these changes.” Take time for each part of this page.
- Ask why students think the glaciers are melting. Pause to show this time-lapse video of Mendenhall Glacier in Alaska. <https://earthvisioninstitute.org/share-this/mendenhall-glacier-alaska/> Ask students to discuss what they see and why it might be happening.
- Ask why the seas might be rising. Where is the extra water coming from? Point out that warmer, wetter air causes more storms and floods in some parts of the world, and droughts in other parts of the world.
- “The Earth’s living creatures had time to adjust to the changing climate.” Ask students to explain to you what the picture shows about how the planet’s temperature and CO<sub>2</sub> change together. When CO<sub>2</sub> was low, what was the climate like? (Point to the the snowy, icy patches.) When CO<sub>2</sub> was high, what was the climate like?

Ask students to discuss:

- What is climate change?
- What kinds of changes are happening?
- What happens to cities on the coast or islands when the sea level rises?
- What happens to farms and cities in hot, dry areas when the air gets hotter and dryer?
- How could these changes affect our lives?

### **Hands-on activity:**

Show students the page from Buried Sunlight with the melting glaciers and rising seas again. Explain that students will be conducting their own experiment to see what happens when glaciers melt and sea levels rise.

In small groups or as a class, use play-dough to build a diorama of a coastal city, inside a large plastic storage container. Then add water to show a base sea level. Have students make predictions about the effect of sea level rise on their city, and then add

more water to test their predictions. You may also wish to use ice to simulate glaciers melting off the land. For a more detailed description of such a demonstration, see this from the GLOBE program (Global Learning and Observations to Benefit the Environment): [https://www.globe.gov/documents/348830/21221037/02\\_EGc\\_FINAL\\_29sept2016.pdf/90286010-cb39-4bbf-95df-e4d549fa4b9a](https://www.globe.gov/documents/348830/21221037/02_EGc_FINAL_29sept2016.pdf/90286010-cb39-4bbf-95df-e4d549fa4b9a)

Further suggestions and discussion questions for this activity are available in GLOBE's lesson plan "Seashores on the Move": <https://www.globe.gov/web/elementary-globe/overview/climate>

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### III. What can young people do about climate change?

Review the final image from *Buried Sunlight* ("Will you humans keep burning...") and discuss:

- What will happen if we keep burning fossil fuels? What changes will happen in the climate?
- What kinds of things do we do that burn fossil fuels? What do we do that uses energy?
- What can we do to stop burning fossil fuels so quickly? How can we reduce the amount of oil, coal, and gas that we use?

Discuss with students and list on the board various kinds of actions we can take to reduce the amount of fossil fuels we burn. You may also wish to read aloud the book *Three Cheers for Trees! A Book About Our Carbon Footprint* by Angie Lepetit (Capstone Press, 2013).

After listing various possible actions on the board, analyze the results together. Ask students which actions they can take on their own, and which require lots of people to agree on together. See if they can come up with any more ideas for collective action.

Then show this [image of the Our Children's Trust plaintiffs](#) and ask students:

- Did you know that children like you have been working together with adults to bring lawsuits against the U.S. government to stop climate change? The case is called *Juliana vs. United States*. The children are asking the Supreme Court to decide that all people, especially children, have the right to a safe climate for their future. If the children win this lawsuit, the U.S. government will have to make changes to stop people from burning so much fossil fuel.

You may also wish to show this [video](#) of one elementary-age plaintiff discussing her reasons for joining the lawsuit.

Discuss as a class:

- What do you think about this lawsuit?
- How does climate change affect children more than adults?
- What are some ways that the government can do more about climate change than individual people can?
- Do you think the government has a responsibility to protect the climate for the future?
- What kinds of collective actions could a class like ours take to fight climate change?

Have children work in small groups to make posters informing other students about climate change and how to fight it.

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# A Climate Change Primer for Middle School

By [Sarah Outterson-Murphy](#)

This primer includes six short, interactive, multimodal lessons to help middle school students learn, think, and write about climate change – and consider how to take action. (3/7/19)



Photo: Kids Climate March in Minnesota in 2017, by [Lorie Shaul](#)

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## To the Teacher

This sequence includes six lessons that can be spread over six or more days:

- How is the climate changing?
- How are glaciers changing over time?
- How will sea level rise affect us?
- How does climate change make weather more extreme?
- Why is climate change happening?
- What can young people do about climate change?

Alternatively, use the ideas and links as resources for your existing climate change lesson plans.

These lessons rely on climate change data from NASA, articles from Newsela, and two key books for middle-school readers:

*How We Know What We Know About Our Changing Climate* by Lynne Cherry and Gary Braasch (Dawn Publications, 2010) collects a wide range of evidence demonstrating how the climate is changing, and presents it in an empowering way by emphasizing how young people are researching and taking action on climate change.

*Rising Seas: Flooding, Climate Change, and Our New World* by Keltie Thomas (Firefly Books, 2018) focuses on one of the most striking effects of climate change, and explores how sea level rise is already impacting coastal regions around the world in order to bring home the urgency of climate action.

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## 1. How is the climate changing?

Ask students what they already know or have heard about climate change. Record their knowledge and wonderings on a KWL chart. (That is, what do you Know about this topic; what do you Want to know; and, what did you Learn).

Next, introduce [NASA's Global Climate Change website](#).

As a class, examine the Global Temperature indicator. Ask students to interpret the chart and the visualization map for what they show about how global temperatures have changed over time.

Then ask students to make predictions about how these changes in temperature might affect the planet. Turn these predictions into questions and add them to the KWL chart.

Note to the teacher: Students may have heard people argue that current climate change is not caused by humans because climate change has also occurred in the past. Be prepared to investigate with students how much faster the rate of climate change is now than in the past, and to make predictions about how those fast-moving changes might be even more challenging for humans and other animals than the slower changes of the past.

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## 2. How are glaciers changing over time?

To explore this question, use the [lesson plan "Disappearing Glaciers"](#) from the teacher's guide to *How We Know What We Know About Our Changing Climate*, pages 19-21.

This lesson plan includes a kinesthetic exploration of a glacier's life cycle and an analysis of the changes in a glacier over time using a Venn diagram.

You can also show this [time-lapse video](#) of Mendenhall Glacier in Alaska.

Ask students what learning and wonderings they can add to the KWL chart based on today.

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### 3. How will sea level rise affect us?

Introduce the lesson's guiding question about how sea level change affects humans by having students conduct an experiment with ice and water, demonstrating how glacier melt affects sea level.

A video of one such demonstration is available [here](#).

After the demonstration, have students explain to each other how glacial ice melting affects sea levels.

Then have students examine the sea level simulation data at NASA's [Climate Time Machine](#).

Alternately, show students [these photos](#) of children standing in water at the level of expected sea level rise during their lifetimes.

Ask students to make predictions about how these changes in sea level will affect people in coastal cities.

Then have students work in small groups to examine selections from the book *Rising Seas*. Pages 6-9 offer an overview of sea level rise, and other sections discuss effects on specific regions from Miami Beach to the Maldives. Be sure to clarify that some of the pictures are photo illustrations based on predictions, not actual photographs. Have students discuss and revise their predictions based on their reading.

Finally, have students write their own creative narratives about how changes in sea level might affect a family like theirs, living in a coastal city of their choice.

Ask students what learning and wonderings they can add to the KWL chart based on today.

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### 4. How does climate change make weather more extreme?

Brainstorm with students: What kinds of extreme weather events have you heard about recently? What are some ways that climate change and global temperature rise might affect the weather and make it more extreme?

Divide into small groups and have each group read one of these four Newsela articles at a time at an appropriate Lexile level, and then discuss the given questions as a group (free Newsela account required).

After groups discuss their article, ask them to work together to write a short summary of the article. Have each group share its summary with the class.

[Cyclones and Climate Change](#) (560-1190L)

[Ten ways climate change can make wildfires worse](#) (410-820L)

[Why there's a big chill in a warmer world](#) (380-810L)

[Climate change in the US Southwest](#) (550-1210L)

### Group questions:

- What kinds of extreme weather are discussed in our group's article?
- How does climate change cause that extreme weather?
- How does that extreme weather affect people?
- Who does it affect?
- What kinds of damage does the extreme weather cause?
- What can people do to help?

Ask students what learning and wonderings they can add to the KWL chart based on today.

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## 5. Why is climate change happening?

To explore this question, use the lesson plan "[Life in the Green House](#)" from the teacher's guide to *How We Know What We Know About Our Changing Climate*, pages 28-33.

This lesson plan includes an informal pre-test of knowledge about the greenhouse effect, an interactive lecture on the greenhouse effect with a graphic organizer, and small-group discussion questions.

Then, consolidate knowledge by having students work in groups to construct cause-and-effect diagrams showing the causes and effects of climate change, using arrows to show how causes lead to effects. Diagrams should link together at least 5 different phrases, and should include target vocabulary, such as "fossil fuels," "carbon dioxide," "sea level," and "global temperature."

As an extension activity, you might ask students to discuss and use a Venn diagram to record which parts of the world have contributed the most to climate change and which parts of the world are suffering the most consequences from climate change. Ask: What responsibility does our country have to help solve this problem? You can introduce this discussion with a reading from *Rising Seas*, page 45.

Ask students what learning and wonderings they can add to the KWL chart based on today.

## 6. What can young people do about climate change?

Ask students to use a [Carbon Footprint Calculator](#) to estimate their carbon footprint. Invite them to discuss results with their neighbors as they do.

Discuss as a class:

- What kinds of actions emit more carbon?
- How can we reduce various forms of carbon emissions?
- Which kinds are harder for individuals to stop or reduce?

Read together pages 50-55 from *How We Know What We Know About Our Changing Climate*. Then, as a class, have students brainstorm ways they can fight climate change. As students come up with actions, take notes on the board. Analyze the results together.

Students are likely to focus on individual actions they can take to reduce their energy consumption. Ask students: What is the difference between individual actions and collective actions? After they identify the difference, ask why collective actions can be more powerful. You might point to the ways our government or institutions contribute to climate change (such as government support for the fossil fuel industry), and encourage ideas about how to change such government decisions. See if they can come up with any more ideas for collective action.

Ask students: Did you know that children like you have been working together with adults to bring lawsuits against the U.S. government to stop climate change?

Have your students read this Newsela article at an appropriate Lexile level:

[Children's court case to fight climate change](#) (580-1250L)

**Discuss as a class:**

- What do you think about this lawsuit?
- How does climate change affect children more than adults?
- What are some ways the government is causing climate change?
- Do you think the government has a responsibility to protect the climate for children?
- What kinds of collective actions could students like you take to fight climate change?

Ask students to reflect on their learning one last time with the KWL chart.

[Lesson index](#)

# Our Water Footprint

By [Marieke van Woerkom](#)

Elementary students consider how much water we consume and what impact it has by hearing some facts and discussing the story of one girl's water consumption. (4/15/11)



Photo: <https://unsplash.com/photos/LoGnr-w1D8E>

## To the Teacher:

In this lesson, students will develop what author and psychologist [Daniel Goleman](#) calls their "green intelligence" by considering their water footprint.

Goleman, author of *Emotional Intelligence*, believes that environmental awareness and action are the next frontier in the field of social and emotional learning.

## Objectives

### Students will:

- discuss the kinds of water they come across on a regular basis
- explore the idea of life force
- consider their own water footprint through an interactive read aloud

### Social and Emotional Skills:

- environmental awareness
- active listening
- making informed decisions

### Materials needed:

- Today's agenda on chart paper or on the board
- Jen's story (below)
- Your own drawing of a foot on chart paper or the board

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## Gathering

(7 minutes)

Ask students to talk in pairs about water. What kinds of water do they come across on a regular basis?

Back in the full group, ask volunteers to share what they discussed. Chart the kinds of water students mention, making sure to include drinking water, water for washing and flushing, oceans, lakes and rivers, and precipitation such as rain, hail, snow or fog.

## Agenda and objectives

(10 minutes)

Tell students that today, as part of Earth Month, we'll be looking at the use of water. Water is considered a life force.

- Ask students what they think the words "life force" mean.
- Why do they think water is considered a life force?

Elicit and explain that we all need water to survive. Water not only covers 70% of the earth's surface, it makes up 70% of the adult human body. When looking at a globe or map of the world, the blue parts represent the water. Imagine if we could see water in the human body, what that might look like. Point out that if we drew a map of the human body in which water was shown as blue, then most of the body would be colored blue, just like our planet.

Ask students about the ways we need water. Discuss the importance of drinking water on a daily basis. By drinking water our bodies are able to digest food and flush out dirt (waste). Water also allows our bodies to control our temperature. Each day we must replace 2.4 liters (over half a gallon) of fluid—either through drinking liquid and eating foods that have lots of water in them - like fruits and vegetables.

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## Our Water Footprint

(15 minutes)

Ask students to consider and discuss the following question: What causes us to create a footprint when we walk in the mud or in soft sand?

Talk about how our actual footprint is caused by putting pressure on a surface. We are creating an impact by our presence.

The footprint we'll be dealing with today is called our water footprint. It's similar to the kind of footprint we make in the sand—only it's an impact we're having on the planet and our environment (not just on the sand) when we use water. Our "water footprint" describes the impact our water use is having on our planet's water resources.

Explain and elicit that each of us uses lots of water for drinking, cooking and washing. Often we're taking clean water (to use, say, in washing dishes), and then flushing it out as dirty or polluted water.

Americans waste and pollute enormous amounts of water every day. The long-term effects of such behavior are dramatic. In some parts of the US, rivers are actually running dry. In many countries around the world, the shortage of clean water is a life or death issue. Around 1 billion people have no access to a clean source of drinking water and about 2.6 billion people - half the developing world - lack basic sanitation (which causes diseases to spread). Americans

contribute to this problem because many of the goods we buy come from other parts of the world where water is scarce. And it takes a lot of water to produce almost anything.

Explain that water is used in producing many things we use (or consume) like paper, cotton clothes, and meat.

Here are some examples for your students to consider:

It takes 1,914 gallons of water to produce 1 pound of beef  
It takes 574 gallons of water to produce 1 pound of pork  
It takes 588 gallons of water to produce 1 pound of chicken meat  
It takes 634 gallons of water to produce 1 hamburger

It takes 359 gallons of water to produce 1 pound of rice  
It takes 162 gallons of water to produce 1 pound of wheat  
It takes 108 gallons of water to produce 1 pound of corn

It takes 3 gallons of water to produce 1 slice of wheat bread

It takes 8 gallons of water to produce 1 cup of tea  
It takes 13 gallons of water to produce 1 orange  
It takes 19 gallons of water to produce 1 orange

It takes 179 gallons of water to produce 1 pound of cane sugar  
It takes 158 gallons of water to produce 1 pound of cheese  
It takes 1,015 gallons of water to produce 1 gallon of milk  
It takes 53 gallons of water to produce 1 egg

It takes 713 gallons of water to produce 1 cotton shirt  
It takes 3 gallons of water to produce 1 sheet of paper

From the water footprint network website at: <http://www.waterfootprint.org/>

Read Aloud:

## Jen's Water Usage

(15 minutes)

The following activity will allow students to see more clearly how our daily actions and choices affect how big and deep our personal water footprint is.

Explain that you will be reading a story about a girl called Jen (pick another name if you have a Jen in your classroom). Jen is a student around the age of your students. In the story we will follow Jen for the day. Ask your students to pay attention to what Jen does that increases her (and her community's) water footprint. Every time students hear something in the story that increases her or her community's footprint ask your students to raise their hands.

You might visually illustrate this activity by drawing the outline of a footprint on a sheet of paper. Post the footprint and every time the students raise their hands, get a volunteer to color in part of the footprint with a blue marker so that by the end of the story, the footprint is all blue.

### The story:

Jen wakes up. She rubs her eyes and rolls out of bed. She goes to the toilet, which she flushes before going into the bathroom to brush her teeth. While brushing she leaves the tap running. Next she hops in the shower, washes herself and continues to enjoy the flow of the warm water for a while longer till her brother starts banging on the bathroom door, letting her know it's been 15 minutes. It's time for him to take a shower. She gets out and dries herself off with a cotton towel, which she throws into the hamper after having used it only once.

She returns to the bedroom where she picks a new outfit to wear to school today. She walks down the stairs into the kitchen where she has cereal and milk for breakfast, with her mom and brother. The family puts their dishes in the sink and mom turns on the tap as she hurries Jen and her brother to get ready, grabbing their bookbags and getting their coats on. Jen grabs her lunch of baloney sandwiches, some bottled water and she and her brother rush out the door to catch the school bus.

Jen's teacher greets her students and gives them a writing assignment. Jen makes a mistake. So she tears the page out of her notebook, crumples it and starts again. She does this several times before finally getting it right. On her way to lunch Jen goes into the girl's bathroom where she notices a leaking faucet as she washes her hands. She ignores it and heads to lunch where she hangs out with her friends. The school lunch today is beef patties and rice – not a student favorite. Most of it ends up in the garbage as students make their way to the playground.

The afternoon's science assignment is printed on handouts - one for every student. Having completed the experiment a student comes by with the garbage can so everyone can toss the handouts now that they're done.

On returning home, Jen and her brother have a snack and a bottle of water from the fridge. Mom sends them to play in the yard. It's hot, so they splash each other with the garden hose until it's time to go inside and have dinner. They put their wet clothes in the hamper, put on clean clothes and join mom for dinner—pasta with a meatball sauce. Afterwards Jen and her brother do the dishes, keeping the tap running all the while. After doing homework and watching some TV, Jen goes upstairs. She tosses her clothes in the hamper, puts on clean pajamas, washes her face and brushes her teeth (while keeping the tap running) and says goodnight to mom before crawling into bed and switching the light off to go to sleep.

After you've read the story, ask your students to look at Jen's water footprint. Consider asking some or all of the following questions:

- What are your thoughts about Jen's use of water?
- Where could Jen have saved (or helped others save) water?
- What does Jen's story make you think about your own water use?

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## Closing

(3 minutes)

Ask a few volunteers to share one thing they might do differently as a result of today's lesson.

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## Homework

For homework ask students to keep track of their own water footprint by keeping a journal detailing their water use. In the next class, conduct a discussion about what students learned and how they might reduce their consumption of water.

[Lesson index](#)

# Climate Disruption—and Climate Action—in 2018

By [Marieke van Woerkom](#)

Students look at photos, read about, and discuss some of the climate crises in 2018, then survey a range of actions being taken to address it. (1/12/19)

In this activity, students look at photos, read about, and discuss some of the climate crises in 2018. Then, they survey a range of actions being taken to address it in the U.S. and the world.

See the Gallery Walk images at the end of this lesson, and the read-aloud section.

Also see complementary lessons related to climate change, including:

- [What is the Green New Deal?](#)
- [How Can We Prevent Climate Catastrophe?](#) (on the recent IPCC report)
- [Young People's Suit Over Climate Disruption Comes to Court](#)

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## Gathering: Severe Weather Events in 2018

Ask students to look at the image to the right (also included in Gallery Walk section below).

What do they think it represents? Ask them to turn to a partner to share out any thoughts and feelings they have about the image. Ask a few volunteers to share out with the whole class, what they shared with their partner.

Photo: <https://pixabay.com/en/earth-destruction-environment-1839348/>



Summarize and explain that climate change is causing extreme weather events around the world, as became clear once again in 2018. Global greenhouse gas emissions reached record highs. The [special report](#) on limiting global warming, published in October, by the

Intergovernmental Panel on Climate Change (IPCC), said we may have only till 2030 to avert catastrophic climate change.

But as we look back at 2018, it is clear that the reality of climate change is already having severe and destructive effects around the world, as the next activity illustrates.

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## Gallery Walk

Post the images for the Gallery Walk (at the end of this lesson) around your room. Invite students to walk around the space quietly, taking a walk through 2018, using the images with their captions to learn about some of the climate disasters that punctuated the year.

As students return to their seats, invite them to do a free-write about the images and information they saw in the gallery walk.

Guiding questions to consider:

- What were your thoughts and feelings during this gallery walk?
- Was there a particular image or event that stood out for you? Why do you think that is?
- What was it like going from one image to the next, 12 climate disasters out of the many that impacted our world in 2018?
- Were there any themes or connections you noticed between the different events?

Next, ask students to break into small groups to share their thoughts and feelings on the questions above and any other issues the images and events brought up for them.

Then, facilitate a full class discussion. Elicit and explain that “weather” refers to the short-term conditions of the atmosphere in a particular area, whereas “climate” refers to weather patterns over the long term. What do the events in our gallery walk tell us about climate change – or climate disruption, as it is sometimes called?

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## Recent Action on Climate Change

Read the following introduction out loud:

As we just saw in our gallery walk activity, climate change is having devastating effects around the globe. Extreme weather events are on the rise. Whether we want to or not, we’re all in this together, including future generations.

In October 2018, the UN Intergovernmental Panel of Climate Change (IPCC) released a landmark report on the impacts of global warming, compelling us to strengthen our global response to the threat of climate change.

Urgent, unprecedented efforts are needed right now to keep global warming in check, to a maximum of 1.5°C above pre-industrial levels. With every additional fraction of a degree of warming, the report warns, the risk of heat waves, drought, associated wildfires, heavy rains, and coastal flooding will worsen around the globe. This is moving people, governments and institutions to action in different ways.

Invite different student volunteers to read out loud this list of recent or ongoing efforts around the world, most of them voluntary, to combat climate change.

1. Clean technology is growing, improving and getting cheaper. Wind turbines and solar energy technology are expanding. Carbon-emitting coal plants are closing down. This is happening even in the U.S., despite the Trump administration's promises to reinvigorate the ailing coal industry.
2. Though the Trump administration continues to downplay climate change and has reversed many Obama era environmental regulations, Americans' support for aggressive action on climate change appears to be growing. Voters increasingly support regulating greenhouse gases and promoting renewable energy goals. According to a January 2018 Pew Research Center poll, 46 percent of Americans felt climate change should be a top priority for the President and Congress.
3. In the U.S. midterm elections, several candidates for office ran on clean energy ambitions. They used their climate advocacy to distinguish themselves, and won.
4. Environmental activists around the U.S. this year pushed their representatives to back an ambitious climate change solution dubbed "The Green New Deal," which is about "decarbonizing" the economy; moving it away from fossil fuels and greenhouse gas emissions, and ensuring that there are jobs for everyone as we make this transition.
5. Though President Trump pulled the U.S. out of the 2015 Paris climate agreement (which commits countries to curbing carbon emissions and investing in green technology), more than 80 mayors of cities across the U.S. pledged to continue following the Paris Agreement guidelines.
6. Internationally, a "Global Covenant of Mayors for Climate & Energy" is an alliance of cities and local governments with a shared long-term vision of action to combat climate change and move to a low-emission, resilient society.
7. Cities are increasingly encouraging urban commuters to avoid driving through better access to bike-sharing fleets, electric scooters, and additional bicycle lanes that more

effectively connect people to improved public transportation. In large cities across the world, “congestion pricing” discourages driving, leading to reduced tailpipe emissions

8. In September 2018, California’s governor Jerry Brown committed his state to become fully carbon-neutral by 2045. He pledged to reduce and offset carbon emissions by extracting as many greenhouse gases from the atmosphere as it emits. California is the world’s fifth-largest economy.
9. China runs the world’s largest carbon-trading market. Simply put, the government assigns carbon credits – the amount of carbon emission a company is allowed (the “cap”). Those who emit less than what they’re allotted can sell their credits to companies that exceed their limit (the “trade”).
10. In 2018, several global corporate giants signed record-breaking agreements to purchase renewable energy to power their operations. Their demand for clean energy is forcing utility companies to respond. One of the biggest utility companies in the U.S., Xcel Energy Inc, pledged that it would go completely carbon free by 2030.
11. The world’s fourth-largest global oil company, Exxon Mobil, supported lobbying efforts to advance the case for carbon tax. It was supported behind the scenes by fifth largest oil company, Shell.
12. Catholic organizations in the U.S. stepped up their climate advocacy in 2018 by opposing the Trump administration’s rollback of U.S. environmental regulations. The “Catholic Climate Declaration” stated: “As Catholic communities, organizations, and institutions in the United States, we join with state, tribal, and local governments, as well as businesses, financial institutions, and other faith organizations, to declare that we are still in on actions that meet the climate goals outlined in the Paris Agreement.” Catholic institutions around the country signed the declaration.
13. In November 2018, a pioneering lawsuit by a group of 21 youth activists against the U.S. government finally won the right to a trial. The kids are suing the U.S. government for failing to adequately protect the planet from the impact of climate change.
14. In December, diplomats from nearly 200 countries came together in Poland in an attempt to keep the 2015 Paris climate agreement alive. After almost two weeks of negotiations they reached a deal, in which a detailed set of rules was adopted to implement the 2015 agreement. The agreement created a uniform set of standards for measuring climate warming emissions and tracking national climate policies. It also calls on countries to step up their plans to cut carbon emissions ahead of the following round of talks in 2020.

### Discuss:

- Ask students their thoughts and feelings in response to these actions.
  - What other actions are students familiar with that help combat climate change beyond the individual level?
  - Who are the actors taking initiative to promote climate change according to these quotes?
  - How might a series of initiatives such as these by different actors be useful?
  - How might a series of initiatives such as these by different actors be problematic?
- 

### A Closing Reflection

According to the Intergovernmental Panel on Climate Change (IPCC) [“limiting the global average temperature rise to 1.5°C is still possible; however, it will require “unprecedented” transitions in all aspects of society, including: the transformation of energy, agricultural, urban and industrial systems; engagement of non-state actors; and integration of climate action into broader public policy and development frameworks.”](#)

And though the agreements and voluntary actions on a local, state, national and international level that we discussed in today’s lesson are important, “ultimately, the world’s success or failure in combating climate change will be determined not by commitments [and voluntary actions], but by concrete action at the national level [everywhere], in partnership with businesses, provinces and cities.”

The IPCC also noted the promise of this moment: “With clear benefits to people and natural ecosystems, limiting global warming to 1.5°C compared to 2°C could go hand in hand with ensuring a more sustainable and equitable society.”

- Ask students to share one thought or feeling as they relate what they discussed today to these last quotes from the IPCC.

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## Gallery Walk: Climate Change in 2018



<https://pixabay.com/en/earth-destruction-environment-1839348/>

## JANUARY



<https://www.flickr.com/photos/mtaphotos/25636084978>

In January 2018 a powerful blizzard hit North America causing significant disruptions along the East Coast. The storm dumped snow and ice in southern states that usually don't get wintry precipitation. In the mid-Atlantic states, it produced snowfall accumulations of over 2 feet. The storm came to be known as the "historic bomb cyclone."

## FEBRUARY



[http://hypotheticaltornadoes.wikia.com/wiki/Mid-February\\_2018\\_tornado\\_outbreak?file=879.gif.png](http://hypotheticaltornadoes.wikia.com/wiki/Mid-February_2018_tornado_outbreak?file=879.gif.png)

On February 7, a series of thunderstorms moved across Alabama, producing large hail, destructive winds, and six tornadoes. The storms also produced flash flooding and river flood warnings. Later that month, another tornado outbreak in Texas and Louisiana was widely considered to be the strongest February outbreak ever.

## MARCH



[https://commons.wikimedia.org/wiki/File:Landslide\\_in\\_Cusco,\\_Peru\\_-\\_2018.jpg](https://commons.wikimedia.org/wiki/File:Landslide_in_Cusco,_Peru_-_2018.jpg)

A major landslide near Cusco Peru in early March, destroyed over 100 houses, a school, a clinic, fields and highways. The government declared a state of emergency. According to officials the landslide was caused by heavy rains and the high level of saturation of water in the earth.

## APRIL



[https://commons.wikimedia.org/wiki/File:Theewaterskloof\\_sandscape\\_2018-03-11.jpg](https://commons.wikimedia.org/wiki/File:Theewaterskloof_sandscape_2018-03-11.jpg)

In early 2018 Cape Town, South Africa, was experiencing a severe water shortage due to insufficient rainfall and fast declining Theewaterskloof reservoir levels (image). The area had gone without significant rains for over three years.

## MAY



<https://pixabay.com/en/storm-thunder-lightning-dark-sky-2258182/>

In May, 2018, devastating winds, thunder and lightning, swept across India's northern states, whipping up some of the deadliest dust storms in decades. High-speed winds and lightning wreaked havoc. The storm devastated villages, killing well over 200 people and leaving many injured.

## JUNE



<https://www.scientificamerican.com/article/l-a-s-not-just-sizzling-its-sultry-why-californias-july-heat-wave-is-so-weird/>

The 2018 North American heat wave lasted from June 28 through October 4 and affected regions of Canada, the U.S., and Mexico. Heat advisories were issued to over 60 million people across the continent. In Halifax, Nova Scotia, the heat wave contributed to a record-breaking number of hot days, and in Quebec at least 70 deaths were heat related.

## JULY



[https://commons.wikimedia.org/wiki/File:2018\\_Carr\\_Fire\\_\(42286511740\).jpg](https://commons.wikimedia.org/wiki/File:2018_Carr_Fire_(42286511740).jpg)

In late July, a spark from a trailer's flat tire scraping the asphalt in an already bone dry part of California set off one of the most destructive wildfires in that state's history. The fire killed seven people, destroyed over 1,000 homes and wasn't 100 percent contained till August 30th.

## AUGUST



[https://commons.wikimedia.org/wiki/File:Pala\\_during\\_2018\\_Kerala\\_floods\\_02.jpg](https://commons.wikimedia.org/wiki/File:Pala_during_2018_Kerala_floods_02.jpg)

In August, severe monsoon flooding hit the state of Kerala, India. Weeks of unusually heavy rainfall led to decisions to open the Idukki Dam floodgates. This triggered landslides in the mountains and swamped coastal areas. It was the worst flooding in a century. More than a million people were displaced.

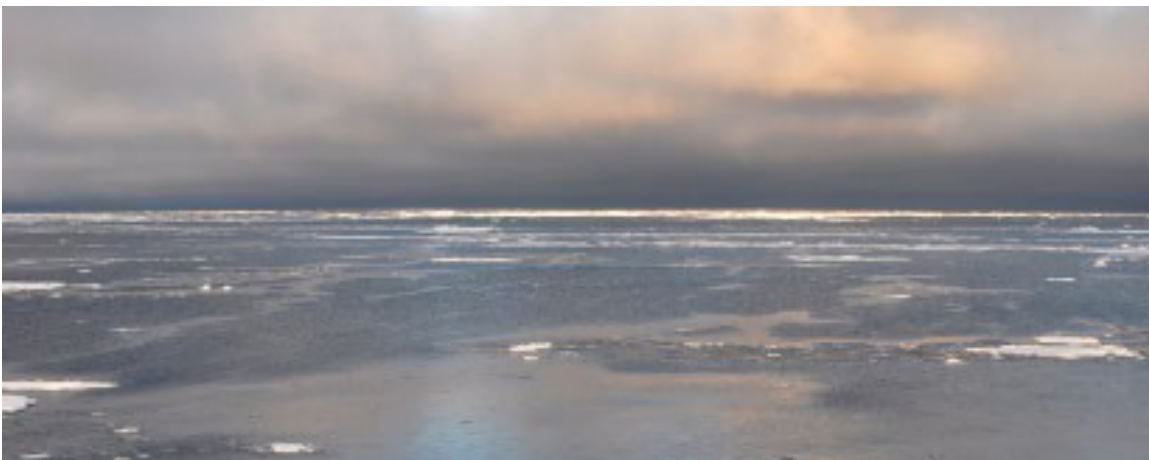
## SEPTEMBER



<https://www.voachinese.com/a/bilingual-news-20190917/4574930.html>

Hurricane Florence brought catastrophic flooding to the Carolinas in the second half of September, killing over 50 people and shattering all-time rain and flood records. Whole neighborhoods were submerged as people got trapped in their flooded homes, and needed to be rescued by boat.

## OCTOBER



[https://upload.wikimedia.org/wikipedia/commons/7/72/Thin\\_Ice\\_%284371017418%29.jpg](https://upload.wikimedia.org/wikipedia/commons/7/72/Thin_Ice_%284371017418%29.jpg)

In the Arctic, on top of the world, the oldest and thickest sea ice has started to break up, opening waters that have traditionally been frozen year round. This unprecedented phenomenon occurred twice in 2018 as a result of warm winds and a climate-change driven heat wave in the summer months.

## NOVEMBER



<https://www.flickr.com/photos/silkebaron/5113682985/in/photostream/>

At the end of November, a record-breaking heat wave in Queensland, Australia, fueled unprecedented bushfires and dust storms, and killed thousands of flying foxes on land. The accompanying marine heat wave increased the risk of further bleaching of the Great Barrier Reef, weakening a rich underwater ecosystem that is home to countless other marine life.

## DECEMBER



<https://earthobservatory.nasa.gov/blogs/earthmatters/category/natural-hazards/>

With continued ocean and atmospheric warming causing sea levels to rise, a large swath of Pacific Island Nations, including Mango Island, Ha'apai, Tonga (image) is slowly disappearing as it "sinks" into the ocean and becomes uninhabitable.

# Does Cold Weather Disprove Global Warming?

By **Mark Engler**

Students consider how some politicians have used the cold weather to deny climate change and explore the science and statistics behind this common argument. (2/4/18)



Photo: <https://unsplash.com/photos/5AiWn2U10cw>

## To the Teacher:

At the beginning of 2018, much of the country experienced cold weather, with some areas experiencing record-breaking low temperatures. The frigid weather led some people to ask whether the winter chill might disprove the idea that global warming is a problem. In fact, this has been a major talking point of climate-change deniers, one repeated every winter season.

President Donald Trump tweeted this argument, suggesting that our country could use more global warming.

This lesson includes two student readings and discussion questions. The first reading examines how some politicians have used the cold weather argument to deny climate change. The second explores the science and statistics behind this common misconception, explaining why individual data points taken from personal experience should not be confused with an overall global trend.

After Reading 2, consider showing or pointing students to this short [video](#), which offers a visual example of the importance of trend and variation discussed in the reading. Using the example of a person walking a dog, the video demonstrates how a data set may have many variations (represented by the seemingly random footsteps of the meandering dog) while the trend (represented by the direction the dog's owner sets for the walk) remains consistent.

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## Reading One: Politicians Respond to Cold Weather

At the beginning of 2018, much of the country experienced cold weather, with some areas experiencing record-breaking low temperatures. The frigid weather led some people to ask whether the winter chill might disprove the idea that global warming is a problem. In fact, this has been a major talking point of climate-change deniers, one repeated every winter season. In January 2018, President Donald Trump made a version of this argument in a tweet: "In the East, it could be the COLDEST New Year's Eve on record. Perhaps we could use a little bit of that good old Global Warming that our Country, but not other countries, was going to pay TRILLIONS OF DOLLARS to protect against. Bundle up!"

This was not the first time that Donald Trump has used cold weather to take a jab at efforts to curb global climate change. Vox reporter Dylan Matthews [found](#) that Donald Trump has tweeted his skepticism of climate change at least 115 times from 2011 to 2015, often remarking on how cold weather casts doubt in his mind on the reality of harmful climate change.

Others have used the same logic. *New York Times* reporter Kendra Pierre-Louis [wrote](#) in a December 28, 2017, article, "Politicians have tried to use cold snaps to prove a point before. Mr. Trump's line of reasoning recalled a February day in 2015 when Senator James Inhofe, Republican of Oklahoma, brought a snowball to the Senate floor as evidence that the Earth was not warming." Likewise, in a December 23, 2015, article, *U.S. News & World Report* staff writer Alan Neuhauser [cited](#) tweets or statements from at least five Republican senators and representatives who claimed that cold weather cast doubt on climate change trends.

Other politicians have taken on the logic of these claims. Following Trump's statement, Democratic Representative Don Beyer offered his own response on Twitter on December 28, 2017, [tweeting](#):

- 1: This isn't how climate change works.
- 2: We weren't paying trillions of dollars. You didn't understand the Paris Agreement in June and you still don't.
- 3: Climate Change is real. It is a serious threat to our children. You need people on your team who can explain this to you.

To find overall trends in climate, scientists look past localized variations in weather. In responding to President Trump's tweet, many scientists explained that some variation in weather is normal. They also noted that one effect of climate change is a change in overall weather patterns, resulting in more frequent cold temperatures in some places. Rachel Becker, a reporter for *The Verge*, [wrote](#) about how scientists responded to President Trump, citing some of NASA's online science education materials:

Cold weather can still happen as global temperatures rise. "The trip to a warmer world (climate change) will have plenty of extreme hot and cold weather," NASA's Climate Kids site patiently explains. We'll just see more of those extremely hot days as the planet warms, according to the climate change tracking platform Climate Signals and scientist Michael Mann. He tweeted that record hot days are beating record cold days three to one.

Right now, a warm ridge of high-pressure air is hovering over the Western U.S., forcing the highway of winds that would normally bring cool, rainy weather to California up into Canada. That's causing the extended warm, dry spell fueling California's wildfires and the East Coast's icy temperatures. When the jet stream plunges back down, it carries frigid air, "mainlining cold to the eastern half of the U.S.," Brian Kahn writes for *Earthar*.

Scientists led by Stanford's Noah Diffenbaugh have studied this strange seesaw effect on temperatures across North America, where upward swings in winter temperatures in the west correspond with icy drops to the east. They found that this warm west / cold east combination is happening more often as the climate warms. "We have strong evidence that not only does it not invalidate global warming, but it's actually very consistent with what we'd expect," Diffenbaugh tells *The Verge*.

Cold weather, such as the extreme temperatures much of the U.S. experienced this winter, often brings questions about the validity of climate change. However, such questions often have more to do with political maneuvering than with climate science.

### For Discussion:

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
  2. Have you heard politicians or friends remark on the weather, relating it to climate change? What did you think?
  3. Why do you think some politicians use weather to attempt to deny climate change?
  4. The reading above includes several responses to President Trump's tweet about climate change and cold temperatures. Which of the responses do you think make the best argument? Explain your reasoning.
- 

### Reading Two: Climate, Science, and Statistics

Whether it is an idle joke from a passerby or a statement from a politician, using cold weather as a counterargument to global climate change represents a misunderstanding of science and statistics. The argument that climate change is not happening because one particular geographical area is experiencing cold weather relies on several fallacies.

The first of these fallacies is a statistical one: confusing one data point with an overall trend.

Two weeks of cold weather during January in the Midwestern United States may give us some information about the overall state of the climate, but it does not constitute proof that the Earth is not warming. Using just a few data points to assert a wider trend—particularly data points chosen for the purposes of supporting one's argument—can lead to wildly inaccurate conclusions. In contrast, scientists and statisticians often try to use the largest data sample possible in order to draw a conclusion that is strongly supported by evidence. Scientists use the terms “trend” and “variation” to describe how, over time, data may vary dramatically, though the trend line clearly points in a particular direction. Using one data point such as a short-term weather event to make an argument about a larger trend is a failure to recognize the importance of gathering enough data to make a meaningful average and trend.

The second and related fallacy involves confusing “weather” with “climate.” The Environmental Protection Agency [describes](#) the difference between weather and climate this way:

**Weather** is the state of the atmosphere at any given time and place. Most of the weather that affects people, agriculture, and ecosystems takes place in the lower layer of the atmosphere. Familiar aspects of weather include temperature, precipitation, clouds, and wind that people experience throughout the course of a

day. Severe weather conditions include hurricanes, tornadoes, blizzards, and droughts.

**Climate** is the long-term average of the weather in a given place. While the weather can change in minutes or hours, a change in climate is something that develops over longer periods of decades to centuries. Climate is defined not only by average temperature and precipitation but also by the type, frequency, duration, and intensity of weather events such as heat waves, cold spells, storms, floods, and droughts.

While the concepts of climate and weather are often confused, it is important to understand the difference. For example, the eastern United States experienced a cold and snowy winter in 2014-2015, but this short-term regional weather phenomenon does not negate the long-term rise in national and global temperatures, sea level, or other climate indicators. It may be helpful to think about the difference between weather and climate with an analogy: weather influences what clothes you wear on a given day, while the climate where you live influences the entire wardrobe you buy.

Every winter in the Northern Hemisphere, scientists explain the difference between weather and climate as people wonder, how do snow and ice relate to the global climate change scientists have been talking about for decades? In a Q&A column, the popular science magazine *Scientific American* succinctly [answered](#) the question: Do snow and ice storms mean the climate is not warming?

**Dear EarthTalk: Don't all these huge snow and ice storms across the country mean that the globe isn't really warming? I've never seen such a winter!**

– Mark Franklin, Helena, MT

On the surface it certainly can appear that way. But just because some of us are suffering through a particularly cold and snowy winter doesn't refute the fact that the globe is warming as we continue to pump carbon dioxide and other greenhouse gases into the atmosphere.

According to the National Aeronautics and Space Administration (NASA), the 10 warmest years on record have occurred since 1997. And the National Atmospheric and Oceanographic Administration (NOAA) reports that recent decades have been the warmest since at least around 1000 AD, and that the warming we've seen since the late 19th century is unprecedented over the last 1,000 years.

"You can't tell much about the climate or where it's headed by focusing on a particularly frigid day, or season, or year, even," writes Eoin O'Carroll of the *Christian Science Monitor*. "It's all in the long-term trends," concurs Dr. Gavin Schmidt, a climatologist at NASA's Goddard Institute for Space Studies.

Most scientists agree that we need to differentiate between weather and climate. The NOAA defines climate as the *average* of weather over at least a 30-year period. So periodic aberrations—like the harsh winter storms ravaging the Southeast and other parts of the country this winter—do not call the science of human-induced global warming into question.

A third problem with using cold weather events to disprove climate change is that even relatively small changes in temperature can have dramatic effects on ecosystems. The fact that average overall global temperatures rise by a small amount does not mean that winter will cease to exist, or that we won't continue to experience cold days. For an individual, the weather might feel not too different than before if it is just a few degrees warmer. Yet such small changes in average temperatures can nevertheless significantly alter conditions for life on the planet.

Climate scientists have agreed that keeping the trend of global temperature warming below 2 degrees Celsius is important for doing the least damage to ecosystems possible. Average global temperatures rising 2 degrees Celsius could cause enormous problems, including disruptions in our agricultural systems. NASA's Bob Silberg [explains](#) in a June 29, 2016, article for NASA's climate website:

The Paris Agreement, which delegates from 196 countries hammered out in December 2015, calls for holding the ongoing rise in global average temperature to "well below 2 °C above pre-industrial levels," while "pursuing efforts to limit the temperature increase to 1.5 °C." How much difference could that half-degree of wiggle room (or 0.9 degree on the Fahrenheit scale) possibly make in the real world? Quite a bit, it appears.

The European Geosciences Union published a study in April 2016 that examined the impact of a 1.5 degree Celsius vs. a 2.0 C temperature increase by the end of the century, given what we know so far about how climate works. It found that the jump from 1.5 to 2 degrees—a third more of an increase—raises the impact by about that same fraction, very roughly, on most of the phenomena the study covered. Heat waves would last around a third longer, rain storms would be about a third more intense, the increase in sea level would be approximately that much higher and the percentage of tropical coral reefs at risk of severe degradation would be roughly that much greater.

But in some cases, that extra increase in temperature makes things much more dire. At 1.5 C, the study found that tropical coral reefs stand a chance of adapting and reversing a portion of their die-off in the last half of the century. But at 2 C, the chance of recovery vanishes. Tropical corals are virtually wiped out by the year 2100.

With a 1.5 C rise in temperature, the Mediterranean area is forecast to have about 9 percent less fresh water available. At 2 C, that water deficit nearly doubles. So does the decrease in wheat and maize harvest in the tropics.

On a global scale, production of wheat and soy is forecast to increase with a 1.5 C temperature rise, partly because warming is favorable for farming in higher latitudes and partly because the added carbon dioxide in the atmosphere, which is largely responsible for the temperature increase, is thought to have a fertilization effect. But at 2 C, that advantage plummets by 700 percent for soy and disappears entirely for wheat.

While the effects of even a small rise in average global temperature can feel dire, climate scientists and concerned citizens share the information to encourage people to take climate change seriously and to join in efforts to address its causes.

**For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. What is the difference between “weather” and “climate”? How does this distinction effect the debate about climate change?
3. Why do climate scientists want global leaders to agree to keep the world’s average temperature increase under 2 degrees Celsius? What could be the impact of such a rise in temperature?
4. Knowing that just a small difference in average global temperatures may have significant and negative consequences, how do you think that people should respond?

– *Research assistance provided by Ryan Leitner.*

[Lesson index](#)

# What is the Green New Deal?

By [Sarah Outterson-Murphy](#)

Students compare the “Green New Deal” proposed by Rep. Alexandria Ocasio-Cortez with President Roosevelt’s original New Deal. (1/12/19)

This lesson invites students to compare the “Green New Deal” proposed by Rep. Alexandria Ocasio-Cortez with President Roosevelt’s original New Deal. Students will evaluate the benefits and challenges of the Green New Deal.

See this [Green New Deal Task Sheet](#) created by science teacher Beth Mowry of the Brooklyn School for Collaborative Studies to accompany the lesson.



This lesson could be combined with several other recent lessons, including:

- [Climate Disruption – and Climate Action – in 2018](#)
- [How Can We Prevent Climate Catastrophe?](#) (focused on the recent IPCC report)
- [Young People's Suit Over Climate Disruption Comes to Court](#)

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## Opening

- Ask students if they have heard about the Green New Deal.
- Show students this video from Twitter of a recent protest supporting the Green New Deal. <https://twitter.com/sunrisemvmt/status/1075419913064468481>
- Ask students what words, phrases, or images they remember from the video. Based on the video, what is the Green New Deal’s main focus?

## Quiz: Make a match

Give students [this handout](#), which includes a quiz and the reading below.

Ask students to use prior knowledge and process of elimination to match this list of names with their definitions, then check answers with a neighbor.

1. Alexandria Ocasio-Cortez
  2. Franklin D. Roosevelt
  3. The Great Depression
  4. Works Progress Administration
  5. Social Security
  6. The New Deal
- 
- a. A New Deal government program to guarantee pensions to elderly and disabled people.
  - b. Congresswoman elected in 2018, who has proposed a new congressional committee to plan a Green New Deal.
  - c. A time of worldwide economic crisis after World War 1, from 1929-1939, in which the stock market crashed and 20% of Americans could not find work.
  - d. A set of expansive new government programs that President Roosevelt began in 1933 in order to help fight the Great Depression by regulating banks, making it easier for workers to organize into unions, directly providing jobs, and subsidizing the economy.
  - e. President of the United States from 1933 until 1945, who began the New Deal in response to the Great Depression.
  - f. A New Deal government program to provide jobs to unemployed people by building highways, parks, schools, and more.

Give students the reading below. Explain that this reading will introduce the Green New Deal that Congresswoman Ocasio-Cortez has promoted. As they read, students should think about similarities and differences between Franklin D. Roosevelt's New Deal of the 1930's and the Green New Deal of today.

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### Reading: A Green New Deal

A recent report from the UN Intergovernmental Panel on Climate Change found that the world has only 12 years to cut carbon emissions in half, by 2030, or we will be on track to experience a disastrous 2 degrees Celsius of global warming as soon as the year 2040. (Two degrees Celsius converts to 3.6 degrees Fahrenheit.)

In response to this situation, newly-elected Congresswoman Alexandria Ocasio-Cortez, representing the Bronx and Queens, has proposed a new Congressional committee charged with putting together a plan for a Green New Deal. This Green New Deal would be a "detailed national, industrial, economic mobilization plan for the transition of the United States economy to become greenhouse gas emissions neutral and to significantly draw down greenhouse gases from the atmosphere and oceans and to promote economic and environmental justice and equality." The committee would produce a concrete plan within one year that would have the goal of moving the U.S. to 100% renewable energy sources by January 2030, across all industries, housing, and transportation. Currently, the U.S. gets [18% of its electricity from renewable sources](#).

The Green New Deal is inspired by the New Deal, a broad set of policies passed during the Great Depression to address widespread poverty and unrest. The programs of the New Deal [reflect demands](#) that had been made for years by labor activists, women's groups, and a wide range of activist organizations across the country. The New Deal was highly controversial when it first passed. It included laws to regulate banks, increase employment, support the poor and elderly, and empower workers to organize unions. New Deal programs included the Works Progress Administration, which hired unemployed people to build many of our nation's highways, hydropower dams, post offices, schools, and parks. Another New Deal program was the Social Security Administration, which provided a safety net for elderly and disabled Americans for the first time. All of these programs were a major change from previous efforts to provide for the general welfare of people through free-market strategies. Instead, the New Deal directly provided jobs and subsidies to people and communities.

Similarly, the Green New Deal would “provide all members of our society, across all regions and all communities, the opportunity, training, and education to be a full and equal participant in the transition [to a green economy], including through a job guarantee program to assure a living wage job to every person who wants one.” These new jobs would work to transition the U.S. to 100% renewable energy by building new systems for generating, storing, and transmitting energy, by remodeling homes and buildings to be more energy-efficient, and by producing new systems for removing greenhouse gases from the atmosphere.

[A recent poll by Yale](#) shows that 81 percent of registered voters in America (including 92 percent of Democrats and 64 percent of Republicans) support this idea of a Green New Deal.

The original New Deal was a massive investment in the U.S.’s infrastructure and economy. Adding all its programs together, Roosevelt’s [New Deal cost about half a trillion dollars](#) over the 1930’s, in today’s money. Meanwhile, the cost of the proposed Green New Deal transition to 100% renewable energy [could be at least \\$2 trillion](#).

However, the Green New Deal would cost less relative to the size of the whole U.S. economy than the New Deal did back in the 1930s. The Green New Deal’s \$2 trillion cost would be about 10 percent of the U.S.’s 2017 GDP (gross domestic product). By comparison, Roosevelt’s New Deal cost about 40 percent of the U.S.’s 1929 GDP. (The government-funded mobilization of industry and jobs for World War 2 just a few years later, [cost about \\$4 trillion](#) in today’s dollars, an even larger investment.)

In short, the Green New Deal would be expensive, but it would not require nearly as much of a relative increase as Roosevelt’s New Deal did at the time. That New Deal was funded by large new taxes on the rich, which Roosevelt called a Wealth Tax. The wealthiest Americans paid up 75% of their income in taxes. Today, the top tax rate is 37% (for people with an annual income of over half a million a year).

Roosevelt’s [New Deal has been criticized](#) for disproportionately benefitting whites while excluding Black and Latino citizens. For example, the Federal Housing Administration, a New Deal program for providing home mortgages, made it very difficult for African-Americans to get federally-backed mortgages and own their own homes, through a discriminatory practice called [redlining, as well as other practices](#). Furthermore, the Social Security program did not at first include agricultural workers and domestic workers (such as maids and nannies), categories that included 90 percent of African-American workers at the time. As a result, African-Americans did not benefit equally from the investment dollars of the New Deal.

By contrast, the Green New Deal proposal insists on “a ‘just transition’ for all workers, low-income communities, communities of color, indigenous communities, rural and urban communities, and the front-line communities most affected by climate change,

pollution and other environmental harm.” Because climate change and pollution are particularly harmful to low-income and marginalized people who have fewer resources to protect themselves, supporters of the Green New Deal argue that any plan for massive investment and economic transition must include and support these groups and their needs.

Democratic leaders in the House of Representatives have not yet agreed to actually create the Green New Deal committee. Instead, incoming Speaker of the House [Nancy Pelosi announced](#) a different Climate Crisis committee that will have the goal of reducing air pollution, creating green technology jobs, and preventing the social instability caused by climate change. Critics of this alternate plan point out that without a specific goal of drafting a Green New Deal, this committee is unlikely to have much impact, like past congressional committees focused on climate change.

Alexandria Ocasio-Cortez [wrote on Twitter on Dec. 31, 2018](#): “A few weeks ago, I joined youth activists in a specific demand for a Green New Deal Committee. It had 3 simple elements: 1. No fossil fuel money on climate cmte [committee]. 2. Offer solutions for impacted communities 3. Draft sample #GreenNewDeal. All 3 were rejected as ‘too controversial.’”

The Congresswoman and her allies, including activists in the Sunrise Movement, say they will keep fighting for a Green New Deal. Ocasio-Cortez said the movement would support Pelosi and others who pushed for “100% renewable energy,” but would also organize [primary election challenges](#) aimed at replacing Congress members who fail to support the Green New Deal with Congress members who do.

### Further reading:

Text of the Green New Deal committee

proposal: <https://docs.google.com/document/d/1jxUzp9SZ6-VB-4wSm8sselVMsqWZrSrYpYC9slHKLzo/edit#>

Comparison between New Deal and Green New

Deal: <https://www.versobooks.com/blogs/4131-building-a-green-new-deal-lessons-from-the-original-new-deal>

Overview of U.S. climate policy and Green New

Deal: <https://theintercept.com/2018/11/27/green-new-deal-congress-climate-change/>

## Discussion Questions

Have students discuss the following questions in small groups. (The questions are included in the [handout](#).) After they discuss, ask each group to use their responses to create a chart or poster comparing the New Deal and the Green New Deal.

- What similarities and differences do you notice between Roosevelt's New Deal and the Green New Deal?
- What crisis was Roosevelt's New Deal responding to in the 1930s? What modern-day crisis would the Green New Deal respond to?
- How was the New Deal's strategy different from previous efforts to support the economy? How would the Green New Deal's strategy be different from previous efforts to fight climate change?
- Why do you think both New Deals include public jobs programs?
- Why might Roosevelt's New Deal programs have faced stiff opposition in their day? Why might some people disagree with the Green New Deal today?
- Why do you think House Democratic leaders are proposing a Climate Crisis committee instead of a Green New Deal committee?
- Should we support the Green New Deal? If so, how?

---

## Closing

Ask each group to display their poster on the wall and assign one or two members of the group to explain it or answer questions from the class. Once everyone is finished, ask the following questions in a go-around:

- What struck you most in our reading and discussion today?
- What is the most important thing that people need to know about the Green New Deal?

[Lesson index](#)

# How Can We Prevent Climate Catastrophe?

By [Sarah Outterson-Murphy](#)

A new UN report on climate disruption points to the need for immediate action. In this lesson, students discuss the report and what kind of response it requires.

## To the Teacher:

Consider combining this lesson with our concurrent lesson about the lawsuit young people have brought against the government: [Young People's Suit Over Climate Disruption Comes to Court.](#)

## Opening

Project this tweet: <https://twitter.com/JimHarris/status/1050367848185380864>



**Jim Harris** ✓  
 @JimHarris

DIRE WARNING: We have 12 years to limit climate change catastrophe, warns United Nations. URGENT changes needed NOW to reduce risk of extreme heat, drought, floods and poverty, warns IPCC [bit.ly/2CCtEHn](https://bit.ly/2CCtEHn) [#ClimateChange](#) [#IPCC](#) [#IPCCReport](#) [#climate](#)

Climate change

### We have 12 years to limit climate change catastrophe, warns UN

Urgent changes needed to cut risk of extreme heat, drought, floods and poverty, says IPCC

● Overwhelmed by climate change? Here's what you can do

**Jonathan Watts** *Global environment editor*  
 Mon 8 Oct 2018 07:23 BST

95,783



▲ A firefighter battles a fire in California. The world is currently 1°C warmer than preindustrial levels. Photograph: Ringo HW Chu/AP

Ask students if they have heard about the report on climate change by the UN's International Panel on Climate Change (IPCC) issued in October 2018. The IPCC is the world's leading scientific authority on climate change.

Explain that according to the report, we must cut global carbon emissions in half in 12 years (by 2030), or we will be on track to experience two degrees Celsius of global warming as soon as 2040. Two degrees Celsius is the equivalent of 3.6 degrees Fahrenheit. (To convert from Celsius to Fahrenheit, multiply by 1.8 and add 32.)

For context, you may wish to explain that the planet is already 1 degree C warmer than it was before the Industrial Revolution. The IPCC argues that allowing the planet to warm to 2 degrees will be much worse than if we can limit it to 1.5 degrees.

---

## Effects of 2 Degrees Celsius

Ask students:

- What will happen if the planet warms 2 degrees Celsius or more, on average?

Student responses may include melting of the ice caps, sea level rise, increase in extreme weather events such as droughts, heat waves, and flooding, death of coral reefs, and other ecosystems, and so on.

Project the statistics below on the board or provide them in a handout ([CarbonBrief.org](https://www.carbonbrief.org)). Ask students to read each one aloud.

- At 2 degrees of warming, global GDP will drop by 13 percent. (GDP is the gross domestic product, the amount we collectively produce.) By comparison, the Great Recession of 2007 involved a 4 percent drop in GDP. Global costs of climate damage will be \$54 trillion by 2040.
- At 2 degrees of warming, corn crops worldwide will decrease by nine percent, leading to famines.
- At 2 degrees of warming, 400 million more people will suffer from droughts and water scarcity.
- At 2 degrees of warming, heat waves will increase across the world, killing thousands of people in America each summer and many more in tropical countries. India would have 32 times as many extreme heat waves. By 2080, levels of heat and humidity that are deadly for anyone caught outside will occur at least once per decade in many parts of the world ([New York Times](https://www.nytimes.com)).
- At 2 degrees of warming, diseases including malaria and dengue fever will strike many more people.

- At 2 degrees of warming, nearly all coral reefs will die, harming the food supply and tourism economy for 500 million people.
- At 2 degrees of warming, sea levels in Miami, Boston, and New York will rise six feet by the end of the century, permanently drowning large areas of these cities. Flood damage costs will be over \$11 trillion every year. (If your students live near one of these coastal cities, take a moment to project this map, search for your city, and invite students to notice what parts of your city are underwater: [https://xs.climatecentral.org/#12/40.7298/-74.0070?scenario=extreme\\_p50](https://xs.climatecentral.org/#12/40.7298/-74.0070?scenario=extreme_p50) )

Discuss as a class, in a circle with a talking piece, or in small groups:

- How might these changes affect your future? Your children's futures?
- How might worldwide societies react to these changes?
- How might changes in GDP affect lifestyles in the U.S.?
- How might the Middle East react to water scarcity and heat waves?
- How might Central America react to heat waves and increased food prices?
- How might the U.S. react to increased immigration from tropical areas?

## Worst-case Scenarios

Explain that the IPCC report is actually relatively optimistic, and the long-term effects of warming will only increase as we emit more carbon into the atmosphere. Explain that the last time that our planet was 2 degrees warmer, in the Pliocene era, sea levels were about 60 feet higher than they are now. ([GlobalChange.gov](http://GlobalChange.gov))

Project this image to demonstrate what 60 feet of sea level rise would look like in New York City:

[https://ss2.climatecentral.org/-12/40.7518/-73.9812?show=satellite&projections=0-K14\\_RCP85-SLR&level=20&unit=meters&pois=hide](https://ss2.climatecentral.org/-12/40.7518/-73.9812?show=satellite&projections=0-K14_RCP85-SLR&level=20&unit=meters&pois=hide)


Discuss:

- How would this kind of sea level rise affect New York City? Who would be most affected? Why?
- How might this kind of damage to coastal cities affect the United States as a whole? The housing market? The economy? Jobs?
- What changes would we have to make as a society if the sea level rises 60 feet?

(If students are interested in further exploring future possibilities for New York City, invite them to read the novel *New York 2140* by Kim Stanley Robinson, or [this review of the book](#).)

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## What is Stopping Us from Taking Action?

 CNN @CNN

Scared by that new report on climate change? Here's what you can do to help:

- Eat less meat (about 30%)
- Swap your car or plane ride for a bus or train
- Use a smart thermostat in your home, and upgrade to more efficient appliances

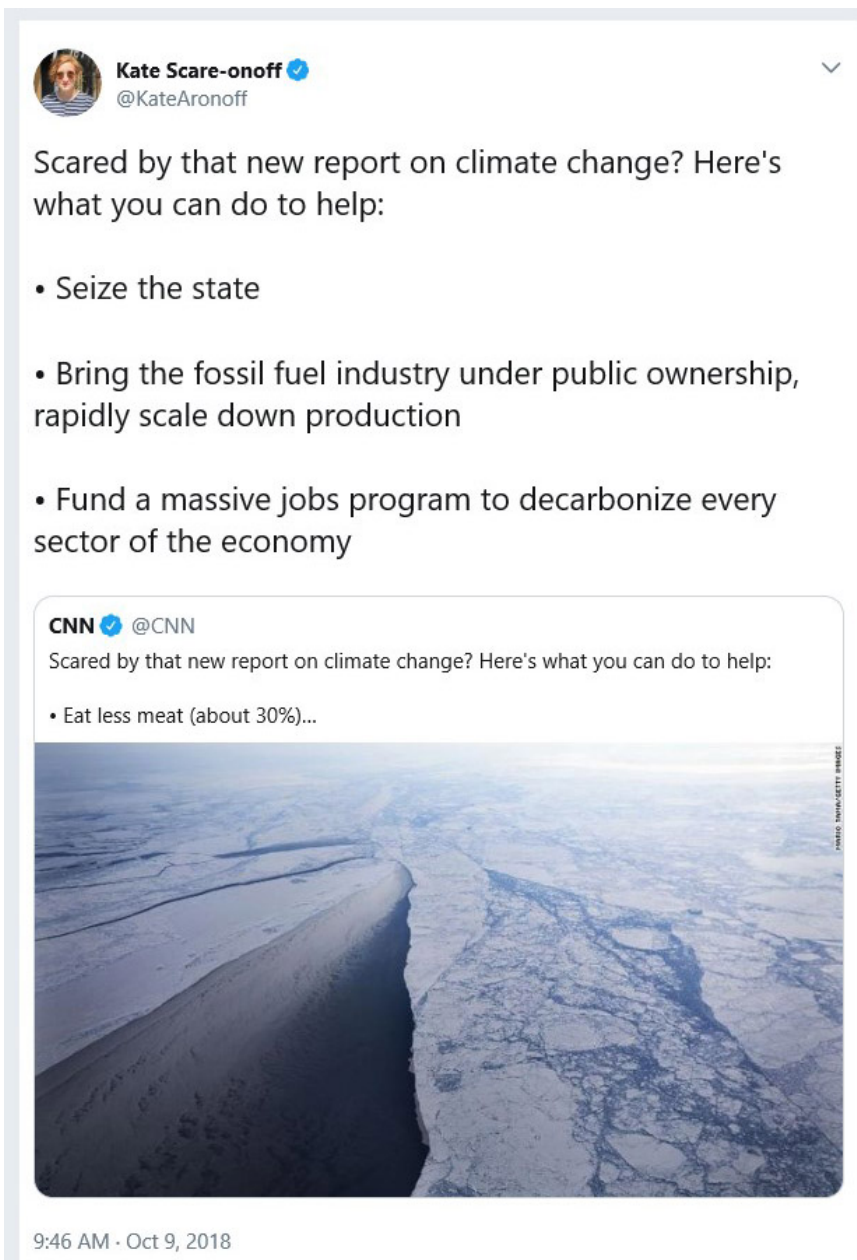
More: [cnn.it/2CjyCXJ](http://cnn.it/2CjyCXJ)



Remind students that according to the IPCC report, we must cut global carbon emissions in half by 2030 in order to prevent warming to 2 degrees. What would be necessary for this to happen? Here are some ideas people have shared:

Project this tweet and ask a student to read it:

<https://twitter.com/CNN/status/1049510036588900352>



Then project this second tweet and ask another student to read it:

**Discuss:**

- What is the first tweet advocating?
- What is the second tweet advocating?
- What kind of strategy do *you* think it will take to meet the goal of cutting carbon emissions in half within 12 years?
- What are possible obstacles might we face in implementing such strategies? Consider obstacles that are societal and systemic as well as personal and emotional.

Share with students that some young people are pursuing a legal strategy to address climate change. Their case, known as *Juliana v. U.S.*, will be heard in federal court in Oregon starting on October 29, 2018. The young

plaintiffs argue that the U.S. government, in failing to take serious action to stop climate disruption, has failed to protect the public trust for current and future generations. (For more, see our [lesson](#) on this suit.)

<https://twitter.com/KateAronoff/status/1049657280873009152>



**David Roberts**   
@drvox

Follow

Basically, stopping warming at 1.5C would involve an immediate, coordinated crash program of re-industrialization, involving every major country in the world. It would be like the US mobilizing for WWII, only across the globe, sustained for the rest of the century.

6:47 PM - 7 Oct 2018

1,396 Retweets 2,607 Likes



88 1.4K 2.6K



**David Roberts**   
@drvox · Oct 7

Nothing like that has ever happened. Nothing even remotely similar has ever happened. There are currently no indications that any such effort is getting underway, and indeed the US is vigorously moving the other direction.

14 422 1.3K



**David Roberts**   
@drvox · Oct 7

We are slouching toward somewhere around 3 or 3.5C. That's probably not extinction-level, but it will cause enormous human suffering & irreversible changes that make the biosphere less welcoming to life. We could easily drive half of earth's other species to extinction.

39 904 1.6K

Project this tweet and ask a student to read it:

(You may wish to read the author's next two tweets in the thread as well.)

Inform students that in today's money, the Allies spent \$97 trillion on mobilizing for World War 2, and the U.S. nearly doubled its GDP in seven years (from 1938 to 1945).  
([source](#))

### Discuss:

- What motivation did the U.S. have to mobilize for World War 2?
- How much do you think this effort affected ordinary people's lives?
- What do you know about the level of

government commitment to this effort?

- How much do you think people were willing to sacrifice (financially, emotionally, personally) to mobilize for their country in this way?
- Do you think people are motivated to make these same sacrifices to prevent climate disaster?
- Since scientists have known about the dangers of global warming since at least the 1960s, why do you think we have not taken mass global action away from fossil fuels already?

<https://twitter.com/drvox/status/1049114118270197760>

Read aloud this excerpt from [this essay](#) by Samuel Miller McDonald:

“In order to address this crisis, it is simply necessary that we love other people more selflessly than we do now. That, above all, is what confronting climate disruption demands. Parents often love their children selflessly, sure. But that’s not enough: they have to learn to love other children just as heartily. As climate refugees flee their homes, we’ll have to take strangers into ours. We’ll have to willingly spend tons of public money—that is, our own money—to experiment on technology that may fail, on projects that may weaken our country’s strategic position in the world, on funding projects with benefits we may never see. We have to do the uneconomical thing, take less to give someone else more, pay more for electricity, or pool our resources to buy solar panels. We have to want a future for someone we’ve never met on the opposite side of the world.”

Discuss:

- Why does Samuel Miller McDonald think that love is necessary for fighting climate change?
- Why do we need to love our own children to fight climate change?
- Why do we need to love other people’s children?
- Which sacrifices are hardest for you yourself to make?
- How can we love others in this way?
- How can we help others recognize the importance of loving others in this way?

If time permits, continue reading from the essay:

“In all the superhero and spy movies, somehow the world always finds itself about to be destroyed. To save the world from destruction, the heroes must do some acrobatics, punch some bad guys, and look really cool. Sometimes they make a sacrifice or two. Well, the real end of the world is now staring at us in the face. It’s real. And no superhero is going to fly down and take care of it for us. Every one of us has to be heroic, and real heroics demand far more than what movies tell us they demand. Meeting this challenge will require an almost inhumanly selfless generosity and courage. That’s just the nature and the scale of the problem.”

Discuss:

- What kind of superhero powers do you have?
- How might you begin to use your powers to fight climate change?

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## Closing

In a go-round, invite students to share what kind of support they personally need in order to face and fight the climate crisis, and one thing they themselves can do to support others.

[Lesson index](#)

# Kids Sue the Government Over Climate Change

By [Marieke van Woerkom](#)

Young people across the country are taking legal action to defend their right to a stable climate and healthy environment. In this activity students learn about the pioneering lawsuit [Juliana v. United States](#), and discuss a short documentary about youth climate activists. (2/22/19)

## Backgrounder for the Teacher

Following the release of a dramatic report by the Intergovernmental Panel on Climate Change (IPCC) in October 2018, climate-related litigation is likely to increase. The IPCC's latest report provided strong arguments for lawyers to use in making the case that climate change poses an enormous threat to people and their fundamental rights.

"By not stepping up their climate action, governments are failing to do their duty to protect citizens," lawyer Roda Verheyen told the European news outlet [Euractiv](#). Verheyen added that the IPCC report not only showed the devastating impacts of warming above 1.5°C, the report "made it clear that limiting the temperature rise to 1.5°C is still possible and doable."

Lawsuits can be an important tool in making major societal change. Examples include momentous cases fighting segregation (like [Plessy v. Ferguson](#) in 1896, [Brown v. Board of Education of Topeka](#) in 1954, and [Loving v. Virginia](#) in 1967) – as well as cases challenging big tobacco in the 1990s, and the more recent fight for LGBTQ rights in cases like [Obergefell v. Hodges](#) (2015) and others.

At the same time, it's important to realize that lawsuits are not only extremely expensive, they're also time-consuming. It often takes years, sometimes decades, for a major lawsuit to make its way through the courts – and in the case of climate change, we have no time to lose.

Victories have been rare in environmental lawsuits to date. Powerful governments and fossil fuel companies have fought back with all their might. Still, legal experts say that climate wins may become more likely in the future, as the attitudes of judges change.

A pioneering lawsuit brought against the U.S. government by a group of 21 youth activists, [Juliana v. United States](#), has been making its way slowly through the courts since 2015. The young people are suing the U.S. government for failing to adequately protect the planet from the impact of climate change. The lawsuit was originally filed against the Obama administration, which sought to have the case dismissed because it

claimed the court was “simply not well-suited to balance the various interests ... and burdens” of “a phenomenon that spans the globe.”

[The complaint asserts](#) that through actions that have contributed to climate change, the government has violated the youngest generation’s constitutional rights to life, liberty, and property, and failed to protect essential public trust resources. The 21 young plaintiffs claim that the government also violated the public trust doctrine, a legal concept grounded in common law that holds the government responsible for resources such as water and land for public use.

In this lesson, students will learn about the IPCC's latest report and the young people's lawsuit. Then they will watch and discuss one or more short videos featuring young people who are taking legal action to secure their right to a stable climate and healthy atmosphere.

For more information about the Juliana climate suit and for a broader exploration of climate change, see also the TM lessons:

- [Young People's Suit Over Climate Disruption Comes to Court](#)
- [How Can We Prevent Climate Catastrophe?](#)
- [What is the Green New Deal?](#)

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## Gathering: Climate Web

Write the word “climate” on the board. Invite students to share any associations they have with the word. Chart students’ associations around the word “climate,” then draw lines from the associations to the word, creating a word web.

When you have a good number of words on your web, and/or when energy starts to wane, ask students to take some time to look at the web, then ask them:

- What do you notice about the words on the web?
- Do you notice themes, differences? Does anything surprise you?
- What is a definition of the word “climate”?

Elicit and explain that “climate” refers to the weather patterns of a particular region averaged out over a long period of time. “Weather” refers to the short-term conditions of the atmosphere of a particular region. Ask students:

- What news came out about our climate at a global conference in Poland, Europe at the end of last year (2018)?

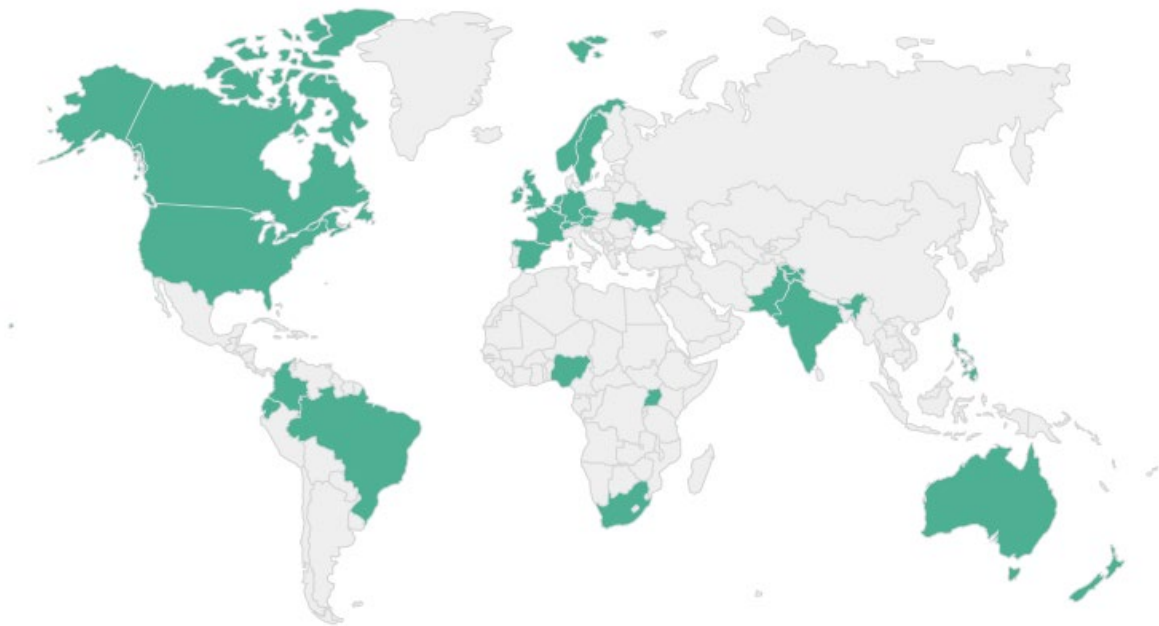
Elicit and explain some of the information in the first paragraph of the Backgrounder above about the Intergovernmental Panel on Climate Change report. (For more information about the conference, please visit: <https://www.ipcc.ch/>)

Next, provide students with a summary overview of how lawsuits have been used to fight injustice historically and point out that different climate cases are currently making their way through court systems across the globe.

Activists of all ages, as well as governments and concerned citizens, are suing the biggest polluters and national governments to prevent climate change from having the disastrous effects that the Intergovernmental Panel on Climate Change is predicting, unless we take action NOW.

Consider showing the [this image](#) to illustrate the point you're making:

### **Countries where climate change litigation has been filed**



Sources: Sabin Center, Arnold & Porter, Grantham Research Institute

Explain that a very famous lawsuit is currently making its way through the American court system: Juliana v. U.S.

- This pioneering lawsuit was brought against the U.S. government by a group of 21 youth activists back in 2015. The young people are suing the U.S. government for failing to adequately protect the planet from the impact of climate change.
- [The complaint asserts](#) that through actions that have contributed to climate change, the government has violated the youngest generation's constitutional rights to life, liberty, and property, and failed to protect essential public trust resources.
- The 21 young people claim that the government also violated the public trust doctrine, a legal concept grounded in common law that holds the government responsible for resources such as water and land for public use.

Ask students:

- What do you think about the idea of suing the government over its failure to protect the environment for younger generations?

Next, have students watch and discuss one or more of the videos below.

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## Young People Take on the Government

Watch the TRUST 350 video on this website (and if there is time, watch more videos from the site): <https://www.ourchildrenstrust.org/short-films/>

This short documentary, and 10 others, was created by the organization Our Children's Trust in partnership with the international human rights organization WITNESS and Montana State University's Master's in Science and Natural History Filmmaking. Each documentary features young people who are taking legal action to secure their right to a stable climate and healthy atmosphere.

[Click here for media interviews and outside documentaries featuring young people who are suing for climate justice.](#)

## **TRUST 350 Video**

Discuss some or all of the following questions:

- What are your thoughts and feelings about the video you just watched?
- Was there anything in particular that stood out for you?
- Was there anything that surprised you?
- What are these young people arguing?
- How do you feel about that?

If time allows, consider watching and discussing other videos on the same website showing young people making their argument for action. Either assign different videos to small groups to watch, then discuss and share out, or watch additional videos as a full class and discuss.

## **TRUST Massachusetts video**

Discuss some or all of the following questions:

- What are your thoughts and feelings about the video you just watched?
- Was there anything in particular that stood out for you in the video?
- Was there anything that surprised you?
- What is the message Eshe Sherley is trying to get across?
- What does she say about environmental justice? What connections does she make to other kinds of justice?
- What does she say about people fighting for their rights?
- What parallels does she make with the Civil Rights Movement?
- As a basketball player, what does Eshe mean when she says:  
"We're treating climate change ... as if we're in the first quarter and we have all the time in the world and really we're in the fourth quarter about to go into overtime and we need to start acting as if we're at the end of the line, we need to start making some important decisions."

## **TRUST Colorado video**

Discuss some or all of the following questions:

- What are your thoughts and feelings about the video you just watched?
- Was there anything in particular that stood out for you in the video?
- Was there anything that surprised you?
- What is the message Xiuhtezcatl Martinez is trying to get across?
- What does he tell us about the forests and wildlife in Colorado?
- How are people affected?

- What does he teach us about the public trust?
  - What responsibility does he want the government to take as part of this public trust?
  - Why is this especially important for young people and the next generation?
  - What responsibility does he want young people to take?
- 

## Closing

Ask students to share their responses to one or both of the following questions:

- What is one thing you take away from today's lesson?
- What is one thing you want to learn more about as a result of today's lesson?

[Lesson index](#)

# Young People's Suit Over Climate Disruption Comes to Court

By [Mark Engler](#)

Young people are suing the U.S. government over climate change, and their case comes before federal court on October 29, 2018. In this lesson, students examine the suit, read the personal testimony of two of the plaintiffs, and consider other strategies that young people are using to affect climate policy. (10/20/18)



Photo: <https://unsplash.com/photos/DwgPkR02Wpc>

## To the Teacher

Is there anything that young people can do to take on the urgent challenge of climate change? Twenty-one youth activists from around the country believe there is, and they have together entered into a lawsuit to force the U.S. government to take action. The case, known as *Juliana v. U.S.*, will be heard in federal court in Oregon starting on

October 29, 2018. The young people will argue that the government, in failing to take serious action to stop climate disruption, has failed to protect the public trust for current and future generations. If they succeed in winning their argument, the court may declare certain U.S. laws relating to energy policy and CO2 emissions unconstitutional and order the federal government to take bolder steps to phase out fossil fuel emissions.

This lesson is designed to provide students with information about the *Juliana v. U.S.* lawsuit, and allow them to discuss possible avenues through which young people can help to address the climate crisis. The lesson consists of three readings. The first examines the legal case that the young people have presented and consider what effect the lawsuit could have. The second gives students the opportunity to read personal testimony from two of the plaintiffs in the Juliana case and looks at the power of storytelling. The third presents other strategies that young people are using to affect climate policy. Questions for discussion follow each reading.

Note: Consider combining this lesson with our concurrent lesson, [How Can We Prevent Climate Catastrophe?](#)

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## Reading One

### Youth Climate Lawsuit *Juliana v. U.S.*

Is there anything that young people can do to take on the urgent challenge of climate change? Twenty-one youth activists from around the country believe there is, and they have together entered into a lawsuit to force the U.S. government to take action. Their case, known as *Juliana v. U.S.*, will be heard in federal court in Oregon starting on October 29. They are arguing that the government, in failing to take serious action to stop climate disruption, has failed to protect the public trust for current and future generations.

Who are these young people, and what effects might their case have if they are successful? Jack Moran, Courts Reporter for The Register-Guard in Eugene, Oregon, [describes](#) the plaintiffs in the case:

There's the punk rocker, the animal lover and the shy performer. A future educator, a taekwondo black belt and an outdoorsman also are part of the group.

All six young people from Eugene are among 21 youth plaintiffs suing the federal government in an unprecedented, constitutional climate change lawsuit that seeks to overhaul the nation's energy system.

The landmark environmental case is scheduled to go to trial at the U.S. Courthouse in Eugene on Oct. 29.

The youths' lawsuit, filed in 2015, asserts the government has for decades promoted fossil fuel production while disregarding dangers associated with greenhouse gas emissions that affect the climate. It seeks a court order requiring the government to make a plan that works to drastically reduce those emissions.

The plaintiffs — between the ages of 11 and 22 years old — all say their lives are affected by a changing environment. And they say it makes sense for them to sue because it's their generation and those in the future who will disproportionately face the impact of climate change.

Some of the youths assert a warming planet already has hampered their ability to learn and recreate in nature, while others say it threatens their customs and livelihoods. Others have experienced stress and loss brought on by natural disasters such as flooding, drought and wildfires. And some have expressed concern about the state of the world when it comes time for them to have children.

"We're not talking about our parents' harms," lead plaintiff Kelsey Juliana of Eugene said. "We're talking about our harms."

The group is supported by Our Children's Trust, a Eugene-based nonprofit organization founded by attorney Julia Olson that has taken similar legal actions against governments in all 50 states.

The case has faced opposition from the federal government, fossil fuel companies, and some judges. One concern shared by some legal scholars is that the case relies on the idea that the United States government is legally entrusted with protecting the well-being of its citizens, that this extends to public things like the land, water, and the atmosphere—and that this idea is not an established legal fact. But Benjamin Hulac and Ellen Gilmer, reporters with E & E News, [wrote](#) on October 5, 2018, that the strategy of appealing to the public trust has sometimes been successful in the past:

In Pennsylvania, the state Supreme Court relied in part on public trust in 2013 when it found a shale drilling rule trod on a state constitutional requirement that natural resources be protected for the people. The court affirmed the approach last year in another oil and gas case ([Energywire](#), June 2, 2017).

And just two months ago, a state court ruled that California's public trust doctrine applies to groundwater withdrawals that affect larger waterways in the state.

The approach has drawn copycats from overseas, too.

A 9-year-old girl, Ridhima Pandey, sued the Indian government in 2017, accusing it of breaking its obligations to protect the environment for her generation and those to come. Another young girl, Rabab Ali of Pakistan, sued her government, saying it is falling short, too. And nearly 900 Dutch citizens successfully sued the Netherlands in 2015 for more robust goals to cut emissions, though the case is pending appeal....

Michael Blumm, a law professor at Lewis & Clark Law School, said the arguments in the case should be taken seriously.

"The people who complain that this is an outlandish expansion of the public trust really haven't looked closely at the expansion of the public trust in years," said Blumm, who has written extensively on the concept, including with [Mary] Wood [a University of Oregon law professor].

He said the youth plaintiffs can easily argue that climate change has harmed them and that the government must step in to protect land and water resources by protecting atmospheric resources.

This raises the question of what will happen if the case is successful. While we can't know for certain what will happen, the plaintiffs [ask](#) that certain energy policies and natural gas contracts be declared unconstitutional, and ask the court to "order Defendants to prepare and implement an enforceable national remedial plan to phase out fossil fuel emissions and draw down excess atmospheric CO2." In other words, if they win, the government would be ordered to take bolder action against climate change.

Even if the court rules in their favor and orders the U.S. government to develop such a plan, implementation will require larger shifts in the actions of corporations and communities across the United States. As Hulac and Gilmer note in their article, it took years of protest and public campaigning to prompt the desegregation of schools, even after the Supreme Court ruled in favor of desegregation in *Brown v. Board of Education* in 1954. Lawsuits alone will not create the policy changes necessary to reduce the impacts of climate change.

Nevertheless, the process of bringing the youth climate case to court has already helped to increase public awareness. As Vic Barrett, a 19-year-old plaintiff in the case from White Plains, NY, said in [press release](#) put out by Our Children's Trust on October 18, 2018:

The lengths my own government is going to to get this case thrown out and avoid trial is absurd and offensive. This case is not about money. This is not about the “harms to the government” or how much money the government has paid its experts or how many hours their lawyers have to work. This is about my future and the future of our youngest generations. This is about fundamental constitutional rights of children. We are simply asking for our right to be heard. Our Government exists to hear us and protect us. If we cannot go to our federal courts with real constitutional claims for relief and present our evidence at trial then the people of this country have been failed by our third branch of government.

## For Discussion:

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. What arguments are the plaintiffs in Juliana v. U.S. making? How does this relate to the concept of the “public trust”?
3. What are some possible impacts of the youth climate case?
4. Some critics have dismissed this and other similar cases as “Hail Mary pass litigation.” What do you think they mean by that? Do you agree or disagree?
5. What do you think is the role of lawsuits in fostering progress on social and political issues? How do legal cases relate to other methods of creating change? What might be some of the strengths and weaknesses of this approach?

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## Reading Two

### Primary Sources: Youth Testimonials

An important part of the Juliana v. U.S. case is the use of personal stories. In the text of the lawsuit itself and in media coverage of the case, the plaintiffs are using the stories of how they and their communities are impacted by climate change to make the argument that the government must act to uphold the rights of young people. On the

website Our Climate Voices, some of the plaintiffs elaborate on how their personal experiences have pushed them to take action. Below are two excerpts from the website. Read these and consider the questions for discussion that follow.

**1) [Jacob Lebel](#) is 21 years old and lives in Roseburg, Oregon.** He works on his family's farm and is a plaintiff in *Juliana v. U.S.* In his personal story, he discusses the effects of wildfires on the farm:

I'm from Roseburg, Oregon. I was homeschooled as a kid. I had three or four hours of school a day and the rest of the day was spent on our farm. In the mornings, I would get up and do small chores—like feeding the dogs and cats—and then I would have breakfast. After that, I went outside for a long walk, for about an hour or two, to feed all the other animals. It was amazing any time of year except when it was two degrees Celsius outside, raining and super muddy everywhere. On the walk, I gathered eggs and let all the birds out. We had turkeys, quail, ducks, and geese. We had cows, horses, and pigs. After that, I came home to do school for three or four hours. I read enormous amounts in the afternoons, and played outside in the creeks. I was very privileged to grow up in an environment like that. That type of childhood is only going to become harder as climate change erodes basic, life-supporting ecosystems....

Look at what happened in Napa Valley, California, in the wine region. Entire businesses were wiped out and lost large parts of vines that had been growing for years. There was a normal community of people, houses, and businesses, and the next day, half of the businesses were gone. The ecosystems around it and around people's lives are completely changed now. That could happen to the farm. And it's a toss-up. We don't have the capacity right now to fight a wildfire. We are in a rural area on a little gravel road outside of town. Firefighters won't come here to protect a huge property like this. So, at this point, it's fate. We just don't know.

Last summer, there were two weeks where it was so smoky we couldn't see blue sky. That has never happened in my life. We always had a couple days of smoky air during the summer. This time, I didn't notice how intense it was until it was dragging on and on, there were barely any days when it got lighter, and we couldn't really see any blue sky. It crept up on us. Then it got really bad. It was so soupy that we couldn't see trees that were a half mile away. We couldn't see the hills around us... We had to wear particle masks. It's extremely bothersome on a farm. It's scratchy. It's hot. You have to take it off whenever you go in and out of the house. I started researching air conditioning filters that filter out smoke particles so that we could protect ourselves when we were inside.

Finally, I started to see blue sky again. I was so thankful. But, then I thought, 'The way things are going, it's probably going to be worse next year.' I started wondering, 'Is it going to last a month next year? How much smoke will we get? Will the wildfire be closer?' Wildfires are a very immediate danger that could wipe out the entire farm. As they get more severe and common with climate change, the chance of our farm being in the burn area increases more and more every year.

**2) [Jayden Foytlin](#) is 14 years old and lives in Rayne, a small town in southern Louisiana.** In her personal story, she discusses the effects of her home being damaged in a flood in 2016:

I was 13 years old. My room was completely destroyed. I had to move my mattress to the living room where there wasn't mold everywhere and it wasn't gross and wet. My little brothers also had to sleep in the living room. Seven kids sleeping in the living room is not the funnest thing in the world, especially if you value it being quiet. It was kind of hectic.

My family aren't the richest people on Earth so we can't just fix everything. We really had to save up to get the house to where it is now. We had to rip out some of the walls and some of the floors to get the mold off. You can see the insulation and stuff now. And we still haven't gotten the floors replaced, so the living room is concrete. We did a lot of painting and reconstruction. FEMA gave us money so we could get our house back in order, but they didn't give us much....

I actually got involved in fighting climate change when I was eleven or twelve, after the Gulf oil spill. My family used to go down to the Gulf of Mexico for birthday parties or to swim. We loved going to the beach. The oil spill didn't just wreck the beaches, it also wrecked the seafood. We couldn't have fish or shellfish for a while. It was bad because being from Louisiana, you're going to want shellfish. After that, I remember my mom took a lot of pictures of pelicans, Louisiana's state bird, covered in oil, and a lot of fishes and turtles. Stuff that should be healthy in the Gulf Coast wasn't healthy. I became more aware just seeing the damages and realized there was a lot to learn.

I went back to the Gulf once last year, but it was different. We were more cautious about the water. I heard rumors that you shouldn't go into the water with an open wound. It wasn't as fun as it used to be because we had to be careful not to hurt ourselves... And we didn't go back after that because it was scary.

It frustrated me because I didn't know if the Gulf Coast would ever recover. I started noticing the pattern of how oil companies were mistreating people of

color and low-income people. You see power plants in the poorest parts of Louisiana. That's completely unfair. Coming from a poorer family, it was very frustrating to me. It got to me.

### For Discussion:

1. What were some of the details in the stories that stood out for you? Were there aspects of the stories that resonated with your own experiences?
2. Why might these young people use storytelling as a part of their lawsuit?
3. Were there any parts of these stories that surprised you? Why?
4. How would you tell your story of how you came to understand the impacts of climate change? Where might you see the impacts of climate change in your community?

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## Reading Three

### Other Youth-Led Strategies for Climate Action

On Sunday, October 7, 2018, the Intergovernmental Panel on Climate Change released a report stating that urgent action was needed to slow the impacts of global warming. Matt Simon, a writer for Wired, [summarized](#) the report:

Simply put: The laws of the physical universe say that we can keep global warming to 1.5 degrees Celsius (on average) above pre-industrial levels, the optimistic goal set out in the [Paris Agreement](#), but we're quickly running out of time. As in, we may reach that 1.5 degree rise in as little as a dozen years at the rate we're spewing emissions. And the consequences will be disastrous.

To correct course and avoid 1.5 C, or 2.7 degrees Fahrenheit, we'll need to cut emissions by half before 2030, and go carbon-neutral by 2050, the report says. That gives us three decades to transform our energy production into something unrecognizable, with renewable energy galore combined with carbon capture techniques like the bolstering of forests, and maybe even sucking the stuff out of the atmosphere and trapping it underground.

This report raises the question of what strategies, if any, will be most effective in creating large-scale action on climate change. The youth climate lawsuit is an example

of how one group of young people is pursuing a legal strategy to try and prompt action around climate change. But other concerned youth are pursuing change by targeting politicians through electoral organizing and direct action campaigns. In a piece for Teen Vogue published on September 14, 2018, college student Izzi Graj [describes](#) one group that is putting pressure on elected officials.

On August 8, I joined dozens of young New Yorkers at Governor Andrew Cuomo's office to demand [for the seventh](#) and last time that he refuse campaign contributions from fossil fuel CEOs and lobbyists. That day we gave Cuomo one last chance to stand with our generation and fight for us. We'd hoped the governor would pledge to reject campaign contributions from the fossil fuel billionaires responsible for this crisis, but that didn't happen, and my friends were arrested at his office. I was infuriated. I was there as a volunteer with Sunrise Movement, a youth-led organization that is turning our rage at decades of inaction on climate change into a political machine capable of helping to elect honest leaders who will fight for our generation and create millions of good jobs in the process. Our organization is only one year old, and we're working every day ahead of the midterms to support real leaders who will fight for our generation....

The most frustrating part is that Governor Cuomo recently told me face to face that he would reject money from fossil fuel interests. In a video of that conversation, [you can see my shock](#) when I asked him if he could pledge to stop taking fossil fuel money and he replied, "Yes, I'm there." I thought he was finally taking young people seriously and standing up to fossil fuel billionaires, the same people who have encouraged climate denial and held back action on climate change for decades, fueling climate disasters that [kill thousands](#) of people every year and [threaten](#) the poorest and most marginalized communities of New York. But the next day, he took it back, his team [arguing](#) that he'd misunderstood the question....

It is not just in New York that our nation's lauded "leaders" on climate change are arresting young people when pushed to take the climate crisis seriously. Also on August 8, six young people [were arrested](#) at the state capitol in Sacramento, California, after demanding Governor Jerry Brown take action on climate change by [rejecting fossil fuel money](#) and ending fossil fuel production in his state, which is the sixth largest crude-oil-producing state [in the nation](#)....

Partnering with these oil and gas executives is not only disastrous for our society's ability to stop climate change; it is also deadly for millennial voter turnout. Millennials [were crucial](#) to Democratic wins in 2017, and we [broadly disapprove of politicians taking money](#) from the companies imperiling our futures. Millennials and Generation Z-ers will form the [largest voting bloc](#) in U.S. history this fall. We demand our leaders reject fossil fuel money and take climate

change seriously.

Politicians are not the only target for young people. On college campuses, students are pressuring their schools to pull their assets out of fossil fuel companies. These divestment campaigns seek to make the idea of profiting off of extracting and burning fossil fuels a moral issue on campuses and in the larger public debate on climate change. At the University of Pennsylvania, their undergraduate student government voted 17-1 on a resolution urging the school to divest. Julia Klayman, a writer for the school newspaper The Daily Pennsylvanian, [described](#) the gains of the divestment movement on her campus:

University investments in fossil fuels have been a topic of contention among administrators and students for the past several years, with the undergraduate group Fossil Free Penn largely leading the battle since its creation in 2014. As of Sept. 9, the Undergraduate Assembly has decided to join the fight.

At the first general board meeting of the year, the UA passed a resolution in support of Penn's Board of Trustees divesting from companies involved in coal and tar sands, two particularly harmful fossil fuels. The assembly voted with an overwhelming majority of 17 in favor, 1 against the proposal, and 2 abstained votes.

"Having that sort of support, it's probably one of the biggest demonstrations of student support on campus thus far because the UA is the voice for the student body," said UA Sustainability and Community Impact Committee Director and College sophomore Ben May, who proposed the resolution.

In early 2015, [87.8 percent of undergraduates](#) voted in favor of fossil fuel divestment in a student body referendum. In [September 2016](#), however, the University's Ad Hoc Advisory Committee on Divestment decided against divestment despite two years of campaigning from FFP, which at that time called the University to divest from all fossil fuel companies....

The new resolution could be "exactly what we needed,"[senior Zach] Rissman added. "Our goal now is to really gain that critical mass of students to do whatever we need to achieve divestment."

Although students at the University of Pennsylvania have yet to convince their administration to act in accordance with the student referendum, other campuses have been successful in persuading their campuses to divest. As of [this fall](#), 44 colleges and universities have fully or partially divested from fossil fuel companies as a result of campaigns led by students.

**For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. Why are some young people targeting politicians through electoral organizing and direct action? What do you think of this strategy, as opposed to other approaches?
3. According to the reading, what is a “divestment campaign”? Why have some students adopted this strategy at their colleges and universities?
4. Of the various approaches discussed in these readings, which ones make the most sense to you? Why? Can you think of other strategies that young people might use to create change?

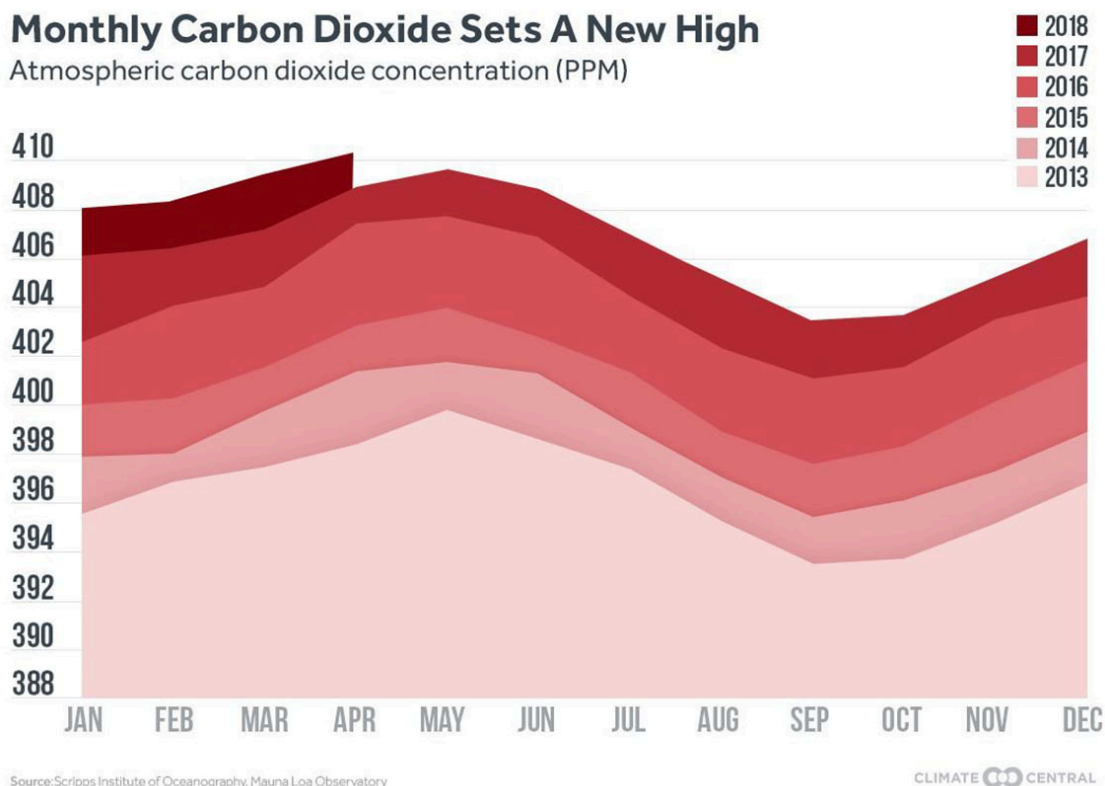
—Research assistance provided by John Bergen

[Lesson index](#)

# CO2 Reaches a New High: What Do We Do?

By [Sarah Outterson-Murphy](#)

Students work together to understand the significance of the rise in atmospheric carbon dioxide and consider different methods for stopping it. This lesson can be adapted for science, writing, or social studies classes. (5/10/18)



What do we already know?

Project the image above, or the tweet below, on the board:

<https://twitter.com/ClimateCentral/status/992468921403019264>

Or, write on the board: Atmospheric carbon dioxide has set a new high — 410 parts per million in April 2018.

Ask students to think and write individually their responses to the following questions. After a few moments, ask volunteers to share their responses.

1. What is the greenhouse effect?
2. What is climate change?
3. What kinds of things produce atmospheric carbon dioxide (CO<sub>2</sub>)?

Alternatively, ask students, in small groups, to look at the graphic or tweet and discuss: What does this chart show? What does it mean? After a few moments, ask volunteers from each group to share their responses.

Next, introduce the central question for the lesson:

*Why is the 410 parts per million (ppm) milestone worrying, and what can we do about it?*

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### **Analyzing the problem**

Have students view this website, or give them a printout of it: <https://mashable.com/2018/05/03/co2-highest-level-human-history/>

Ask students to read the article individually, and write down or highlight the most concerning statistics, information, graphs, or ideas in the article.

In small groups, ask students to discuss: What do you find most concerning about this article?

Ask groups to share with the whole class the facts that concern them most, and record their responses. If students repeat points, add a checkmark to those points so everyone gets a sense of what is most concerning to the class.

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### **What can we do about it?**

Return to the initial question of the lesson:

*Why is the 410 ppm milestone worrying, and what can we do about it?*

Ask students to write a letter to the editor of their local paper about this climate change milestone. To research their letter, students may want to visit the

website [ClimateSignals.org](https://www.climatesignals.org). If there is time, do the extension activity below with students before they write their letter.

The letter should:

- mention that we have reached 410 ppm of atmospheric carbon and what that means
- explain how climate change will affect our future
- use personal details or stories to make the letter relatable
- argue for readers to take a particular course of action to fight climate change

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### **Extension Activity: Strategies to fight climate change**

This optional extension activity can enrich the science, writing, or social studies aspects of the lesson, and prepare students to write a stronger letter to the editor.

Divide students into five groups. Each will research a different method for fighting climate change: scientific research, lawsuits, protests, lobbying, and personal habit change. Give each group a handout or a link to begin their research (see below). Ask each group to answer the following questions:

- What is your group's method for fighting climate change?
- What does this method look like in action?
- What would need to happen or change for this method to be successful?
- What are the benefits of this method?
- What are the challenges or problems with this method?
- How effective has this method been so far?
- Could this method, by itself, solve the problem of carbon emissions and climate change?

Next, ask students to create a skit demonstrating what this method looks like in action, and present their skits to the class.

Finally, integrate students' learning by discussing these questions:

- What method is easiest?
- What method is most effective?
- Which methods might work well together?
- Which method or methods should we focus our time and energy on?

## Handouts:

### Group 1: Scientific research

This article focuses on technology for removing carbon from the atmosphere. If the group has time, they may wish to also research green technology that prevents future carbon emissions, including solar and wind technology and electric cars.

<https://www.washingtonpost.com/news/theworldpost/wp/2018/01/08/carbon-emissions/>

### Group 2: Lawsuits

Several climate lawsuits have been brought by children. The article focuses on one of the most recent of these.

<http://www.miamiherald.com/news/local/environment/article208967284.html>

### Group 3: Protests

[350.org](https://350.org) uses many strategies, but students should particularly notice how they conduct direct, confrontational, public, large-scale actions.

<https://350.org/about/>

### Group 4: Lobbying

Students should notice how Citizens Climate Lobby has a laser focus on a particular legislative proposal, carbon fee and dividend, and how they appeal to legislators directly through meetings and letters to the editor.

<https://citizensclimatelobby.org/about-ccl/levers-of-political-will/>

### Group 5: Personal habit change

Note that this website has been archived and is not on the EPA's current site along with most other information on climate change. You might ask students why they think this was done and what effect that might have.

[https://19january2017snapshot.epa.gov/climatechange/what-you-can-do-home\\_.html](https://19january2017snapshot.epa.gov/climatechange/what-you-can-do-home_.html)

[Lesson index](#)



# Cities and States Lead on Climate Change

By **Mark Engler**

When President Trump announced that the U.S. would be pulling out of the Paris climate agreement, governors and mayors across the country announced that they were still on board and would continue their efforts to reduce greenhouse gas emissions. In this activity, students read about and discuss how cities and states are leading by example when it comes to climate change. (8/3/17)



Photo: <https://unsplash.com/photos/iYYf3JZEUP>

## To the Teacher

For years, cities and states have set aggressive goals for reducing greenhouse gas emissions, providing leadership that has often been missing from Washington.

Following President Trump's announcement in 2017 that the United States would be pulling out of the Paris climate agreement, hundreds of cities and states pledged their commitment to reducing greenhouse gas emissions in line with or exceeding the benchmarks set by the Paris climate accord. This flurry of statements by governors and mayors in support of climate action is only the most recent chapter in a longer history of cities and states leading by example to reduce the effects of climate change.

This lesson is divided into two readings designed to have students explore how local governments are responding to climate change. The first reading covers the response of governors and mayors to the news that President Trump would be taking steps to remove the United States from the Paris climate agreement. The second reading examines more general actions that local governments have taken. Questions for discussion follow each reading.

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### Reading 1:

#### Cities and States Respond to President Trump's Climate Announcement

Following President Trump's announcement in 2017 that the United States would be pulling out of the Paris climate agreement, hundreds of cities and states pledged their commitment to reducing greenhouse gas emissions to meet or exceed the benchmarks set by the Paris climate accord. This flurry of statements by governors and mayors in support of climate action is the most recent chapter in a longer history of cities and states leading by example to reduce the effects of climate change.

When President Trump announced he was pulling the U.S. out of the Paris climate agreement, more than 1,219 governors, mayors, businesses, investors, and universities from across the United States responded by signing on to an open letter entitled "We Are Still In." With this letter, signatories pledged that they would still take action in support of the Paris climate accord, regardless of the stance of politicians in Washington, D.C. The letter [reads](#):

We, the undersigned mayors, governors, college and university leaders, businesses, and investors are joining forces for the first time to declare that we will continue to support climate action to meet the Paris Agreement.

In December 2015 in Paris, world leaders signed the first global commitment to fight climate change. The landmark agreement succeeded where past attempts failed because it allowed each country to set its own emission reduction targets and adopt its own strategies for reaching them. In addition, nations – inspired by the actions of local and regional governments, along with businesses – came to recognize that fighting climate change brings significant economic and public health benefits.

The Trump administration's announcement undermines a key pillar in the fight against climate change and damages the world's ability to avoid the most dangerous and costly effects of climate change. Importantly, it is also out of step with what is happening in the United States.

In the U.S., it is local and state governments, along with businesses, that are primarily responsible for the dramatic decrease in greenhouse gas emissions in recent years. Actions by each group will multiply and accelerate in the years ahead, no matter what policies Washington may adopt.

In addition, several state governors have made policy pledges to uphold the United States' commitment to the Paris climate agreement. As Robinson Meyer, an associate editor for *The Atlantic*, [reported](#) in a June 2, 2017, article, some cities and states have started to announce concrete plans to implement the agreement:

Immediately after Trump's announcement, the governors of New York, California, and Washington announced that they would work to uphold the U.S. commitment under the Paris Agreement. Taken together, those states encompass about 10 percent of the United States' greenhouse-gas emissions, 20 percent of its total population, and 25 percent of its gross domestic product.

Other state and local officials also soon announced they would step up. Mark Dayton, the Democratic governor of Minnesota, said his state would pursue the Paris goals. And dozens of mayors across the country said they would continue to work to reduce greenhouse-gas emissions from their cities. Their number included Mitch Landrieu, a Democrat of New Orleans, and Jim Brainard, the longtime Republican mayor of Carmel, Indiana.

"We can accelerate our progress further, even without any support from Washington."

They may soon have a venue to do so. More than 30 mayors, 80 university presidents, and 100 businesses will soon submit their own emissions-reductions plan under the Paris Agreement, announced Michael Bloomberg, the former mayor of New York City, on Friday. They will call it "America's Pledge."....

[Bloomberg] said that the group will "aim to meet the U.S. commitment to reduce our emissions 26 percent below 2005 levels by 2025."

"We are already halfway there—and we can accelerate our progress further, even without any support from Washington," he added.

Despite President Trump's pledge to remove the United States from the Paris agreement, the commitment to continued action on climate change expressed by cities and states across the U.S. suggests that the nation as a whole has not given up on addressing this urgent issue.

### **For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. What message do cities and states hope to send in response to President Trump's decision to remove the U.S. from the Paris climate agreement?
3. Some critics argue that local efforts cannot substitute for national and international coordination on climate change policy. What do you think of this idea? What might be some of the benefits of cities setting goals and policies around climate change, even if national action is still needed?
4. How might individuals get involved in local climate change reduction plans? How does personal action relate to efforts to promote policy change?

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### **Reading 2:**

#### **Can Cities Go 100% Renewable?**

Even before President Trump announced that he would be pulling the U.S. out of the Paris climate agreement, cities and states had set the pace for taking action on reducing the effects of climate change.

As one example, Burlington, Vermont, became the first U.S. city to be powered by 100% renewable energy in 2014. In a February 6, 2015, article, *Fast Company* magazine staff

writer Adele Peters [described](#) how Burlington transitioned from fossil fuels to renewable energy:

When it flipped the switch on a new hydropower plant last fall, Burlington, Vermont, became the first city in the U.S. to run on 100% renewable electricity.

"It's been a long time coming," says Ken Nolan, manager of power resources for Burlington Electric Department. "Actually, the first inclination goes back to the early 1980s." At that time, the city retired a coal-burning plant, and decided to replace it with a biomass plant that runs on scrap wood from across the state.

A decade ago, the city was at a crossroads, trying to decide whether to invest long term in natural gas and other traditional power sources—or try to go fully renewable. "That was the first time we had an inkling that this might be the right thing to do," Nolan says. "By 2008, we actually saw a path where we could make this work."

Now the city runs on a mix of biomass, wind, solar, hydro, a little bit of landfill gas, and a few other renewable sources. At a given time, if the renewable plants aren't producing enough power, the utility might buy traditional power. But they also produce and sell enough extra green power that, over the course of a year, the total is 100% renewable...

One of the reasons the city can run on renewable energy is that it has also worked hard to help residents use less power overall. With an aggressive energy efficiency program, the city actually uses less energy now than it did in 1989.

But even though Burlington has some unique circumstances—and a very liberal population that strongly supported the push to 100% renewables—Nolan believes that it's a goal that other cities can easily reach. Some smaller communities (like Greensburg, Kansas, which rebuilt with green energy after the town was destroyed in a tornado) have already achieved the goal, though Burlington is the first larger city...

"It's a challenge for folks," [Nolan] adds. "Renewables are still more expensive than traditional coal plants or natural gas plants. But if cities really take the time to assess what they have for resources in their area, and take advantage of any financial markets that may be available, I think it's doable."

In his book, *Against Doom: A Climate Insurgency Manual*, historian and author Jeremy Brecher notes that "Portland, Oregon, has become the first city in the U.S. to pass a resolution opposing the development of all new infrastructure for fossil fuel transport and storage." And he goes on to relate an even more unusual step taken by Grant

Township, Pennsylvania. In 2013, the township passed extraordinary legislation limiting the actions of a fossil fuel company. It legalized the use of nonviolent direct action by citizens seeking to block harmful infrastructure projects by the company that could increase greenhouse gas emissions. As Brecher writes:

In 2013, the Pennsylvania General Electric company (PGE) applied for permits for wells to inject contaminated fracking wastewater in Grant Township, Pennsylvania. Despite hearings, public comments, and permit appeals, the federal Environmental Protection Agency issued a permit to PGE. With support from the Community Environmental Legal Defense Fund, the Grant Township Supervisors thereupon passed a Community Bill of Rights ordinance which established rights to clean air and water, community self-government, and the rights of nature; it prohibited the proposed injection well as a violation of those rights.

PGE sued Grant Township, claiming it had a right to inject wastewater within the Township. When a judge stated that the Township did not have the authority to prohibit injection wells, the residents voted two to one for a new home rule charter. Then the Grant Township Supervisors passed a law under the new charter that legalizes direct action to stop wastewater injection wells. It states that if a court does not uphold the people's right to stop corporate activities threatening the wellbeing of the community, "any natural person may then enforce the rights and prohibitions of the charter through direct action." Further, the ordinance prohibits "any private or public actor from bringing criminal charges or filing any civil or other criminal action against those participating in nonviolent direct action."....

Grant Township Supervisor and Chairman Jon Perry added, "I was elected to serve this community, and to protect the rights in our Charter voted in by the people I represent. If we have to physically and nonviolently stop the trucks from coming in because the courts fail us, we will do so."

In creating templates for action and legislation, municipalities such as Burlington, Vermont, and Grant Township, Pennsylvania have set an example. In the coming months and years, other local and state governments will be deciding on whether they will take action as well.

**For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. According to the reading, what are some specific actions that cities have taken to protect the environment or reduce the impact of climate change?
3. Grant Township, Pennsylvania took an unusual stance in protecting its residents against the actions of a corporation. What type of actions might residents take now that nonviolent direct action has been endorsed by the Grant County Supervisors? Do you think that these actions might be effective in stopping fossil fuel development, in Pennsylvania or elsewhere?
4. Some people who are concerned about climate change nevertheless feel unmotivated to take action because the issue can seem far removed from their daily lives. Do you think that efforts on the level of individual cities might be a good way of engaging such people? Why or why not?

-- *Research assistance provided by Ryan Leitner*

[Lesson index](#)

# Earth Day Lesson: Plastics and You

By [Julie Weiss](#)

We use plastics all the time. So often, in fact, that they're practically invisible to us. In this lesson, students keep a log of their plastic use, take action to decrease it, and explore systemic approaches (like bag bans and bag taxes) to minimize use of plastics. (4/19/16)



Photo: [https://unsplash.com/photos/OTDyDgPoJ\\_0](https://unsplash.com/photos/OTDyDgPoJ_0)

## Learning Objectives

Students will:

- keep a record of their plastics use
- brainstorm ways to decrease their use of plastics
- choose and implement at least one action step they will take to reduce their plastics use
- brainstorm systemic solutions to excessive use of plastics, such as bag bans, bag taxes, and banning the sale of bottled water

## Introduction

Write the word "plastic" on the board and tell students that in this lesson they will be gathering data about plastic use and exploring ways to decrease it, including changing their personal behaviors and advocating for larger-scale change.

Have students read—or read aloud to students—the Background Reading below so they can learn more about how much plastic we use and the impact that it has on the natural environment. After the reading, provide an opportunity for students to ask questions or share comments about it.

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## Background Reading: Drowning in Plastic

We're drowning in plastic! Plastic bags, plastic bottles, plastic wrapping on almost everything we buy. Plastic keyboards, plastic phone cases, even plastic furniture.

Just how much plastic are we humans using? Let's take a look at some numbers.

### The Data

Globally, people use 100 million tons of plastic a year. In the 1950s, people used only 5 million tons per year. <sup>[1]</sup>

Consider the ubiquitous plastic bag. How many of them do we use? <sup>[2]</sup>

- 1 trillion plastic bags a year globally
- 1 million plastic bags every minute
- 100 billion plastic bags in the United States every year
- 15 plastic bags by a family on every trip to the supermarket

And what about plastic bottles? How many of those do we use?

- 190 billion drinks in plastic bottles in the United States every year
- 2.5 million plastic bottles in the United States every hour<sup>[3]</sup>
- 500 plastic bottles per U.S. household per year<sup>[4]</sup>
- 2 plastic drink containers a day per person in the United States<sup>[5]</sup>

## The Impact

This huge amount of plastic affects our world in dangerous ways.

First of all, remember that plastic doesn't decompose quickly. A plastic bag, for example, can endure in the environment for 1,000 years. Think about that. A thousand years ago it was the 1100s! So the plastic waste we generate today isn't going to go away. It's going to pile up on land and float in the oceans. (For more information about the impact of plastic waste in the ocean, see [these Teachable Moment lessons](#).)

- Only about 1 in 5 plastic bottles gets recycled. That means that 4 out of 5 go into landfills.<sup>[6]</sup>
- Only about 5% of plastic bags get recycled.
- More than 90% of humans on the planet have chemical residue from plastics in their bodies.<sup>[7]</sup>
- 86% of debris in the ocean is plastic.<sup>[8]</sup>
- More than 1 million birds and marine mammals die from ingesting or getting tangled in plastic every year.<sup>[9]</sup>

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## Record Your Plastics!

Ask students to begin thinking about what they use that is made of plastic or has plastic in it. Explain that they are going to keep a record for one day of the plastic that they use. Distribute this "Record Your Plastics" sheet at the end of this lesson.

Review examples with students, and ask students to come up with one more example that could be added to the chart. Then tell students that tomorrow will be the day that they will do the exercise.

## Report back

The day after students complete "Record Your Plastics," ask them what they notice about their lists.

Students might notice, for example, that they used several plastic cups, or that they threw away the plastic container that they brought their lunch in, or that they have furniture at home or in

school that is made of plastic.

Make a list of student observations.

Then ask students to write for two minutes about what they think and how they feel about the results of their plastics record. Give volunteers the opportunity to share their thoughts and feelings.

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## Group Work

Divide the class into groups. Give students highlighters in at least two colors (Highlights are made of plastic, by the way!)

Ask students to look at the third column of their record, "What I did with it after I used it." Have them use one color to highlight all the items that they threw away immediately (e.g., a plastic bag) or that they would throw away eventually (e.g., a computer).

Then have them look at the fourth column and use a different color to highlight all the items that they could easily replace with something non-plastic.

Ask students, working with their group members, decide on one thing they are willing to change regarding their plastic use. To decide, have them review their charts:

- Is there something they threw away immediately that they could avoid using entirely?
- Is there something easily replaced that they could replace? For example, will they commit to using cloth bags instead of plastic bags? Will they commit to not using plastic straws?

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## Class Discussion

Ask people from each of the groups to report back:

- What were the most common plastic items students used? List these on the board.
- What items did students decide they could avoid entirely?
- What items could they easily replace?

Work with students on their choices. If they can't commit to getting a reusable water bottle, for example, urge them to stop using an item that isn't really necessary, like a plastic straw.

Ask students what obstacles stand in the way of their making the change, and what they need in order to overcome that obstacle and then problem-solve with them. If, for example, they get bottled water from the machines at school, where can they get a reusable bottle? If they can't afford to buy one, can the class see if a local business, such as a donut shop or dollar store, will donate plastic bottles?

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## Follow-Up Study

For a week, have students keep a record of their use of the item they targeted.

For example, if they committed to reduce their use of plastic straws, how many straws did they use every day that week? How did the number compare to the number they recorded in their log?

Or, how many plastic bags did they use, and how did that number compare to the number they had recorded at the start of the lesson?

At the end of the week, check back with students on how they are doing. Did they meet their goals? If so, how? If not, why not?

Ask students to calculate how many items they will *not* use over the course of a year if they continue their new behavior. If, for example, they stop using one plastic bottle a day, in a year, they will use 365 fewer bottles.

Then tally total class numbers: How many plastic bottles and how many plastic bags will students *not* be using?

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## Discussion: Systemic Change

Changes that individuals make do add up. But changes made at a larger scale add up even faster, and can be more lasting. Encourage students to think about what larger-scale changes they could push for and possibly achieve.

For example, could they advocate that their town or city institute a ban on plastic bags, or impose a fee on them?

Or, could students find a way to get water bottles for every student in the school, and get the school to remove the machines that sell bottled water?

Here are a few links to get them—and you—started.

<http://plasticbaglaws.org/>

<http://www.byobYork.org/resources/action.html>

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## References

[1] <http://www.greenlivingtips.com/articles/Consumption-statistics.html>

[2] <http://www.statisticbrain.com/plastic-bag-statistics/>

[3] <http://www.saynotoplastics.com/plastic-facts/>

[4] <http://www.statisticbrain.com/plastic-bag-statistics/>

[5] <http://www.inspirationgreen.com/index.php?q=plastic-bag-stats.html>

[6] <https://www.banthebottle.net/articles/10-startling-facts-about-bottled-water/>

[7] <http://www.environmentalhealthnews.org/ehs/news/dangers-of-plastic>

[8] <http://www.iwma.com/programs-events/Impact%20of%20Plastic.html>

[9] <http://www.iwma.com/programs-events/Impact%20of%20Plastic.html>

[Lesson index](#)



# The Growing Fossil Fuel Divestment Movement

By [Mark Engler](#)

Students learn about the growing movement by climate change activists to get universities and other institutions to divest from fossil fuels and explore the connection between this movement and the successful divestment campaign against apartheid South Africa. (10/22/15)



Photo: <https://unsplash.com/photos/ZdzO5PgYObA>

## To The Teacher:

Climate change can seem like an overwhelming problem. For environmentalists committed to raising public awareness and forcing action on this issue, it can be hard to find the best place to start. In recent years, however, concerned citizens interested in challenging the power of the fossil fuel industry have turned to a tactic with a rich history: divestment.

Activists are generating public pressure to compel institutions, from universities to local city governments, to withdraw their investments from the companies most responsible for producing greenhouse gases. They aim to hit polluting industries where it hurts the most—their bottom lines. Since 2011, the fossil fuel divestment effort has gone from a small campus-based campaign to a worldwide movement that is gaining steam.

As they attempt to address climate change, fossil fuel divestment campaigners take inspiration from earlier generations who effectively used the divestment tactic. The most notable example of this was the campaign to compel international corporations to stop doing business with the apartheid regime in South Africa in the mid- to late-1980s. The South African divestment campaign played an important role in ending the system of legalized discrimination in that country.

This lesson consists of two readings designed to encourage students to think critically about divestment campaigns in general, and fossil fuel divestment in particular. The first reading considers the growing fossil fuel divestment movement and how it is inspired by the divestment campaign in South Africa. The second reading considers both the successes and challenges of the fossil fuel divestment campaign. Questions for discussion follow each reading.

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## Student Reading 1

### Fossil Fuel Divestment: Goals & History

Climate change can seem like an overwhelming problem. For environmentalists committed to raising public awareness and forcing action on this issue, it can be hard to find the best place to start. In recent years, however, concerned citizens interested in challenging the power of the fossil fuel industry have turned to a tactic with a rich history: divestment.

Activists are generating public pressure to compel institutions, from universities to local city governments, to withdraw their investments from the companies most responsible for producing greenhouse gases. They aim to hit polluting industries where it hurts the most—their bottom lines.

In a 2013 article in [Rolling Stone](#), author and climate activist Bill McKibben explained the rationale behind pressuring institutions to divest from fossil fuel companies:

The logic of divestment couldn't be simpler: if it's wrong to wreck the climate, it's wrong to profit from that wreckage. The fossil fuel industry... has five times as

much carbon in its reserves as even the most conservative governments on earth say is safe to burn - but on the current course, it will be burned, tanking the planet. The hope is that divestment is one way to weaken those companies - financially, but even more politically.

If institutions like colleges and churches turn them into pariahs, their two-decade old chokehold on politics in DC and other capitals will start to slip. Think about, for instance, the waning influence of the tobacco lobby - or the fact that the firm making Bushmaster rifles shut down within days of the Newtown massacre, after the California Teachers Pension Fund demanded the change.

"Many of America's leading institutions are dozing on the issue of climate," says Robert Massie, head of the New Economics Institute. "The fossil fuel divestment campaign must become the early morning trumpet call that summons us all to our feet."

The growing desire among concerned citizens to address the pressing issue of climate change has allowed fossil fuel divestment to blossom. As [Time](#) reporter Victor Luckerson writes in a September 22, 2015 article:

A movement that began on college campuses to reverse investments in fossil fuel companies is now measuring its impact in the trillions.

More than 400 organizations and 2,000 individuals across the world with \$2.6 trillion in assets have pledged to divest from fossil fuel companies, according to a new report from Arabella Advisors, a consultancy firm for philanthropies. A year ago, the total amount of assets being divested from fossil fuel companies was just \$50 billion.

It's a huge acceleration for a campaign that began at just a handful of colleges in 2011. Back then, students were struggling to convince their universities to reroute their endowment investments away from companies that make oil, coal and natural gas. Today, 40 educational institutions have pledged to divest. They've been joined by philanthropic organizations, state governments, faith-based institutions, medical organizations and celebrities.

Fossil fuel divestment campaigners take inspiration from earlier generations who effectively used the divestment tactic. The most notable example of this was the campaign to compel international corporations to stop doing business with the apartheid regime in South Africa in the mid- to late-1980s. The South African divestment campaign played an important role in ending the system of legalized discrimination in that country. Anti-apartheid activists argued that universities should make sure that

none of the funds from their endowments were being invested in a country that officially treated people of color as second-class citizens. And they contended that major corporations such as General Motors should cease doing business with the discriminatory regime.

In a December 15, 2013, Op-Ed for the [Chicago Tribune](#), Adele Simmons, the former president of Hampshire College and an early supporter of South African divestment, discussed the origins of the campaign, its growth, and ultimately its contribution to toppling the apartheid regime. Of her experience in the anti-apartheid movement in the 1970s and 1980s, she writes:

Apartheid opponents needed to do something more than protest. The candlelight vigils were not working.

In the mid-1970s, students began to demand that their universities divest stock in all companies doing business in South Africa, but they made little progress. How could Harvard sell its stock in IBM, not to mention General Motors, Polaroid or Shell? But the argument that universities should not bring politics into their investment decisions carried little weight with the activists. They believed that a university's investment policy should reflect its values....

In the fall of 1977, urged on by students, I asked the Hampshire College board of trustees to divest. They agreed, and Hampshire College became the first U.S. college to divest completely from companies either trading with South Africa or doing business in South Africa....

Other schools followed. The protests at the University of Michigan, Michigan State, Columbia University and the University of Wisconsin attracted the greatest attention.

By 1988, 155 universities had divested, and the dollars were significant. In 1986, the University of California divested, selling \$3.1 billion worth of stock.... [F]aith organizations, unions, cities, counties and states joined in. Investment funds started to take a careful look at companies in their portfolios that had South African ties.

In 1986, in response to increasing violence in South Africa and protests in the United States, Congress passed the Comprehensive Anti-Apartheid Act that banned new investment in South Africa, sales to the police and military, and imports of a number of products. President Ronald Reagan vetoed the bill, but Congress overrode him.

Companies began to withdraw from South Africa. General Motors sold its plant in 1986. IBM left South Africa in 1987. Locally, Sara Lee and Borg-Warner got out. Doing business in South Africa became too expensive for U.S. companies. Moreover, it did not impact their core business. Eventually, many of the companies that had signed the Sullivan Principles went further and closed their operations.

One expert at the time argued that companies were leaving because of the ailing economy, not because of pressure. But the weakness of the economy had a lot to do with divestment, which caused a flight of capital, declining exchange rate and inflation. In South Africa, the government realized the damage of being isolated.

When I met F.W. de Klerk, the last president of the apartheid regime, in Chicago two years ago, he was clear: "When the divestment movement began, I knew that apartheid had to end." And when I met with Mandela in 1990 in New York, he said that divestment was a crucial factor in ending apartheid. The movement against apartheid was led by South Africans, and Mandela was an inspiration throughout the decades, but the actions of U.S. investors gave the movement both visibility and legitimacy and had a decisive economic impact.

Divestment was only one of the many tactics that opponents of apartheid used to end the system of legalized discrimination in South Africa. However, it was an important one. Fossil fuel divestment campaigners of today hope that their efforts can make a similar impact in ending the dominance of fossil fuel corporations and stirring action to prevent climate disruption.

**For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. What is divestment? How does a divestment campaign work?
3. We read about campaigns for divestment from fossil fuels and South Africa. Can you think of any other divestment campaigns? What were their goals? How did activists fare?
4. How does pressuring institutions to change their investment patterns compare with a personal decision to change what products you buy and what corporations you support with your business? How is divestment similar to or different than personal lifestyle decisions? What do you think is the importance of the differences?

## Student Reading 2

### Divestment Movement Critics and Potential

In the last four years, the fossil fuel divestment campaign has gone from a small campus-based effort to a worldwide movement that is gaining steam.

Nevertheless, the divestment campaign has also encountered criticism. In a July 7, 2014, op-ed for [Al Jazeera America](#), journalist Matthew Cunningham-Cook argued that divestment is an ineffective tactic. He contended that the divestment movement had little ability to affect the financial resources of the fossil fuel industry. Cunningham-Cook wrote:

[Divestment] appears to be a noble, even necessary idea...

But the fossil fuel divestment movement is, at best, a misguided endeavor and, at worst, a self-defeating roadblock. The changes being proposed will do little to stop investment in the fossil fuel economy. Severely hampering the campaign is its focus on publicly traded securities such as stocks and bonds – when much of the fossil fuel investment today is taking place on private markets....

[F]ossil fuel divestment would target only major corporations that are listed on the stock market. But pension funds and endowments, the entities largely targeted by the 350.org campaign, invest hundreds of billions of dollars in privately traded securities, such as hedge funds and private equity – vehicles that are invested at all levels of the fossil fuel economy....

The divestment campaign argues that 200 publicly traded fossil fuel companies dominate the fossil fuel exploration market. But they ignore that such companies frequently depend on private equity and hedge funds for financing new investments when large banks are uninterested in taking on further risk. The public can rarely (if ever) verify that these types of arrangements take place, even if it is a teacher attempting to verify what her pension fund is doing with her money....

For the climate justice movement to gain any ground, it will require what Martin Luther King Jr. called "a revolution of values." Hedge funds and private equity must be held to the same standards as the retirement funds of millions of working-class Americans.

To many divestment activists, however, this argument misses the larger point of the divestment campaign. Of course climate justice cannot be achieved with divestment alone, they argue—it's just one tool of many. But a divestment campaign can greatly influence public opinion—drawing attention to the issue and drawing in more activists to fight for the cause. Climate activist and journalist Kate Aronoff makes this point in a July 10, 2014, article for [Waging Nonviolence](#) in response to Cunningham-Cook's argument:

Criticizing divestment for not taking on privately traded stocks is akin to criticizing the civil rights movement for in 1955 for not focusing its energies exclusively on the state courthouses that ratified racist laws in the Jim Crow South. Why boycott a bus system in Selma? The real power is in the Montgomery legislature!

Similarly to that movement, fossil fuel divestment has rallied 400 campus campaigns across the country around a symbolic demand. As 350.org's Jamie Henn explained ... the goal "isn't to make a direct economic impact by selling stock, it's to stigmatize the industry to the point they start losing political power." Were divestment an instrumental demand, then the critique would be spot on: the goal would be to move as much capital as possible out of the fossil fuel industry, and the movement would be failing. On numbers alone, divestment will not be the campaign that defunds either the fossil fuel industry or a global capitalism that deals in increasingly risky and volatile financial products; no single tactic can.

Campus divestment is one blunt tool that taps into a sizeable base of people in higher education, and leverages the cultural, social and — to a certain extent — economic capital of colleges and universities. It's just one in an expansive toolbox that includes a range of work on climate justice looking to move all sectors of society. The sort of broad-scale societal transformation required to upend the fossil fuel economy will require mass participation-across race, class, generation and so much more....

In imagining a way forward, I could not agree more that achieving climate justice will require a "revolution in values" against not only the fossil fuel industry, but the extractive economy as a whole. Fossil fuel divestment is not that revolution, but it is a vital and fighting part of it.

Indeed, it seems that the divestment campaign has already had a significant impact on public opinion, as Rhiannon Meyers reported for the [Houston Chronicle](#), in a May 29, 2015 article:

The divestment movement's formation on college campuses underscores how a generation of young people has taken a more organized and formal approach

toward reducing their carbon footprint, a troubling trend for industry, [divestment activist Karthik] Ganapathy said.

"If you have an entire generation feeling about climate change the way a couple of generations felt about the atomic bomb, that is a deeply powerful thing," he said. "I don't think the industry understands that's not just something you can do away with by mocking and saying, 'You need us.' That's something you have to tap into and address in a meaningful way."

Some fossil fuel companies are taking notice.

Peabody Energy Corp., the world's largest private-sector coal company, listed the divestment campaign among the risk factors affecting its business. As climate change continues to garner public attention, the environmental campaign against coal combustion has led to increased government scrutiny and "unfavorable lending policies," the company said in its annual report to SEC.

And when prominent electricity provider NRG announced last fall plans to cut the company's carbon emissions in half by 2030, CEO David Crane said that the college campus divestment movement was weighing on his mind.

"I don't relish the idea that year after year we're going to be graduating a couple million kids from college who are going to be American consumers for the next 60 or 70 years that come out of college with a distaste or disdain for companies like mine," Crane said back in November.

If the response of the fossil fuel industry to the divestment campaign is any indication of its power, the potential impact of the tactic should not be underestimated.

### **For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. Do you think the divestment campaign is a worthwhile use of time for climate change activists?
3. What is Matthew Cunningham-Cook's argument against the fossil fuel divestment campaign? How do environmentalists respond to this argument? Which position do you find more convincing?
4. Environmentalists contend that divestment is an important tactic for the symbolic value it carries—that the goal of withdrawing money from the fossil fuel industry is secondary

to the goal of drawing attention to the industry's role in contributing to climate change. What are some other symbolic tactics activists have used? How important do you think these tactics were to the cause they supported?

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### Extension activity

Have students research whether any fossil fuel divestment campaigns are underway in their area, perhaps on a nearby college campus. One place to start is this website, sponsored by the climate change organization 350.org: <http://gofossilfree.org/usa/>

Ask students to find out:

- What actions have the activists taken as part of the divestment campaign?
- What has the response been to the campaign?
- Is there evidence that the campaign has drawn public attention to the issue of climate change?

If possible, invite local divestment activists to your classroom. Have students prepare interview questions and consider how they will share what they've learned with schoolmates or the community.

If students are interested, support them in deciding on and implementing an action to support the divestment campaign.

[Lesson index](#)

# SEL & Climate Change: Responding to a Flood

By [Laura McClure](#)

In the closing days of 2015, some of the highest flood waters ever recorded hit the Mississippi River valley. This activity encourages students to empathize with flood victims, and to consider how we as individuals and as a community can best respond to floods and other climate change-related disasters. (1/9/16)



Photo: <https://www.flickr.com/photos/usacehq/25113780996/in/photostream/>

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## Gathering

Remember a time when you got needed help from someone, perhaps after an accident or injury. How did it feel when you got the help you needed?

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## The Mississippi River Floods

Read aloud or summarize the following, which is based on New York Times reporting on the flood.

December 28, 2015, west of St. Louis, Missouri: After three days of heavy rain, Linda was starting to worry that her home would be flooded. She could actually see flood waters from the river creeping into the woods near her house. And she heard the news reports warning that a flood of historic proportions was hitting the whole Mississippi River valley, and heading her way.

But she didn't want to believe she'd actually have to abandon her home. The last big flood hadn't touched her house. Maybe it wouldn't this time either. It wasn't until she heard water gurgling under her mobile home that she finally realized she had to go. She packed up some of her most precious belongings and went to the Red Cross shelter, which had been set up at a Baptist Church in the area.

"I didn't realize I was going to lose everything," she said.

In the closing days of 2015, some of the highest flood waters ever recorded hit the Mississippi River valley. Whole neighborhoods and towns had to be evacuated, and many homes and businesses were damaged beyond repair. Millions of people had their lives disrupted, and 22 lost their lives as a result of the flooding.

Many of the low-lying areas around the Mississippi River have always been prone to flooding, but the floods have gotten more and more frequent and severe, in part because of climate change. Climate change, which is caused largely by our burning of fossil fuels, warms the atmosphere, which leads to violent changes in the weather, including torrential rains.

This is raising big questions about the future for individuals like Linda: How will they respond to the repeated flooding of the place they call home? And how should all the rest of us - their friends, neighbors, and fellow citizens - help people like Linda who are threatened or hurt by climate change? What help would we ourselves hope get from others if we were hit with a similar climate change disaster?

## Scenarios for Small Groups

Ask students to break into small groups of four or five and to sit in a circle.

### Round One: Linda

Ask students to imagine that they are Linda: Picture yourself in the Red Cross Shelter, surrounded by the few objects you were able to save from your home before it was completely submerged. You have some home insurance, but it won't come close to covering the cost of building a new home or buying another one.

- What are you feeling? What are you thinking?

Give the groups 4 minutes to respond to the question in a go-round. After the go-round, ask students to volunteer some of their responses, and record them on the board.

### Round Two: Linda's friend

Imagine that you are a friend of Linda's who lives nearby. Your home was not flooded.

- How will you help Linda? Will this be hard for you? Will it be rewarding?

Give the groups 4 minutes to respond to the question in a go-round. After the go-round, ask students to volunteer some of their responses, and record them on the board.

### Round Three: Linda's community

Imagine that you live in Linda's community, though you don't know her. Your home wasn't flooded, but you know several people who had to evacuate their homes, have lost their possessions and are staying in the local Red Cross shelter.

- How will you help Linda, either as an individual, or through an organization you are part of?

Give the groups 4 minutes to respond to the question in a go-round. After the go-round, ask students to volunteer some of their responses, and record them on the board.

### Round Four: Government (all of us)

Before beginning this go-round, provide the following background.

Historically, government agencies at all levels have responded to "natural disasters" like floods by first rescuing people or moving them to safety, and then by supporting clean-up and the rebuilding of homes and communities. This help is provided by all of us, through taxes we pay to the government. One agency that is key in responding to disasters is the Federal Emergency Management Agency, or FEMA. FEMA says that its mission is to "ensure that as a nation we work together to build, sustain and improve our capability to prepare for, protect against, respond to, recover from and mitigate all hazards."

There have long been questions about whether government should fund the rebuilding of homes and communities in locations that are prone to flooding or other disasters. This question has gotten more urgent now that climate change is causing more and more such disasters. We know that some parts of the country, including low-lying coastal areas and many river valleys, are very likely to face repeated catastrophic flooding in the years to come.

But denying people the right to rebuild in the same location - or refusing to provide funds for rebuilding - means that we as a society are forcing people to abandon their communities, places where many people have lived for a lifetime.

Ask students to address, in a go-round,

- How do you think our government should help people like Linda, whose homes are damaged or destroyed, and who are living in areas that are prone to catastrophic flooding because of climate change?

Give the groups 4 minutes to respond to the question in a go-round. Reconvene the whole class and tell students we'll discuss their responses as a group.

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### **Discussion: Being Strategic about How We Help**

Ask the full class:

- By a show of hands, do you think our government should help people rebuild in areas that are almost certain to flood again, especially given climate change? Ask for a volunteer from each position to give a reason for their opinion.
- If government does *not* support rebuilding in communities prone to disaster, how should government support those who lose their homes in these disasters?
- Some people think that it isn't government's role to help individuals recover from disasters at all. What do you think of this view? What consequences do you think it

would have on the rest of us if we did not provide support for those who are left homeless by climate disruption?

- People who are low-income are generally hardest hit by climate change because they have less money to protect themselves from it or to recover from its impacts if they are hit. What can we as a people do to address this inequality?
- Sometimes people feel more empathetic and are more willing to help those whom they perceive as being more like themselves. Do you think these reactions should govern how we as a people respond to climate change?
- Although we often still refer to floods and other climate change-related events as "natural disasters," they are often mostly "human-made disasters." How should this knowledge affect the way we respond to disasters like the Mississippi River valley flood?

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## Closing

In a go-round, ask students:

- What is one strength or quality you have that would be useful if your community was hit by a flood or other climate change-related disaster?

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## Extension Activity

Ask students to read this New York Times article about Valmeyer, IL, a town near the Mississippi River that completely relocated itself after the "Great Flood of 1993."

<http://www.nytimes.com/1996/05/06/us/higher-and-drier-illinois-town-is-reborn.html?pagewanted=all>

Then, as homework, ask them research how Valmeyer is doing today.

In the next class, ask students:

- What impact did the move have on Valmeyer?
- What qualities or strengths did the people of Valmeyer have that helped them adapt to climate change?
- What if anything do you think we can learn from Valmeyer's experience, given that more floods and other climate change-related disasters are likely?

[Lesson index](#)

# A Global Challenge: 'Climate Refugees'

By **Mimi Bluestone**

Students learn about people around the globe who are being forced from their homes because of climate change, and think about how we as a society should respond. This companion lesson encourages empathy for climate refugees. (12/3/17)



Photo: <https://unsplash.com/photos/6ZgTEtvD16I>

## Gathering

Ask students:

- What do you think it means to be a refugee?
- What kinds of events cause people to search for safety far from home?
- Can you think of any examples?

## Reading 1: Refugees from a changing climate

Refugee. The word conjures images of people running from persecution and war, clinging to rafts, sleeping in tents. Under international law, refugees are people fleeing conflict or persecution. There are 20 million people classified as refugees in the world today, according to the [UNHCR](#), the United Nations Refugee Agency. They include Syrians running from their country's devastating conflict, members of Myanmar's Rohingya ethnic minority escaping persecution, and [South Sudanese](#) fleeing civil war. All told, there are more refugees in the world today than at any time since the end of World War II.

To organizations that help refugees, such as the UNHCR, the world is already suffering from a catastrophic refugee crisis. But today's refugee population may be just a fraction of what the world could see in coming decades. As the planet warms and polar ice melts, changing weather patterns and rising seas will force millions of people to leave their homes.

By 2060, there could be about 1.4 billion climate refugees, estimates Charles Geisler, professor emeritus of development sociology at [Cornell University](#). By 2100, the number might be as high as 2 billion — about one-fifth of the world's anticipated population. Geisler cites a variety of factors contributing to the expected tsunami of refugees, including "war, exhausted natural resources, declining productivity desertification, urban sprawl, 'paving the planet' with roads."

A refuge is a safe shelter. Where can people find refuge when the climate in their home countries can no longer support farming, fishing, hunting, and other activities that have sustained human life for centuries, if not millennia?

People who fit the legal definition of "refugee" are entitled to certain types of protection under international law. But people fleeing climate chaos do not meet the current legal definition of "refugees," even when government policy is responsible for uninhabitable conditions. The current migration system "makes climate refugees particularly disposable," says [Zygmunt Bauman](#), a professor emeritus of sociology at the University of Leeds, leading to "a lack of protection for these people."

"Ironically," writes reporter [Bruna Kadletz](#), climate refugees "often come from countries with low carbon dioxide emissions and few resources to respond to climate change."

Kadletz describes the precarious life of 11-year-old Melina, who left her home in southern Malawi when she was three to move with her parents to South Africa. Since the late 1990s, Malawi has cycled between extreme flood and drought conditions. This severe weather made it impossible to grow the staple crop, maize, that had sustained Melina's family for generations. In South Africa, the family is living in limbo, without the legal status that would allow Melina to go to school and the family to have access to health care.

Climate change doesn't happen in a vacuum. Typically, a combination of factors forces people to leave their homes. Excessive drought, heat, or flooding intertwine with famine, unemployment, inequality, and conflict. Climate change acts as a "[threat multiplier](#)" — a factor that can push simmering social, political, and economic problems into full-blown crisis.

[Syria](#) is a clear example of a climate disaster that that catapulted a political crisis into catastrophe. A three-year drought, the worst in the region's recorded history, led to crop failures and livestock deaths. Scientists say the drought's length and intensity could only be explained as a result of a changing climate. More than a million people, mostly farmers who could no longer live on the land, sought work in overcrowded cities where food prices soared, fueling existing dissatisfaction with the authoritarian Assad regime. By March 2017, more than [5 million people](#) had left the country and 6.3 million were displaced within the country.

On the other hand, there are places where climate change is the clear single cause of displacement. A report by the [Lancet](#), a British medical journal, found that at least 4,400 people have been forced to leave their homes in Alaska, Papua New Guinea, and Louisiana because of rising seas, coastal erosion, and disintegrating coastlines.

Kiribati is another example of a country that expects climate change to drive migration. The Pacific island nation, located midway between Australia and Hawaii, may be entirely underwater in 30 to 50 years. So it is planning for "Migration with Dignity" by training its citizens in high-tech skills that, the government hopes, will win them a welcome in other countries. [New Zealand](#), for its part, is discussing whether to offer asylum to people fleeing climate change, which could open the door for Kiribati's climate refugees.

But it seems unlikely that Kiribati's strategy could provide a solution for the millions if not billions of people who eventually may be displaced. "Humanity is in crisis," warns sociologist Zygmunt Bauman, "and there is no exit from that crisis other than the solidarity of humans."

## For discussion

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. How does climate change force people to leave their homes?
3. Should governments recognize people displaced by climate change as refugees? How might this help the people who are displaced?
4. Should countries that are not suffering from climate displacement help people fleeing from other countries because of changes in climate? How can they help?
5. What does Zygmunt Bauman mean when he says that "there is no exit" from a humanitarian crisis "other than the solidarity of other humans?" Do you agree? Why or why not?

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## Reading 2: Louisiana's climate refugees

People who study climate change expect many future climate refugees to come from Africa and Asia. But some climate refugees will be leaving homes in the United States.

In September 2017, an enormous hurricane, Maria, struck the island of Puerto Rico, a territory of the United States whose residents are American citizens. The hurricane caused massive destruction across the island and created a crisis for millions of people. Tens of thousands of storm victims have fled the island to rebuild their lives on the mainland. (See this [companion TeachableMoment lesson](#) on Puerto Rican families forced from their homes after Hurricane Maria.)

Other Americans are being turned into refugees because of ongoing climate changes. The Native American people of [Isle de Jean Charles](#), 80 miles from New Orleans are among them.

Over the past 60 years, Isle de Jean Charles has lost 98% of its land mass in a perfect storm of rising sea levels, damaging hurricanes, and oil and gas canals that slice

through the island. Only half a square mile of land remains above the water level, and that too will disappear by 2100 if sea levels keep rising as predicted.

Many of the island's people have already moved on. Where there were about 80 families in the 1950s, only 30 still remain. It's not clear how much longer they can stay. To help them build new lives away from the island, the U.S. Department of Housing and Urban Development announced in 2016 that it would spend \$48 million to move the entire Isle de Jean Charles community to higher ground.

[New York Times](#) reporters Coral Davenport and Campbell Robertson describe the challenges of resettling this community in their article "*Resettling the First American 'Climate Refugees'*" (May 3, 2016). They quote Walter Kaelin, the head of [the Nansen Initiative](#), a research organization working with the United Nations to address extreme-weather displacement: "You don't want to wait until people have lost their homes, until they flee and become refugees," he said. "The idea is to plan ahead and provide people with some measure of choice."

Under a federal grant, the island's approximately 60 residents will be resettled to drier land, to a community that does not yet exist. According to the Times, the Isle de Jean Charles resettlement plan is one of the first programs of its kind in the world – and a test of how to respond to climate change without tearing communities apart.

For over a century, the American Indians on the island fished, hunted, trapped and farmed among the lush banana and pecan trees that once spread out for acres. But since 1955, more than 90 percent of the island's original land mass has washed away. Channels cut by loggers and oil companies eroded much of the island, and decades of flood control efforts have kept once free-flowing rivers from replenishing the wetlands' sediments. Some of the island was swept away by hurricanes.

What little remains will eventually be inundated as burning fossil fuels melt polar ice sheets and drive up sea levels, projected the National Climate Assessment, a report of 13 federal agencies that highlighted the Isle de Jean Charles and its tribal residents as among the nation's most vulnerable.

Already, the homes and trailers bear the mildewed, rusting scars of increasing floods. The fruit trees are mostly gone or dying thanks to saltwater in the soil. Few animals are left to hunt or trap.

Violet Handon Parfait sees nothing but a bleak future in the rising waters. She lives with her husband and two children in a small trailer behind the wreckage of their house,

which [Hurricane Gustav](#) destroyed in 2008.

The floods ruined the trailer's oven, so the family cooks on a hot plate. Water destroyed the family computer, too. Ms. Parfait, who has lupus, is afraid of what will happen if she is sick and cannot reach a doctor over the flooded bridge.

Ms. Parfait, who dropped out of high school, hopes for a brighter future, including college, for her children, Heather, 15, and Reggie, 13. But the children often miss school when flooding blocks their school bus. "I just want to get out of here," she said.

Still, many residents of Isle de Jean Charles do not want to leave. Attachment to the island runs deep. Parents and grandparents lived here; there is a cemetery on the island that no one wants to abandon. Old and well-earned distrust of the government hangs over all efforts, and a bitter dispute between the two Indian tribes with members on the island has thwarted efforts to unite behind a plan.

"Ain't nobody I talk to that wants to move," said Edison Dardar, 66, a lifelong resident who has erected handwritten signs at the entrance to the island declaring his refusal to leave. "I don't know who's in charge of all this."

Whether to leave is only the first of the hard questions: Where does everyone go? What claim do they have to what is left behind? Will they be welcomed by their new neighbors? Will there be work nearby? Who will be allowed to join them?

Mark Davis, the director of the [Tulane Institute on Water Resources Law and Policy](#), told the Times reporters: "This is not just a simple matter of writing a check and moving happily to a place where they are embraced by their new neighbors. If you have a hard time moving dozens of people, it becomes impossible in any kind of organized or fair way to move thousands, or hundreds of thousands, or, if you look at the [forecast for South Florida](#), maybe even millions."

### **For discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. Why do you think it's so difficult to resettle climate refugees?

3. Do you think the federal government should be involved in resettling people from areas affected by climate change?
  4. Should state and local governments begin preparing now for evacuation of areas that are predicted to be underwater in the coming decades? How can people prepare as climate change advances?
  5. What can we do to ensure that those who are displaced by climate change find safe and welcoming homes elsewhere?
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## Extension Activity

The United Nations Framework Convention on Climate Change calls on nations participating in the Paris climate accords to find ways to protect and support people displaced by climate change. The UNHCR, the United Nations Refugee Agency, asks all nations to commit resources to helping those already displaced, find ways to prevent and reduce the risk of displacement, and support areas at risk with technical advice for relocating people in harm's way.

How can governments and non-governmental aid groups provide the support that climate refugees need?

Ask students to read this [New York Times article](#) and choose a specific area of the world where climate is displacing people or is expected to displace people.

Ask students, in small groups or individually, to research the area they have chosen, and to be prepared to share what they've learned with classmates. Ask them to find out:

1. How climate threatens people's lives and may force them to leave
2. How climate change may be causing or aggravating other problems in the area, such as war, crime, and human rights abuses.

3. Whether international and national organizations are acting to help people displaced by climate change and related problems and how these groups are trying to help.

In the next class, ask students to share what they've learned. Talk with students about what we, as individuals, or as a school or community, might do to help people who are displaced by climate change.

[Lesson index](#)

# Cultivating Compassion for Puerto Rico's 'Climate Refugees'

By **Marieke van Woerkom**

Students learn about a few of the thousands of people who have fled Puerto Rico after Hurricane Maria. In small groups, students discuss their stories and consider how they may be feeling about what has happened. This companion lesson has students explore the climate refugee crisis worldwide. (12/3/17)



Photo: <https://unsplash.com/photos/HuoCThvdRtc>

## Gathering

In pairs, ask students to share something that makes them feel "at home." Ask a few volunteers to share with the full group.

## Check Agenda and Objectives

Explain that in today's lesson we'll be hearing stories from people who left Puerto Rico in the wake of Hurricane Maria, which struck the island on September 20, 2017.

Though the news media has largely moved on from this story, the devastation in the wake of the hurricane continues to impact families in Puerto Rico and across the U.S.

## Student Reading

Invite students to read the handout "Tragedy in Puerto Rico" (included at the end of this lesson). After reading it, discuss it by asking students some or all of the questions below.

- What are your thoughts and feelings about what you just read? What stood out for you about what you just read?
- Were you aware of the devastation Hurricane Maria caused in Puerto Rico? How?
- When did you last see a story about Puerto Rico in the news?
- Do you think this means that the people of Puerto Rico have been able to return to their lives as normal? Has the devastation created by Hurricane Maria been dealt with? Have the problems of the island been resolved?
- How do you feel about the fact that the devastation of Puerto Rico, and the struggle of its people, is no longer in the news?
- What does the article say about the Puerto Rico before the storm ever made landfall? How has this continued to impact the island's relief efforts?
- What does the article say about small islands and large climate events? What does it say about the future of small islands like Puerto Rico in this regard?

As you discuss the questions, elicit or explain that although we now hear little in the news about Puerto Rico, the crisis continues:

- Puerto Rico's infrastructure was devastated by the storm, and recovery is expected to take years, causing huge economic pain for island residents, who are American citizens. The Climate Impact Lab estimates that Hurricane María will reduce per capita income in Puerto Rico by 21% over the next 15 years.
- In the three months following the hurricane, hundreds of thousands of people living in Puerto Rico left for the U.S. mainland. The Center for Puerto Rican Studies at Hunter College expects this mass exodus to continue: They estimate that Puerto Rico may lose up 14% of the population in the next several years.

- Meanwhile, refugees from the hurricane are trying to make new homes for themselves in communities around the U.S., including in Florida and New York. Many hope to someday return to their homes.

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## Climate Migration Stories

Post these six migrant stories (included below) around the room, each with the questions underneath the story. Split your class into six groups, asking each to stand by one of the migrant stories that you have posted.

Invite each group to read their story, then discuss the questions posted underneath for up to 10 minutes. After 10 minutes, ask groups to rotate around the room clockwise, moving to the next story. Ask them once again to read the story and discuss the same questions underneath. If time allows, have the groups rotate once more, going through the same process.

At the end of the rotation, bring the group back together again, asking some or all of the following questions for discussion

- What were some of the similarities and differences between the stories?
- What did you learn about why people left Puerto Rico? Did they want to leave? Why or why not?
- What do you think lies ahead for the people who left Puerto Rico?
- What do they say about leaving Puerto Rico?
- What do they say about returning to Puerto Rico?
- In what ways can we as individuals help those who have lost their homes in Puerto Rico?
- What should we expect our government to do to help those who have been displaced?

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## Closing

Ask students to share one wish they have for the families whose stories we have discussed today.

## Student Reading: Tragedy in Puerto Rico

On September 20, 2017, Hurricane Maria struck the island of Puerto Rico, a territory of the United States whose residents are American citizens. The hurricane caused massive destruction across the island, creating a crisis for millions of people. According to [Scientific American](#):

Hurricane Maria's destruction on Puerto Rico could spawn one of the largest mass migration events in the United States' recent history, experts say, as tens of thousands of storm victims flee the island territory to rebuild their lives on the U.S. mainland. ... "Whether that migration will be permanent or temporary is still anyone's guess," Garcia added. "Much depends on the relief package that Congress negotiates."

[Public Radio International](#) reported on the many Puerto Rican college students who have moved to the mainland to continue their education.

Puerto Rico was already losing population because of its economic challenges before Hurricane Maria. ... The devastation wrought by Maria is expected to accelerate that exodus. And the wave of new arrivals to the mainland could be considered environmental migrants because of the role of climate change in making hurricanes more intense. ... This environmental migration is likely to only make Puerto Rico's economic problems worse. ...

It's been known for a long time that Puerto Rico was vulnerable to the violent storms that are becoming more and more frequent as the climate warms. [Slate](#) reports:

"These storms are big, islands are small; if they get a direct hit it can overcome the entire place," said John Mutter, a professor of earth and environmental sciences and of international and public affairs at Columbia University. "If all the first responders are unable to respond because the whole place is trashed, it creates a whole new level of disaster."

Poor communities are always hit the hardest in events like this, Mutter said. In the case of Puerto Rico—where nearly half the population is below the poverty level, the territory has no vote in Congress, and Texas and Florida are [competing] ... with the territory for limited federal disaster resources—inequity in recovery could be [made worse] ...

"This is not a one-off event," Georges Benjamin of the American Public Health Association, said. "We are going to see more of these. We ought to contribute to their recovery much more than we have done in the past, just as we plan to do in Texas and Florida."

## Climate Migration Stories

### 1. Rosamari's Story

"Coming here was a big relief," says Rosamari Palerm. Rosamari was the first student from Puerto Rico to arrive at St. Thomas University, a private Catholic school in Miami Gardens, Florida, after Hurricane Maria struck. The electricity, clean water and cell service available on campus — not to mention college classes — stand in stark contrast to conditions at home.

Much of Puerto Rico is still without power. Water contamination is widespread. The scope of the disaster there is still not completely understood. When the winds died down, sewage water flooded the streets outside her family's apartment, the electric grid was down, and life as Palerm knew it was on hold. "I worked at a mall and the mall is completely destroyed, so I couldn't work," Palerm says. Classes were suspended at Sacred Heart University where Palerm was a senior biology major.

So when Palerm heard through family on the mainland that St. Thomas University was offering free room and board and tuition discounts to students displaced by the hurricane, she jumped at the chance to transfer. "I literally left with nothing. I just had my clothes," Palerm says. At the airport it hit her: "I'm probably not going to come back for a while." But Palerm's family ties hold her tightly, and she says she wants to go back to Puerto Rico eventually. "I love my little island. I want to be a part of helping it get better."

(Adapted from a story by PRI's [The World](#), 10/19/17)

#### Questions:

- What might Rosamari Palerm have been feeling while in Puerto Rico after the storm?
- What do you think she is feeling now that she's in Florida?
- What were the reasons for her to leave Puerto Rico?
- What do you think lies ahead for Rosamari?

## 2. Ana María's Story

Ana María Caraballo, 34, a Middle Island, NY, resident who is a morning drive-time personality for the Spanish-language station La Nueva Fiesta, feared for her family back in Puerto Rico after Hurricane Maria. "I was dying of worry," she said.

A relative and a friend drove hours along damaged roads from the Puerto Rican capital San Juan to check on Ana Maria's dad. Days after the storm, they found Miguel Caraballo Pietri, a heart attack and stroke survivor, alone and disoriented in a dark house. A light pole had fallen on the roof and water had poured inside.

On Sept. 29, Ana Maria's father was among scores of storm refugees arriving at New York City's Kennedy Airport, in what could be the start a larger migratory post-storm wave. He came to live with her.

"Those of us who were at the airport waiting for relatives recognized each other from looking at our eyes. We went from a lot of worry and sadness to great relief," Ana María Caraballo said. "And people were coming through the gates and hugging each other and we all clapped."

(Adapted from a story in [Newsday](#), 10/8/17)

### Questions:

- What might Ana Maria Carabello have been feeling while her father was in still Puerto Rico?
- What might her father have been feeling before coming to New York?
- What do you think Ana Maria is feeling now that her father is in New York?
- What do you think her father might be feeling?
- What were the reasons for him to leave Puerto Rico?
- What do you think lies ahead for Ana Maria and her father?

### 3. Lydia's Story

After the hurricane, Lydia Acevedo boarded a flight from San Juan, Puerto Rico, to Homestead, Florida, with her 14-year-old daughter, 22-year-old daughter, her son-in-law, 1-year-old grandson and her 72-year-old mother.

"Having to separate is not easy, but we have to think positive. We have to think that this will pass soon and we will be able to reunite," says Lydia with tears in her eyes. Lydia says she had to take the role of head of household when the hurricane hit. Her husband was helping everyone else in Puerto Rico and she had to take the lead in looking for food and water for her family.

Lydia faced a mixture of traumas, including her fear for the well-being of her 1-year-old grandson, Mateo, who suffers from asthma. He was running out of formula, and then there was the heat and humidity and the insects that come with it. Mosquito bites still cover part of Mateo's cheeks and arms.

Lydia has family in Illinois and for now plans to stay in a hotel. But like everyone else aboard she vows to return to Puerto Rico to reunite with the piece of their hearts left behind."

(Adapted from a report on [CNN](#), 9/27/17)

### Questions

- What might Lydia Acevedo have been feeling while she was still in Puerto Rico after the storm?
- What do you think Lydia is feeling now that she's on her way to Florida? What do you think her husband might be feeling?
- What were the reasons for her to leave Puerto Rico?
- What do you think lies ahead for Lydia and her family?

#### 4. Jennifer's Story

Jennifer Hernandez already has brought her sister, her sister's husband, their 2-year-old daughter and her 68-year-old grandmother to come live with her and her husband in their one-bedroom apartment in Long Island, NY.

Jennifer and her husband Miguel gave up their bed for her grandmother to use. She and everyone else fit, however they can, in their living room. "I have mattresses all over the place, leaning on the walls," said Hernández, 30, a warehouse supervisor at a thrift store.

Jennifer wants to bring her mom and two sisters to Long Island, she said, "even if I have to live paycheck to paycheck" to do so. She wouldn't feel comfortable here knowing her niece didn't have milk to drink in Puerto Rico, and she worries about others still stranded in isolated areas.

Jennifer's sister, Niulska, said she was starting to become desperate in Ponce, Puerto Rico. "All we had left were the walls, without a roof," Niulska said. "There was no electricity, no water and mosquitoes were everywhere. . . . It was raining inside the house."

(Adapted from a story in [Newsday](#), 10/8/17)

#### Questions

- What do you think Jennifer Hernandez was feeling about her family in Puerto Rico after the storm?
- What do you think her sister Niulska was feeling while in Puerto Rico after the storm?
- What do you think Jennifer is feeling now that her sister, her sister's husband, their 2-year-old daughter, and her 68-year-old grandmother are with her in Long Island?
- What do you think her sister Niulska Hernandez is feeling?
- What were the reasons for Niulska and her family to leave Puerto Rico?
- What do you think lies ahead for Jennifer and her family?

## 5. Vanessa's Story

Vanessa Carbia is aboard a plane taking her and her three children, ages 11 to 19, from Puerto Rico to Florida. In the back cargo section of the plane are Vanessa's two Yorkies, Pandylucas and Benjamin. Vanessa wouldn't leave her home without them.

Vanessa says that back in Puerto Rico, she only had food for four days and was left rationing it, never thinking she would have to evacuate on a flight with other families. With a heart heavy from the devastation and the worry that her children would be traumatized, Vanessa tried to manage her children's fears and worries while their father was working. Food and water shortages, she says, were difficult to reckon with.

"When you see children waiting in line for food and water," Vanessa says and pauses. "That was the most impactful." Vanessa and her children plan to stay in a hotel for now, though she has family in Arizona. She plans to go back to Puerto Rico. "My whole life is there," says Carbia.

(Adapted from a report on [CNN](#), 9/27/17)

## Questions

- What might Vanessa Carbia have been feeling while still in Puerto Rico after the storm?
- What do you think Vanessa is feeling now that she's on her way to the mainland?
- What were the reasons for her to leave Puerto Rico?
- What do you think lies ahead for Vanessa and her family?

## 6. George's Story

"Only time will tell how many will return or stay, said George Siberón, 70, a Baldwin, NY, resident and community activist.

George brought his mother, Antonia, 89, and his stepdad, Julio, 88, from Hatillo on Puerto Rico's northern coast to live in Brooklyn. His daughter is considering moving with her husband and two kids from Bayamón, a municipality in the northern coastal valley, to Orlando, he said.

"There was an exodus from Puerto Rico to begin with" because of the struggling economy, Siberón said. "When you don't have electricity and you don't have work and you don't have a job that's necessarily waiting, and the infrastructure is completely devastated, there's a very strong sense that it's going to take years to get some normalcy."

(Adapted from a story in [Newsday](#), 10/8/17)

### Questions

- What might George Siberón have been feeling while his mother and stepfather were still in Puerto Rico?
- What do you think George is feeling now that his parents are in New York? What do you think his parents might be feeling?
- What were the reasons for her to leave Puerto Rico?
- What do you think lies ahead for George and his parents?

[Lesson index](#)



# After the storms, a look at 'climate injustice'

By [Mimi Bluestone](#)

This lesson has students look at the devastating impact of Hurricane Maria on Puerto Rico, and consider how around the world, people with the fewest resources are most at risk from climate change. (10/10/17)



Photo: <https://www.flickr.com/photos/rooseveltskerrit/37372729655>

## Gathering

- What do you know about the role of fossil fuels in causing climate change?
- What do you know about the contributions of climate change to the severity of hurricanes and other extreme weather?
- What examples of extreme weather are you most familiar with?

## Reading 1: Inequality and climate change

The images are haunting. Demolished houses. Cars and trucks plowing through streets that look like rivers. Men and women, children in their arms, standing waist-deep in filthy floodwaters.

Most Americans have seen the damage that hurricanes Harvey, Irma, and Maria poured down on Texas, Florida, and Puerto Rico (among other places), leaving scores of people dead and millions flooded. But these were not the only places hit by terrible storms in late summer and early fall of 2017. At the end of August, similar scenes played out in south Asia, with far deadlier effects. Floods across Bangladesh, India, and Nepal killed 1,200 people. In Bangladesh alone, floods affected more than 7.4 million people and destroyed or damaged nearly 700,000 homes.

All of these stories have something in common. The world's climate is changing, and weather is more extreme than it was a century ago. But the effects of these changes are falling most heavily on those who have the least, and who have done the least to cause the problem.

"No nation will be immune to the impacts of climate change," the [World Bank](#) warned in 2012. "However, the distribution of impacts is likely to be inherently unequal and tilted against many of the world's poorest regions, which have the least economic, institutional, scientific, and technical capacity to cope and adapt."

Within any country, those with the fewest resources will be hurt the most. But the effects vary greatly between countries, and some already are suffering more than others. Geography is one reason. The world's poorer regions tend to be closer to the equator, where changing weather patterns have led to desertification (the expansion of deserts) and more intense storms. More extreme weather means that farmers in parts of [Africa and Asia](#) have been unable to cultivate their land. The extreme drought that shriveled the crops on so many [Syrian](#) farms between 2006 and 2009 pushed thousands of farmers off their land and into cities, aggravating that country's political crisis and war.

Poorer countries lack richer nations' resources for adapting to rising seas and hotter temperatures. Richer countries and individuals can build stronger homes, develop evacuation plans, and marshal first responders after a hurricane or typhoon. "When it comes to such disasters, money matters," wrote Annie Lowrey in [The New York Times](#).

For some countries, climate change could literally mean doom. "To visit the Maldives is to witness the slow death of a nation," a [BBC](#) reporter wrote in 2004. About 80% of the

Pacific nation's 1,200 islands are no more than 1 meter (about a yard) above sea level. Given the rate at which ice caps are melting and seas are rising, scientists say the Maldives could be uninhabitable by the end of the century. To dramatize what would happen to Maldives' 360,000 residents if climate change continues unchecked, the country's president staged an underwater [cabinet meeting](#) in 2009.

The great irony is that the people who did the least to cause climate change are the ones who will endure its greatest devastation. Global-scale, human-induced climate change began with the Industrial Revolution of the late 18th and early 19th centuries. That's when factory owners in western Europe and the United States first burned coal to power large-scale manufacturing technology, when locomotives and steamships began replacing horsepower and wind. With their head start in industrialization, Western Europe and the United States have enjoyed a higher living standard than other parts of the world. In the process, they have burned through a bigger cumulative pile of fossil fuels than other regions, emitting greenhouse gases that have changed the climate for everyone.

"Equality is a big issue," says [Lord Stern](#), one of the world's foremost climate economists. "The rich got rich on high-carbon growth and it's the poor people of the world – whether they be poor people in rich countries or poor people in poor countries – who suffer earliest and most."

The differences in greenhouse gas emissions are startling. According to a study by Oxfam, a global anti-poverty organization, the poorest half of the world's 7 billion people are responsible for about 10% of global emissions arising from individual consumption. The richest 10% of the world's population create 11 times more greenhouse gas emissions than the poorest half. And the richest 10% of people emit 60 times more greenhouse gases than the poorest 10%. The activities of the world's richest 1% generate emissions that are about 175 times that of the poorest 10%.

The international climate agreement forged in Paris at the end of 2015 calls on richer nations to donate funds to help poorer countries adapt to climate change. But there's no "meaningful mechanism" for making that happen, according to Oxfam. Oxfam also found that rich nations fell short on their 2009 pledge to donate \$100 billion a year to help poorer nations adapt. Only \$16 billion has been paid, Oxfam reports – far short of the \$500 billion a year that poorer countries may need, according to the [United Nations](#).

### For discussion

1. How much of the material in this reading was new to you, and how much was familiar?
2. Why are the effects of climate change so unequally distributed, both around the world and within countries?
3. What parts of the world have contributed the most to climate change, and how?
4. If the countries that did the most to cause climate change are suffering the least, how should they behave toward the countries that are most severely affected?

### Reading 2:

#### Vulnerability, recovery, philanthropy

Why are some places more resilient than others in the face of disaster? When calamity strikes, what do governments and individuals owe to those in need? Should it matter how close to home the needy are? These are some of the questions that arise from the rapid succession of three powerful hurricanes within a single month.

Hurricane Harvey struck Houston on August 25, 2017, followed by Irma, which made landfall in Florida and other southeastern states on September 10. Irma also skirted Puerto Rico before moving to the mainland. But while Puerto Rico dodged the center of the hurricane, Irma still knocked out nearly 70% of the U.S. commonwealth's fragile electrical system. Ten days later, Maria's 100-mile-per-hour winds dealt the island a direct hit, and all but 5% of the island was without power.

All three hurricanes brought death and destruction. But Puerto Rico's weaker economy and infrastructure made the island more vulnerable than the mainland areas affected by this season's storms. [Nearly half](#) of the island's 3.4 million people live below the poverty line, compared with an official poverty rate of [13.5%](#) for the United States as a whole in 2015. Puerto Rico has been in recession for 11 years, and its government is [\\$74 billion](#) in debt. ([Many argue](#) that U.S. policies helped lead to Puerto Rico's impoverishment.)

It's hard to compare the damage caused by the three hurricanes because the extent of Puerto Rico's losses can't yet be calculated. Harvey killed 75 people and Irma another

69. Two weeks after Maria, the official death count was 36, but no one knew the real toll because so much of the island's [communications system](#) was still not working. There was limited fuel to get vehicles across the mountainous terrain, slowing the distribution of food, water, and other supplies. About three-quarters of the hospitals were still using emergency generators, and at least one hospital reported indoor temperatures above 110 degrees. Ten days after the storm, [more than half](#) of the territory still lacked access to clean drinking water.

Aid has also been delayed by the Jones Act, a law that only allows U.S.-owned ships to carry goods between Puerto Rico and other U.S. ports. Eight days after Maria hit Puerto Rico, the Trump administration lifted the requirement for a 10-day period, but containers full of supplies sat in the harbor because trucks and drivers could not reach the ports.

Despite Puerto Rico's extreme need, donors have been slower to open their wallets following Maria than they were after Harvey and Irma. As of October 4, 2017, combined donations and pledges to the Red Cross and Catholic Charities for Harvey recovery had surpassed \$350 million; for Irma, the number was \$47 million. Just [\\$2 million](#) had trickled in by then for Maria, a number that was probably kept down by the news of a mass shooting in Las Vegas that swept aside news about Puerto Rico.

One reason for the gap in giving may be the incorrect perception on the part of many Americans that Puerto Rico is a separate nation. Puerto Rico's 3.4 million people are, in fact, U.S. citizens. But *The New York Times* reported that a poll by [Morning Consult](#) found that only 54 percent of respondents knew that Puerto Rico is part of the United States.

Should shared citizenship be part of the criteria for giving?

"I find the notion that we need to give more because people are Americans a bit uncomfortable, simply because we have a tradition of giving all over the world when things happen, like earthquakes in Mexico and tsunamis in Asia," Stacy Palmer, the editor of *The Chronicle of Philanthropy*, told [USA Today](#). "There may be some lack of understanding about Puerto Rico being part of the U.S., but mainly the factors have to do with being a third disaster that is now battling with the Las Vegas shooting for our giving."

## For discussion

1. Why was Puerto Rico so vulnerable when Hurricane Maria struck the island?
2. Why has aid been slow to reach so many of Puerto Rico's people?
3. Do you know anyone who has been affected by this season's hurricanes? Do you know anyone who has tried to offer help in any way, by gathering supplies, raising money, or volunteering in recovery efforts?
4. Why have donors given less for recovery from Maria than for recovery from the earlier hurricanes that hit Texas and Florida? How do you feel about the different levels of aid for the different hurricane recovery efforts?
5. In offering aid, should people and governments consider the nationalities of those in need before deciding whether and how much to give? Or should aid be based on where the need is greatest?

## Extension activities

### A. Research countries' vulnerability to climate change

As homework, break students into small groups. Either assign each group a country or ask students to decide on a country they will research. (You might direct students to this [map](#), which shows the risks of climate change to countries around the world.)

Ask each group to research the answers to these questions about the country they have selected:

1. What is the most serious threat that climate change poses for this country? Cite three pieces of evidence to support your view that this is the most important threat for this region.
2. What strategies is this country using to adapt to climate change and to the major threat you have identified?
3. Has this country been a major contributor to greenhouse gases?

In the next class, ask students to discuss their findings with other members of their group and prepare to report their findings to the class.

As students report on their country, you might point out the countries they're discussing on [this map from the World Bank](#), which includes the per capita income for each country. Note that in general, people in countries that contributed the least to climate change have the lowest incomes – and the fewest resources to respond to climate change.

Finally, have students explore, either in small groups or all together, how their countries might move toward renewable energy. [The Solutions Project has developed a model](#) for 100% renewable energy for every country and state.

## **B. Take Action**

If students are interested, support them in finding ways to help people in the country they have researched address climate change challenges. Students might begin by identifying organizations in these countries that are doing this work.

Alternatively, have students explore how their own state or community could 1) become more resilient to climate change or 2) move toward 100% renewable energy. Help students identify organizations in your area that are working toward these goals, and decide on how students could get involved.

[Lesson index](#)

# Hurricane Harvey: A Natural and Human-made Disaster

By [Mimi Bluestone](#)

After an initial gathering, students read about and discuss the human and natural context for Harvey's devastation. An extension activity has students research local climate change threats and consider how to address them. (9/4/17)



*Photo: Houston, Aug. 27, 2017, by Texas Army National Guard Lt. Zachary West.*

## To the Teacher

The three most devastating storms to hit the United States have all occurred within the past 12 years: Katrina in New Orleans in 2005, Sandy in New York and New Jersey in 2012, and now Harvey, which hit Houston at the end of August 2017. Although more lives were lost to Katrina, the economic costs of recovering from Harvey will probably

be higher than those of Katrina or Sandy, and the economic impact for the nation as a whole is also likely to be greater.

While hurricanes are a fact of life in the Gulf of Mexico, a combination of factors contributed to Harvey's destructiveness. The first set of factors is the result of climate change: rising temperatures and rising seas have exacerbated storms' effects, leading to bigger storm surges and heavier rainfall. A second set of factors has to do with the Houston area's rapid and unrestricted development. Developers have covered over wetlands and prairies that, in the past, had absorbed heavy rains.

This lesson includes an initial gathering to debrief what students already know and feel about the destruction caused by Harvey, followed by two readings intended to help students understand the human and natural context for Harvey's devastation. Questions for discussion follow each reading. An extension activity has students research local climate change threats and consider how to address them.

### Gathering

- What do you know about Hurricane Harvey?
- What images, stories, facts stand out most for you?
- How did you feel as you saw scenes from the hurricane in the media?
- Why do you think this hurricane was so damaging?

### Reading 1: Hurricane Harvey's deadly impact

Scientists had warned it was only a matter of time before a catastrophic storm would hit Houston. They predicted that the combination of rising seas, warmer temperatures, a lack of urban planning, and the city's geography left this fourth-largest U.S. metropolis **highly vulnerable** to devastating flooding.

In August 2017, what scientists foretold came to pass. Hurricane Harvey poured a record-breaking **50 inches of rain** on areas of Harris County, home to Houston. The storm killed dozens of people and damaged **100,000 homes**. Texas Governor **Greg Abbott** predicted that the cost of rebuilding could be as high as \$150 to \$180 billion.

The storm's impact is rippling far beyond Texas. The Houston ship channel is one of the world's busiest shipping passages, and the Gulf region of Texas contributes nearly half of U.S. gasoline and petrochemical production. The storm damaged the oil refineries that line the shipping channel, causing average **gasoline prices to rise** nationwide just

ahead of the Labor Day holiday. Harvey also knocked out half of the U.S. capacity for making [ethylene](#), a basic ingredient in everything from phones and milk jugs to medical devices, shoes, and clothing.

Many oil and chemical companies have long refused to disclose details about the more dangerous materials stored in their plants. What is clear is that a lot of those plants seeped petroleum and chemicals into waterways during and after Harvey. Even before the worst of the storm had hit, the Coast Guard, which collects information about such leaks, had logged reports of [750 gallons of chemicals](#) spilled into the Gulf of Mexico.

More dramatically, volatile chemicals at a plant operated by the Arkema company began to explode when the plant's electric system and backup systems all failed and the company's refrigeration system went down. The flooded areas also include [13 Superfund sites](#), places the federal government has designated as dangerously contaminated and in need of major cleanup. It will probably be [months](#) before scientists are able to evaluate the impact of the storm on these sites.

Major storms are nothing new for Houston. The city's growth dates to 1900, when a category 4 hurricane demolished the nearby port city of Galveston, killing at least 6,000 people and convincing many survivors to relocate further inland to Houston. Hurricane Ike – until now the nation's third costliest after Katrina and Superstorm Sandy – killed 74 people and caused \$30 billion in damage before it shifted course away from Houston in 2008. Other lethal storms followed in 2001, 2015 and 2016.

Scientists say that the frequency and intensity of storms is rising because the climate is changing. "Climate change doesn't cause extreme events," write Katharine Mach and Miyuko Hino of Stanford University in [The New York Times](#). "It amplifies them."

As the earth's average temperatures rise, both sea and air temperatures are hotter than in the past. Hurricanes typically lose force as they come closer to land. But the storms feed off hotter air and water, so instead of diminishing, Harvey's wind speeds rose during the final 24 hours before it hit the coast.

At the same time, global sea level has [risen eight inches](#) since 1880, and water is rising much faster on the East Coast and the Gulf of Mexico. Add higher sea levels to faster wind speeds, and the upshot is [storm surges](#) that are higher and more powerful than those seen in the past.

Harvey's unprecedented rainfall is also a result of a changing climate. Warmer air holds more water, and rainfall in the mid-latitudes is rising worldwide. While Harvey devastated Texas, monsoons on the other side of the world in India killed more than 1,000 people and displaced millions.

Climate change alone can increase rainfall 5 to 10 percent, and it can cause rainfall to increase by as much as 20 percent if ocean temperatures are higher than usual,

according to [Kevin Trenberth](#), a senior scientist at National Center for Atmospheric Research in Colorado.

No one knows exactly when or where the next monster storm will hit, but it's clear that weather patterns are changing. "Unprecedented is increasingly the norm," write Mach and Hino.

**For discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. What do you think will be the most difficult part of recovering from the storm, and why?
3. Why do scientists say that climate change is making storms more powerful?
4. How are higher temperatures and more extreme weather affecting your region?

## Reading 2: Development and Devastation

Why wasn't Houston better prepared for a foreseeable crisis? "We're sitting ducks," is what Phil Bedient, engineering professor at Rice University in Houston, told reporters in March, 2016.

It didn't have to be that way, Bedient told the *New York Times* after Harvey rained devastation on the Houston area. But high-speed growth in an area famous for flooding meant that all that water had nowhere to go.

Read this excerpt from a New York Times article by Richard Fausset, Manny Fernandez, entitled [A Storm Forces Houston, the Limitless City, to Consider Its Limits](#) (September 2, 2017).

Though its breakneck development culture and lax regulatory environment have been lauded for giving working people affordable housing — and thus a shot at the American dream — many experts and residents say that the developers' encroachment into the

wetlands and prairies that used to serve Houston as natural sponges has inevitably exacerbated the misery that the city is suffering today.

"There could have been ways to have more green space and more green infrastructure over the years, and it just didn't work that way, because it was fast and furious," said Phil Bedient, a civil and environmental engineering professor at Rice University. Many developments were not built with enough open land or enough detention areas to take in floodwaters, Dr. Bedient said. "It's been known for years how to do it," he said, "it just costs the developers more money to do it that way."

Greater Houston has always been a precarious place for a boomtown. It sprawls across a flat coastal plain, crisscrossed by slow-moving bayous, with clay soils that do not easily absorb water. The average annual rainfall is 48 inches.

The city grew rapidly in the postwar years, and in an effort to control storm water and direct the runoff to the Gulf of Mexico, two key bayous through the city were channelized — essentially converted to concrete culverts — while a third was widened, Dr. Bedient said. A network of channels — 1,500 of them, today totaling 2,500 miles — were built to move storm runoff out of neighborhoods and down to the sea.

But in the end, they may have provided a false sense of security. "And so the building just went rampant, and there weren't many controls," Dr. Bedient said. "We had no zoning. It was like the Wild West, and you just built housing subdivision after housing subdivision up close to the bayous, up close to the channels."

By the 1980s, Dr. Bedient said, officials came to realize that the system could not handle big rainfalls: the green space that could have absorbed much of the water from a big storm was now paved over with parking lots, houses, churches and malls.

Metropolitan Houston has kept growing. Though the region suffered some tough years after the 1980s oil bust, Harris County, which includes Houston, experienced the highest annual population growth of any county in the United States in eight of the last nine years, [according to census data](#).

Developers both responded to and fueled the boom, often doing what they wanted in Texas' relatively laissez-faire regulatory climate. In 2015, the Houston Chronicle examined a sampling of permits issued to developers, and found that more than half the developers had failed to follow through on Army Corps of Engineers directives meant to mitigate the destruction of wetlands.

Two years ago, Erin Kinney, a research scientist with the nonprofit Houston Advanced Research Center, wrote that 65 square miles of freshwater wetlands had been lost in the Houston-Galveston Bay region, largely because of development and sinking land, and that 30 percent of Harris County was covered with impervious surfaces like roads, parking lots and roofs.

If the region begins to put stricter regulations on building, there is a chance that one of Houston's great lures — affordable housing — may disappear. This is a concern for Joel Kotkin, the urban theorist and author who has been a great champion of Houston's lax regulation policies.

"If you put the kind of super-strict planning shackles on Houston, that would be the way to kill it," he said. "Why would you live in a hot, humid, flat space if it was expensive?"

Like many others, he was quick to praise Houston's energy and optimism, and said the city would recover. The Texas author Larry McMurtry, a former Houston resident, agreed.

"Houston will accept anybody who's got hustle — it respects energy more than any place," he said. "Houston is a very resilient city, and it will overcome."

The Trump administration asked Congress for an initial \$7.85 billion for recovery efforts in Houston, an amount that Texas Governor Greg Abbott called a "down payment" on the federal aid that will ultimately be needed.

In 2015, the Obama administration passed new rules requiring that developers who receive federal rebuilding dollars after a disaster must build in ways that take climate change into account (such as raising the elevation of buildings in flood-prone areas). But on August 15, 2017, President Trump [reversed](#) that measure, which he described as burdensome.

However, those burdensome rules might not only prevent future loss and heartache, but save money. According to a report by the [Pew Charitable Trusts](#), every dollar invested in reducing the impact of disasters like Harvey saves \$4 in relief and rebuilding costs.

### **For Discussion:**

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. How has unrestricted growth in the Houston area affected the severity of damage from hurricanes and other storms?
3. Many people argue that a region benefits economically when homeowners and developers are allowed to build wherever they want. Should state and local governments restrict this kind of development? Why or why not?

4. Do you think the federal government should require that rebuilding be done in ways that reduce Houston's vulnerability to future storms? If so, what might those requirements be?
5. How vulnerable are homes, farms, businesses, and wildlife in your area to climate-related disasters such as flooding, drought, wildfires, and heat waves? How prepared is your area to withstand these threats?

## Extension Activities

### A. Research your community's climate change threats

As homework, ask students to research this question:

What is the most urgent climate change-related threat facing your community? Cite three pieces of evidence to support your view that this is the most urgent threat.

The [Union of Concerned Scientists website](#) includes information about the range of climate change impacts that may be helpful. Also see information on the [Alliance for Climate Education](#) website about effects of climate change in different regions — and ideas about [actions](#) students can take.

In the next class, have students present their ideas and arguments. Work with the group to come up with what you believe is the most urgent climate change-related threat in your area.

Next, break students into four small groups. Ask each group to research, in class or as homework, a different question related to the threat you have identified.

Group 1: What is the history of this threat in our community, and what can we learn from that history?

Group 2: What policy shortcomings (such as development and zoning policies, regulations, or environmental policies) may have contributed to the problem?

Group 3: What groups in your community are working on climate issues and on improving the resiliency of your community to climate change? What proposals have been put forward to address the threat?

Group 4: What have other cities, regions or nations done to address a similar threat to the one your community is facing? What can we learn from their experiences?

## B. Take Action

Ask each group to present its findings, and facilitate a discussion to help the class decide on one or more needed reforms or actions your community should take to address the threat.

Help the class plan a project to raise awareness or press for action on the threat.

[Lesson index](#)

# Flint Water Crisis: Environmental Racism at Work?

By [Mark Engler](#)

What is environmental racism? And is the poisoning of people in Flint, Michigan, an example of it? Students explore these questions in two readings, with discussion questions and an extension activity. (2/27/16)



Photo: <https://unsplash.com/photos/vDQ-e3RtaoE>

## To the Teacher:

In 2016, a state of emergency was declared for the city of Flint, Michigan, because of alarmingly high levels of lead in the city's water. Currently, more than 100,000 people do not have access to safe drinking water in this struggling city. Studies have shown that a substantial percentage of children in the city have elevated levels of lead in their blood, which represents a serious public health crisis.

The disaster in Flint has opened up a debate about what is known as "environmental racism." This term is used to describe the way communities of color are

disproportionately impacted by pollution and environmental disasters. For some, the situation in Flint is a prime example of environmental racism and discrimination. The majority of the city's residents are African-American, and almost half live in poverty.

This lesson consists of two readings designed to encourage discussion about the situation in Flint and to introduce students to the concept of environmental racism. The first reading describes the concept of environmental racism and explains why it provides a useful lens for making sense of many environmental problems. The second reading discusses how this concept applies to the crisis in Flint. Questions for discussion follow each reading.

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## Reading 1

### What is "Environmental Racism"?

"Environmental racism" is a term used to describe how communities of color are unfairly impacted by pollution and environmental disasters. It refers to "the disproportionate exposure of Blacks to polluted air, water and soil," writes [New York Times](#) reporter John Eligon. "It is considered the result of poverty and segregation that has relegated many Blacks and other racial minorities to some of the most industrialized or dilapidated environments."

First coined in the 1980s, "environmental racism" remains a useful way to talk about how exposure to pollution and environmental hazards varies according to a person's race, economic status, and political power. The concept is also useful in discussing the impact of climate change, which tends to disproportionately affect people of color and low-income communities around the world.

In his *New York Times* article, Eligon provides some concrete examples of environmental racism:

Many [civil rights] advocates assert that environmental racism is a major reason Black people in Louisiana's factory-laden "Cancer Alley" contract the disease at higher rates, or why the most polluted zip code in Michigan is in a southwest pocket of Detroit that is 84 percent Black.

Many also say that environmental racism left Blacks confined to the most flood-prone parts of New Orleans, and that the government was slow to respond to the agonies immediately after Hurricane Katrina. President George W. Bush staunchly rejected that assertion.

Environmental decisions are often related to political power. In some cities, garbage incinerators have been built in African-American neighborhoods that do not have the political clout to block them.

Recent scientific research confirms the existence of racial disparities in exposure to environmental risk. In an April 17, 2014, article for [ThinkProgress.org](http://ThinkProgress.org), reporter Carmiah Townes discussed a University of Minnesota study that revealed a strong connection between race and the effects of air pollution:

A study produced by the University of Minnesota concluded that race is a determining factor in who is most affected by air pollution. Specifically, non-white people breathe air that is substantially more polluted than the air that white people breathe.

According to Julian Marshall, who led the University's research, race outweighed income in regards to who is most affected by poor air quality. When low-income white people were compared to high-income Hispanic people, the latter group experienced higher levels of nitrogen dioxide. Altogether, people of color in the U.S. breathe air with 38 percent more nitrogen dioxide in it than their white counterparts, particularly due to power plants and exhaust from vehicles.

"We were quite surprised to find such a large disparity between whites and nonwhites related to air pollution," Marshall told the Minnesota Post. "Especially the fact that this difference is throughout the U.S., even in cities and states in the Midwest."

Other evidence has also pointed to disproportionately high levels of air pollution in low-income and non-white communities. A 2012 study conducted by Yale University researchers revealed that "potentially dangerous compounds such as vanadium, nitrates and zinc" exist in locations with high concentrations of people of color, including African-Americans, Hispanics, and Asians....

Dirty air is linked to asthma, kidney damage, heart disease, and cancer. Drawing on data from 2009 to 2011, State of the Air concluded that 42 percent of people living in the U.S., alone, reside in areas with "pollution levels [that] are too often dangerous to breath."

Activists around the country are organizing against environmental racism and for "environmental justice." The [Environmental Protection Agency](http://EnvironmentalProtectionAgency) defines environmental justice as

...the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation,

and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

For many years, people of color and the poor have suffered far more than other populations from the degradation of our environment. Thanks to the work of environmental justice advocates, the concept of environmental racism has given people a way to talk about this phenomenon and has motivated them to fight back against it.

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### For Discussion

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read?
2. According to the reading, what is environmental racism?
3. When we talk about environmentalism, many people think about forest and wilderness areas rather than densely populated cities. How does the concept of environmental racism help us to redefine environmentalism to apply to urban areas?
4. What does environmental racism have to do with climate change?
5. According to the reading, what is the concept of "environmental justice"? Why is this concept important?

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## Reading 2

### Flint Water Crisis: Environmental Racism?

In 2016, officials declared a state of emergency for the city of Flint, Michigan, because of alarmingly high levels of lead in the city's water. Currently, more than 100,000 people in Flint do not have access to safe drinking water.

Although the issue has only gained significant media attention in recent months, the water crisis in Flint has been going on for nearly two years. In April 2014, a state-appointed emergency manager tried to cut costs by switching the city's drinking water from the Detroit water system to the Flint River—the former dumping ground of General Motors, which had auto plants in Flint. A study released in September 2015 revealed that since the time when the water source was switched, the percentage of children

under age five in Flint with elevated levels of lead in their blood has nearly doubled. This was because the corrosive, polluted water from the Flint River caused lead to leach from the city's old pipes. This leaching could have been avoided if the water had been treated.

In a January 20, 2016, article for the [New Yorker](#), staff writer Evan Osnos described the widespread indifference and denial among Michigan officials in the face of a mounting crisis:

Last July, after more than a year of public complaints about the drinking water in Flint, Michigan—water so pungent and foamy that a local pastor had stopped using it for baptisms—reporters were calling the state's Department of Environmental Quality. The response from the department was of limited urgency. In an internal e-mail to colleagues, a spokeswoman, Karen Tommasulo, wrote, "Apparently it's going to be a thing now."

The D.E.Q. tried to stop the water from becoming a thing, partly by downplaying concerns. A memo from the U.S. Environmental Protection Agency warned that the city's use of a new water source was exposing the public to unsafe levels of lead, but Brad Wurfel, the department's lead spokesperson, told a reporter, "Let me start here—anyone who is concerned about lead in the drinking water in Flint can relax." Even after a group of Virginia Tech researchers found unsafe levels of lead, Wurfel disputed the importance of the findings because, he wrote, the group "specializes in looking for high lead problems. They pull that rabbit out of that hat everywhere they go." He added that "dire public health advice based on some quick testing could be seen as fanning political flames irresponsibly. Residents of Flint concerned about the health of their community don't need more of that."

As it turns out, the residents of Flint needed much more of that. The state's inept response is now a full-blown national scandal. President Obama has declared an emergency in Flint, making available five million dollars in federal assistance. Much of the blame falls on Governor Rick Snyder, who acknowledged, on Tuesday, that he had run out of excuses. "I am sorry; we will fix this," he said, in his State of the State address. He thanked the whistle-blowers, and promised to seek millions more in state funds for bottled water, health care, and infrastructure fixes. Facing calls for his resignation, he told the people of Flint and elsewhere, "You deserve accountability. You deserve to know that the buck stops here, with me. Most of all, you deserve to know the truth."

Governor Snyder, a Republican, has nevertheless denied that the water crisis in Flint, a predominantly Black and poor city, is an instance of environmental racism. As Scott Bixby reported in a January 22, 2016, article for the [Guardian](#):

Michigan's embattled governor, Rick Snyder, declared on Friday morning that despite assertions to the contrary, the Flint water crisis is "absolutely not" a case of environmental racism.

In an interview on MSNBC's Morning Joe, the Republican governor acknowledged "major failures" on the part of the state's government in addressing the lead contamination that has poisoned thousands of residents of Flint, Michigan, but strongly resisted charges that racism was one of those failures.

"I've made a focused effort since before I started in office to say we need to work hard to help people that have the greatest need," Snyder said. "This was a terrible tragedy. These people work for me. And that's why it was important to accept responsibility, and my focus is on fixing this problem."

For many observers, however, Governor Snyder's characterization of the situation as simply a bureaucratic problem does not add up. Despite overwhelming evidence of a serious problem, state officials took no action while the residents of Flint were poisoned. Skeptics have asked, "Could this have happened in an affluent white suburb?" As journalist Jaimee Smith argued in a January 24, 2016, article for [theGrio.com](http://theGrio.com), the crisis in Flint fits into a broad, nationwide pattern of systemic neglect for the health and safety of people of color and the poor:

The water crisis in Flint, Michigan is more than just a natural disaster or a series of unfortunate, environmental events—it is an inexcusable, egregious human and health rights violation against a majority Black city, where 56 percent of the population is African-American....

Unfortunately, Flint is not the only city where African-Americans and people of color are suffering from the onslaught of environmental racism and discrimination. Detroit schools are so heavily infested with rats, roaches and mold that more than 85 schools closed on Wednesday, as teachers staged a sickout in protest to the deplorable conditions. In Baltimore, the levels of lead poisoning among children is three times the national rate. Before Freddie Gray became a victim of racialized state violence in Baltimore, he too was a victim of lead poisoning as a young child; tests showed that his blood lead levels were as high as seven times the reference level given by the Centers for Disease Control.

Based on such evidence, advocates of environmental justice conclude that if future cases of environmental racism are to be prevented it will require community members coming together to demand change.

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## For Discussion

1. How much of the material in this reading was new to you, and how much was already familiar? Do you have any questions about what you read
2. Governor Rick Snyder does not see the Flint crisis as a case of environmental racism. What is his position?
3. How do advocates of environmental justice respond? Why do they see environmental racism at work in this instance?
4. If officials are working to address the crisis in Flint, does it matter whether we call it "environmental racism"? Why or why not?
5. Do you think that understanding the concepts of environmental racism and environmental justice make it more likely that we can prevent crises like that in Flint in the future?

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## Extension Activity

Assign students to research charges of environmental racism in their community or region. Ask them to come to the next class with a brief description of the concern, and a list of what groups, if any, are working to address it.

When the class reconvenes, ask students to share what they've learned. Guide the class in selecting one of the charges of environmental racism to research. Help them develop research questions and a strategy for answering those questions. This might include interviewing activists who are organizing on the issue. Once students have completed their research, encourage them to publicize their findings.

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