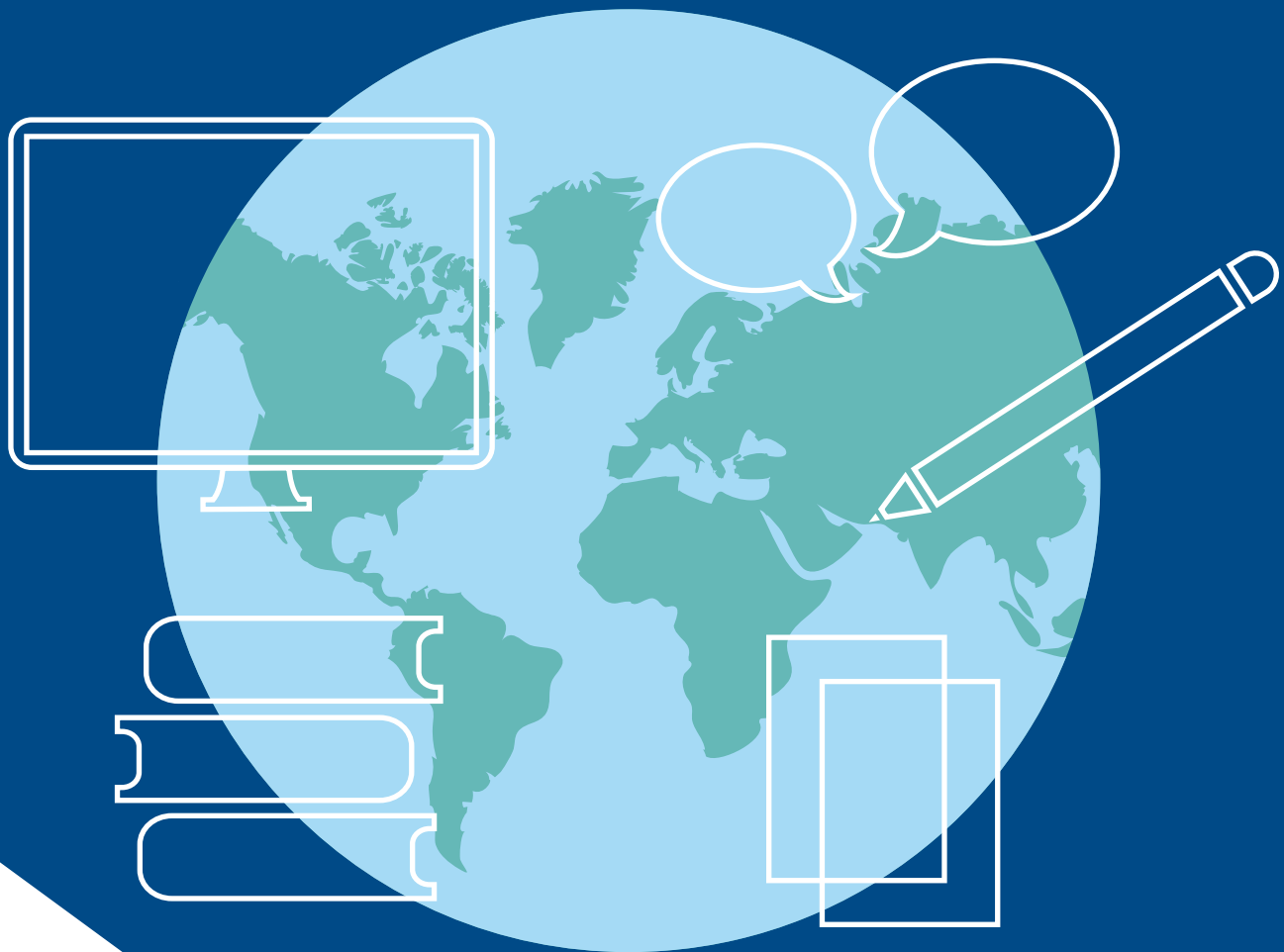


Build THE Change

EXPANDING CLIMATE CHANGE EDUCATION: INCORPORATING CLIMATE CHANGE INTO A VARIETY OF SUBJECTS & SETTINGS



Build the Change is a partnership between First Book and the LEGO Group that provides resources for educators about climate change, biodiversity, sustainability, and human impact with the goal of empowering students to envision and work toward a future without waste.

Key Terms

CLIMATE CHANGE

the long-term shifts in temperature and weather that are caused by human activity, particularly the burning of fossil fuels.

BIODIVERSITY

the variety of life in a habitat or ecosystem. Ecosystems that have more species are healthier and more productive and offer many benefits for people and the Earth. Climate change threatens biodiversity.

SUSTAINABILITY

the idea that humans should use resources in a way that ensures they will be available for future generations.

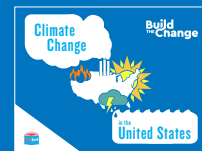
HUMAN IMPACT

the effects, both positive and negative, that human activity has on the Earth and its ecosystems.



Other resources in the Build the Change series include:

For hands-on activities to teach students about climate change and biodiversity, use the LEGO Group's Biodiversity and Climate Change Course Pack to support students in designing their own real-world solutions. First Book's Climate Change in the United States provides additional activities and explores how climate change is affecting each U.S. region and state in different ways.



The LEGO Group's Future Without Waste Course Pack encourages students to dream of and work toward a future where people and the planet exist in harmony. This resource includes lessons about circular economy, reuse, recycling, and pollution. First Book's accompanying educator guide offers additional activities and a recycling tip sheet that can be shared with families.

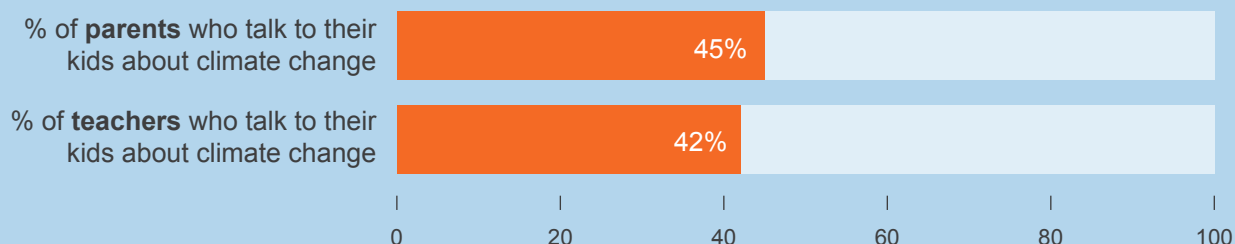


The LEGO Group's Human Impact Course Pack introduces students to the concepts of endangerment and extinction, provides examples of positive and negative impacts, and offers case studies of birds under threat from human activity around the world. First Book's Human Impact Activity Guide provides digital literacy activities, lessons, and links to relevant standards.



A study from NPR/Ipsos (2019) found that more than 8 in 10 teachers and parents support teaching kids about climate change, yet fewer than half of the K-12 educators and parents who participated in the poll actually talk about climate change with their students and children.

Taking Responsibility For Teaching Climate Change



Source: NPR/Ipsos polls of 1,007 U.S. adults conducted March 21-22 and 505 teachers conducted March 21-29. The credibility interval for teachers is 5 percentage points; for parents, 7.3 percentage point. Credit: Alyson Hurt/NPR

Source: Climate Change Is a Thing. You Should Teach It, Science Teachers Group Says | edweek.org

Many states have standards related to human-caused climate change, and as of March 2023, twenty states* have adopted the Next Generation Science Standards, which include sections about Biodiversity and Humans and Human Impacts on Earth Systems. Traditionally, climate change has mostly been taught in Earth science classes in middle and high school, and the top reason educators give for not teaching about climate change is that it is not related to the subjects they teach.

*Arkansas, California, Connecticut, Delaware, Hawaii, Illinois, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Nevada, New Hampshire, New Jersey, New Mexico, Oregon, Rhode Island, Vermont, and Washington

This trend is beginning to change, and in 2020, New Jersey became the first state to pass educational standards requiring that climate change be taught across all grades (K-12) and in nearly every subject, including social studies, physical education, and art. Connecticut recently passed similar climate change education standards that took effect in July 2023. California has introduced a bill that would modify “the course of study for science in grades K-12 to include content regarding causes and effects of, and methods to mitigate and adapt to, climate change” no later than the 2023-2025 school year. Similarly, New York has introduced a bill that would require climate change to be taught in all grades in history, social studies, science, health, and math.

To support educators in meeting national and state standards and incorporating climate change into a variety of educational subjects and settings, First Book created this guide for educators of students in grades 2 through 6 with lessons, standards alignment, and more.

Sources: [Tips For Teaching Your Students About Climate Change And Global Warming | NPR](#), [Teaching Climate Change in Every Subject | Edutopia](#) & [Climate Change Is a Thing. You Should Teach It, Science Teachers Group Says | edweek.org](#)

This guide provides examples of how to incorporate the topic of climate change into a variety of subjects and settings, including:

English Language Arts

Social Studies

Digital & Media Literacy

Math

Art

Social Emotional Learning

Service Clubs & Projects

Relatable Media Content
& Popular Culture

ENGLISH LANGUAGE ARTS

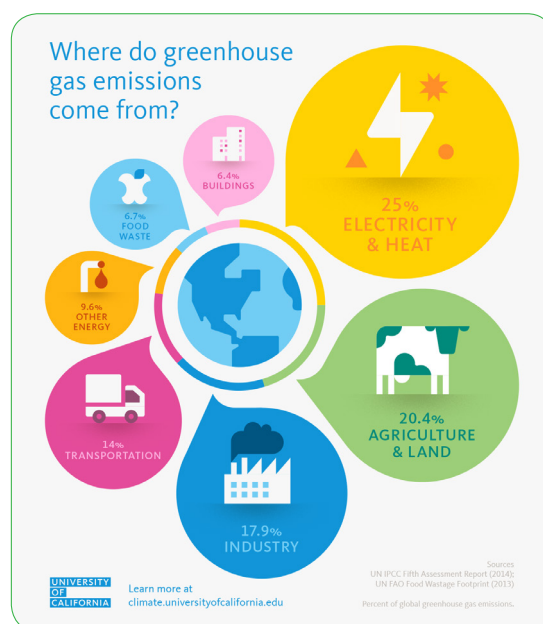
Although science, technology, engineering and math (STEM) courses are the most established options for climate change education, there are many ways to have students develop their reading and writing abilities while considering the impact of climate change on our world and future. Below are ideas about how to include climate change and other environmental topics in **narrative and expository writing assignments, poetry lessons, and independent reading selections.**

Narrative Writing

Climate fiction (Cli-fi) is a genre of fiction that incorporates elements of climate change into stories that take place in the future or in fictional worlds. As a creative writing assignment, have students write a short story that takes place on Earth sometime in the future or in a fictional world. Their stories should describe how climate change has impacted the population in a variety of significant ways. Ask students to address what caused the change (including accurate scientific explanations when possible); how humans and other species are impacted; how have humans and other animals have adapted (or not) to their new environment and climate; and what measures are being taken (if any) to reduce or prevent further changes to the climate.

To add an **infographic** component to this assignment, ask students to incorporate data from charts and infographics related to climate change, such as:

- [Where do greenhouse gas emissions come from? | University of California](#)
- [A Degree of Concern: Why Global Temperatures Matter – Climate Change: Vital Signs of the Planet | nasa.gov](#)
- [Climate change in the Coral Triangle | WWF](#)



The Common Core standards about narrative writing include:

- Write narratives to develop real or imagined experiences.
- Establish a situation and introduce a narrator and/or characters.
- Use dialogue and descriptions of actions, thoughts, and feelings.
- Use temporal words and phrases to signal even order.
- Prove a conclusion or sense of closure.

Grade-specific standards are available on the Common Core website: [Grade 2](#), [Grade 3](#), [Grade 4](#), [Grade 5](#), and [Grade 6](#).

Common Core
Standards



Opinion Pieces

Climate change, a complex and urgent issue, is an apt subject for opinion pieces and argumentative writing. Individuals with access to the same scientific data confirming the impact of human activity on climate may have different opinions about strategies, solutions, and priorities.

Assign students an opinion piece about one of the following topics or texts:

- Should schools teach about climate change?
- Should the government restrict the amount of meat people can eat to reduce the emissions of greenhouse gasses?
- Should the responsibility for climate change rest mostly with the countries who produce the most greenhouse gasses?
- Should travel be restricted to reduce the impact of flight travel on the environment?
- What can individuals do to prevent or reduce the impact of climate change?
- Are companies a cause of climate change or a solution to it?
- Should maintaining biodiversity be a priority?
- Should we try to save all species that are endangered because of climate change?

Common Core Standards



The Common Core standards about opinion pieces include:

- Write opinion pieces on topics or texts, supporting a point of view with reasons and information.
- Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.
- Provide logically ordered reasons that are supported by facts and details.
- Link opinion and reasons using words, phrases, and clauses.
- Provide a concluding statement or section related to the opinion presented.

Grade-specific standards are available on the Common Core website: [Grade 2](#), [Grade 3](#), [Grade 4](#), [Grade 5](#) & [Grade 6](#).

Informational texts about climate change can be used for reading practice and assessment. These articles from CommonLit offer translations, annotation tools, guiding questions, and discussion questions.

- [Ecosystems Feel the Heat from Climate Change by Jacqueline Pratt-Tuke](#) (Grade 5)
- [Climate change has finally caught up to this Alaska village](#) (Grade 6)
- [These teens have some ideas for stopping climate change](#) (Grade 7)



Photo by
Li-An Lim
on Unsplash

Poetry

Poetry is a form of writing that encourages empathy and helps students process their feelings about complex topics. Students can use poetry to explore big issues like climate change and express their feelings about an uncertain future.

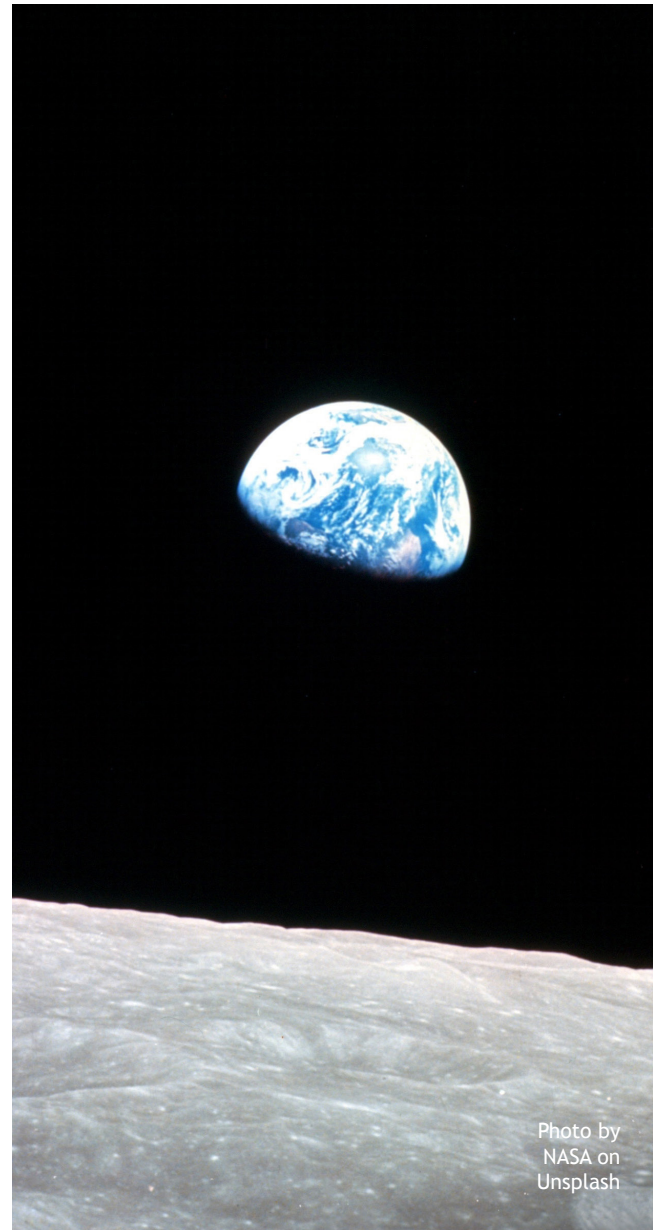
These robust, easy-to-implement lessons for sixth graders (adaptable for older and younger students) combine poetry and environmental issues and include information about prerequisite knowledge (e.g., alliteration), differentiation options, and links to Common Core Standards.

Letter to Earth: Poetry for Climate Change

This lesson teaches students how poetry can be used to talk about climate justice. After listening to the poem “Dear Matafele Peinam” by Kathy Jetñil-Kijner, students will investigate how climate change is affecting communities and people around the world and then create a piece of poetry about an aspect of climate change.

“Earthrise” by Amanda Gorman

This lesson — a perfect ELA Earth Day activity — asks students to analyze Amanda Gorman’s poem “Earthrise” and then write their own poem, drawing inspiration from Gorman’s ode to the planet.



The Common Core standards about poetry include:

- Understand the parts (e.g., lines and stanzas) and structural elements (e.g., verse, rhythm, and meter) of a poem.
- Determine the theme of a poem.
- Explain how a speaker in a poem reflects on a topic.
- Compare and contrast the experience of reading a poem to listening to or viewing an audio, video, or live version of the text.

Grade-specific standards are available on the Common Core website: [Grade 2](#), [Grade 3](#), [Grade 4](#), [Grade 5](#) & [Grade 6](#).

Common Core
Standards



“

If there is not that connection made between the sciences and the humanities, ... it's very difficult for [the kids] to buy in because they just don't feel it.

Yen-Yen Chiu,
the director of content
creation for the nonprofit
Subject to Climate

“

“In science fiction, we dream. In order to colonize in space, to rebuild our cities, which are so far out of whack, to tackle any number of problems, we must imagine the future, including the new technologies that are required.”

Ray Bradbury.
American author
and screenwriter

Independent Reading

Students are often drawn to stories about animals and the outdoors. Many works of fiction that feature wild animals or focus on the natural world also address issues related to how people can live in harmony with their environment. First Book has curated a selection of books for students in grades 2-6 that reference or relate to climate change or that fall into the genre of climate fiction, or cli-fi. Cli-fi incorporates elements of climate change into stories that take place in the future or in fictional worlds.

How to Use Climate Fiction (Cli-fi) in the Classroom:

- Include a mix of dystopian and utopian stories.
- Feature diverse authors and diverse characters.
- Use the stories as a starting point for climate activism and community projects.
- Make connections to current climate issues and climate justice.
- Incorporate journal prompts and discussions so students can reflect, share, and make connections to real life climate change issues.

The following questions can be used as journal prompts to help students reflect on cli-fi narratives and make connections to present day situations:

- How does the climate impact the characters in the story?
- What is the main character's relationship with nature?
- How does the setting (specifically the climate) compare to where you live?
- What (if any) role does the media play in the story?
- How does society impact individual characters in the story?
- What role does community play in the story?
- Describe a time when a character gave or received help.
- What would climate justice* look like for the character in your story?

* See the [Social Studies section](#) for information about climate justice.

Consider these books when stocking your classroom library or helping students select books for independent reading.

***The Watcher: Jane Goodall's Life with the Chimps* by Jeanette Winter (Ages 3-8)**

The story of Jane Goodall's life, from her childhood in London, to her time in the forests Tanzania studying chimps, to her worldwide crusade to save the endangered chimps and their habitat.

***The Great Kapok Tree* by Lynne Cherry (Ages 4-8)**

Featuring beautiful illustrations of lush rainforests and the plants and animals who live there, *The Great Kapok Tree* tells the story of a man trying to chop down a giant kapok tree in the Brazilian rain forest. While he sleeps, the forest's residents, including a child from the Yanomamo tribe, whisper in his ear about the importance of trees and how "all living things depend on one another."

***One Tiny Turtle* by Nicola Davies (Ages 4-9)**

Beautiful illustrations help tell the story of an endangered loggerhead turtle who swims thousands of miles searching for food before returning to the beach where she was born to lay her eggs.

***Water Day / El día del agua* by Margarita Engle (Ages 4-9)**

Plants, laundry, and even flushing waits for water day. A small village no longer has a water supply of its own, but one young girl and her neighbors get by with the help of the water man. When he comes to town once a week, water flows like hope for the whole familia, and everyone rejoices. In an author's note, Engle describes Cuba's worsening water crisis.

***You Should Meet Kids Who Are Saving the Planet* by Laurie Calkhoven (Ages 7-9)**

Meet the environmentally minded kids who are coming up with ways to save the planet in this fascinating nonfiction Level 3 Ready-to-Read, part of a series of biographies about people "you should meet!"

***The Wild Robot* by Peter Brown (Ages 7-10)**

Roz the robot discovers that she is alone on a remote, wild island with no memory of where she is from or why she is there, and her only hope of survival is to try to learn about her new environment from the island's hostile inhabitants.

***The Last Bee Keeper* by Pablo Cartaya (Ages 7-12)**

The Last Beekeeper follows twelve-year-old Yolanda Cicerón as she fights to save the last known beehive in the world from extinction against nearly insurmountable obstacles – an environment completely changed by climate change and the greedy humans who will profit from the bees.



Thirst by Varsha Bajaj (Ages 7-12)

Minni lives in the poorest part of Mumbai, where access to water is limited to a few hours a day and the communal taps have long lines. Lately, though, even that access is threatened by severe water shortages and thieves who are stealing this precious commodity. Meanwhile, in the high-rise building where she works, she discovers that water streams out of every faucet and there's even a rooftop pool. How did something as simple as access to water get so complicated?

Wildfire by Breena Bard (Ages 8-14)

Life in the country is sweet for Julianna and her family until a wildfire forces them to relocate to Portland, Oregon. The graphic novel format adds depth to Julianna's grief and anger as she adapts to her new school, works to create a home for her family's beloved goats, and finds ways to take action.

Hoot by Carl Hiaasen (Ages 9-12)

Everybody loves Mother Paula's pancakes. Everybody, that is, except the colony of cute but endangered owls that live on the building site of the new restaurant. Can the awkward new kid and his feral friend prank the pancake people out of town? Or is the owls' fate cemented in pancake batter?

Flush by Carl Hiaasen (Ages 10-12)

After his dad tries unsuccessfully to stop a casino boat from illegally dumping sewage in the harbor, Noah sets out to seek justice for the environment by proving that pollution from the boat is responsible for toxic beaches and floating fish.

Paradise on Fire by Jewell Parker Rhodes (Ages 10-12)

Addy's life was forever changed when her parents died in a wildfire. Now, after having been raised by her grandmother, she finds herself at wilderness camp with five other Black kids learning outdoor survival skills. When a fire sweeps the forest, will her newfound skills triumph over her haunting past?

Little Monarchs by Jonathan Case (Ages 10-12)

Ten-year-old Elvie and her caretaker, a biologist named Flora, are survivors in a world seared by the sun. On a quest for a vaccine that will cure "sun sickness," allowing humanity to live aboveground, they travel across the former western United States, following the butterfly migration. This innovative graphic novel includes map coordinates and compass headings so that the reader can see the same landscapes Flora and Elvie are passing through.

The First Rule of Climate Club by Carrie Firestone (Ages 10-13)

When Mary Kate Murphy joins a special science pilot program focused on climate change, the class opens her eyes to lots of things she never noticed before about her small suburban town. She starts a podcast on climate activism and rallies her friends to create lasting change in their local community and beyond.

Note: Although not all of the titles listed above are available on the First Book Marketplace, many were at the time this resource was published. Find additional books that include topics and themes related to the environment, ecology, and sustainability on the [First Book Marketplace](#).



There's even a climate change comic book, [Chakra Climate Action](#), which was released at the Climate Change Conference in Paris. It features the adventures of two superheroes trying to take action against climate change.

SOCIAL STUDIES

Climate Justice

Climate change is relevant to social studies themes and topics because our changing climate affects people and communities, including how and where we live and how we share resources. Decisions about how we plan for future disasters, allocate resources, and address the connection between pollution and racism are relevant topics for students learning about key social studies themes, such as power, governance, consumption, technology, and global connections.

One way to connect climate change to the NCSS social studies standards and organizing themes is to focus on climate justice. **The term *climate justice* refers to the fact that the effects of climate change are not and will not be felt equally among all people and communities.** Climate change and climate justice relate to the concepts and ideals that students should understand according to the NCSS standards: “individual dignity, fairness, freedom, the common good, rule of law, civic life, rights, and responsibilities.”

NCSS Revised Social Studies Standards

The ten themes for social studies programs:

1. Culture
2. Time, Continuity, and Change
3. People, Places, and Environments
4. Individual Development and Identity
5. Individuals, Groups, and Institutions
6. Power, Authority, and Governance
7. Production, Distribution, and Consumption
8. Science, Technology, and Society
9. Global Connections
10. Civic Ideals and Practices

Source: [NCSS Revised Social Studies Standards](#)

Climate justice is an important social issue because:

- Climate change is happening now, and no country or community will be unaffected.
- The impacts of climate change will not be felt equally or fairly among countries or socioeconomic groups and are often most severe in traditionally under-resourced and marginalized communities.
- In general, the people who will suffer the worst effects of climate change have disproportionately low responsibility for creating the emissions that cause climate change.
- Low-income communities, people of color, indigenous people, people with disabilities, and the very young or old can be a greater risk to the dangers of wildfire, heat waves, air pollution, food and water scarcity, and coastal erosion.

Many students have already faced climate disasters, such as wildfires, pollution, floods, and drought. The unequal effects of climate change may be particularly relevant to your students because of where they live. For example, urban environments experience more air pollution, deserts struggle with water scarcity and heat waves, and coastal locations may experience erosion, floods, and severe storms.

There are many ways to teach about climate change and climate justice in a social studies class, including lessons about climate change topics, research projects, presentations, speeches, and debates. Included in this section are lesson plans that incorporate a variety of these skills as well as ideas for research projects and debate topics.

Lesson Plans

What Can We Do About Green Spaces? | Subject To Climate

This lesson for grades 3-5 explores ways that students can address environmental justice as they compare the cities of Compton and Pasadena and discuss income levels, demographics, tree cover, and air pollution. The lesson includes teacher slides, printable maps, vocabulary cards, teaching tips (prerequisites and differentiation), and standards alignment.

Voices Like Thunder

In this lesson for grades 6-8 students, students analyze a speech by a youth climate activist before researching, writing, and presenting their own speech. Students reflect on the impact of climate change on their communities and explore the connection between public speaking and activism. The lesson includes teacher slides, standards alignment, and teaching tips (prerequisites and differentiation).

Climate Justice Unit Plan | Share My Lesson

This unit about climate justice for grades 6-8 includes 7 lessons built around inquiry questions that address how human activity accelerates climate change, who is impacted by climate change, who is responsible for our climate crisis, who should prevent future damage, and what we can do as individuals to protect our planet. The unit includes lessons, slides standards alignment, case studies, and research projects.



Photo by
Vincent Ma Janssen

Research Projects

Research projects allow students to practice evaluating sources and perspectives, incorporating data, formulating opinions, writing, and more. These assignments allow students to “represent what they learn in products that demonstrate their ability to use information accurately, and that reflect the thinking and research skills acquired in the process of learning” (NCSS Essential Social Studies Skills and Strategies).

If your students are studying their state’s history, indigenous communities, main industries, or geography, consider assigning a research assignment related to climate justice or about how climate change has impacted the weather, wildlife, economy, and livability in their state or region. Below are resources that explore how climate change affects specific regions, states, and communities in different ways:

- [Climate Change in the United States](#) – a First Book resource that lists the specific environmental impacts of climate change on U.S. states and territories (pages 12-19)
- [Climate Change Impacts by State | US EPA](#)
- [Endangered Animals in Every U.S. state | nationalgeographic.com](#)

Debate Topics

Studying climate change offers many opportunities for students to practice debating skills. The following debate topics can be used in pro/con format or adapted in a variety of ways:

- Should countries that create more greenhouse gasses share a greater responsibility for addressing climate change?
- Should animals have rights like humans?
- Is renewable energy a better option than fossil fuels?
- Should companies be taxed on their carbon emissions and other negative environmental impacts?
- Should car companies be required to switch to electric vehicles?
- Should public transportation be free?
- Should all neighborhoods have access to green spaces and parks?

Source: [Resources for Teaching Climate Change in K-12 Social Studies Classes | Edutopia](#)

State-Specific Stories About Climate Justice

These short, relatable videos from Action for Climate Emergency feature young people concerned about climate change and climate justice. As they are state-specific, they are great examples of communicating the effects of climate change on individuals and communities.

- [Climate Justice and Air Pollution in Illinois](#)
- [The Gulf is Not a Sacrifice Zone](#)
- [The Financial Burden of Storms in North Carolina](#)
- [Sea Level Rise in Massachusetts](#)
- [Climate Action in Ohio](#)
- [Regenerative Agriculture in Illinois](#)
- [Environmental Racism in Minnesota](#)
- [First Foods and the Fight to Protect Indigenous Lands in Oregon](#)



DIGITAL & MEDIA LITERACY

Digital and media literacy are fundamental skills in our modern, tech-driven world. Within the prevalence of misinformation and AI generated text and images, it is critical that students receive media literacy instruction and learn to “access, analyze, evaluate, create, and act using all forms of communication” ([The National Association for Media Literacy Education](#)). These key skills empower students to think critically and communicate effectively. While there are many elements of digital and media literacy, the curated lessons in this section focus on information literacy specifically.

Essential Media Literacy Questions

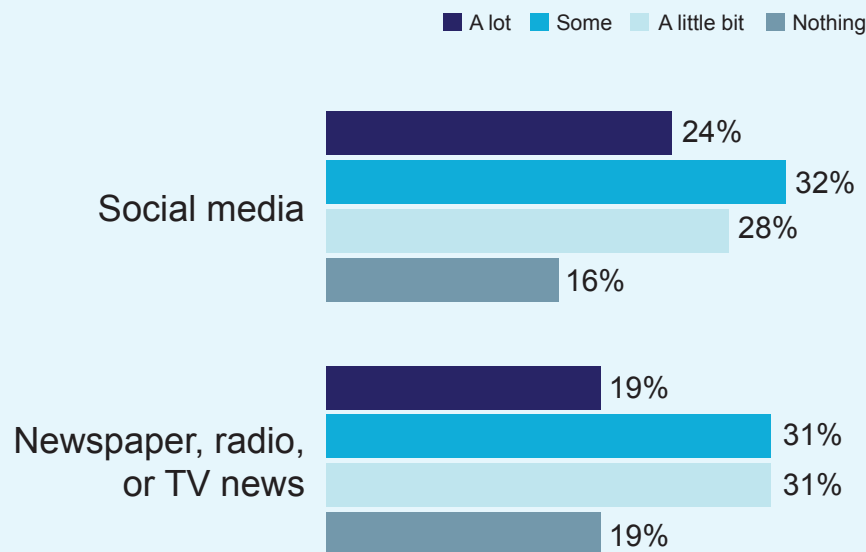
1. Who created the message or content?
2. What techniques are used to attract my attention?
3. How might different people interpret this message?
4. Which lifestyles, values, and points of view are represented? Which are missing?
5. What was the intention or purpose of creating this content?

In an EdWeek survey of teens,

- 79 percent of high school students said that climate change is happening and that it is primarily caused by human impact.
- 66 percent said they had learned “some” or “a lot” from their teachers.
- 64 percent said they had learned “some” or “a lot” from their parents.
- 56 percent said they had learned “some” or “a lot” about climate change from social media such as YouTube and TikTok.
- 46 percent said that the hole in the ozone layer was created by gases from spray cans and refrigerators is a significant cause of global warming. **FALSE!**
- More than 25 percent said that solar flares and increased radiation from the sun have been a major contributor to global warming since the 1800s. **FALSE!**
- Nearly 20 percent said that volcanoes are a major source of the greenhouse gases contributing to climate change. **FALSE!**

Source: [Most Teens Learn About Climate Change From Social Media. Why Schools Should Care \(edweek.org\)](#)

How much have you learned about climate change from the following sources of information?



Results show responses from young adults ages 14-18 years old.
Source: EdWeek Research Center survey, October 2022

Lesson Plans

Reading News Online | Common Sense Education

This 45-minute introductory lesson designed for 5th graders offers a solid foundation for students about how to recognize and interpret the distinct elements of an online news article: headline, byline, publisher (URL), publication section, images, dates, related articles, advertisements, sponsored content, and comments. Students will isolate each of these elements using a sample news article and learn tips that will help them evaluate news articles they find on their own.

Objectives:

- Understand the purposes of different parts of an online news page.
- Identify the parts and structure of an online news article.
- Learn about things to watch out for when reading online news pages, such as sponsored content and advertisements.

Includes: lesson slides, handouts, lesson quiz, family engagement resources, vocabulary, and links to Common Core Standards

Finding Credible News | Common Sense Education

This 45-minute lesson designed for 6th graders helps students distinguish rumors and inaccurate information from credible sources and content and evaluate the credibility of what they're finding online.

Objectives:

- Learn reasons that people put false or misleading information on the internet.
- Learn criteria for differentiating fake news from credible news.
- Practice evaluating the credibility of information they find on the internet.

Includes: lesson slides, handouts, lesson quiz, family engagement resources, vocabulary, and links to Common Core Standards

Using Search Tips to Find & Assess Climate Change Information

Being savvy about how to use search engines is the first step in finding credible information about a specific topic. Use this lesson (available in the [Appendix](#)) to teach students ways to refine their search by limiting or expanding their search queries to focus on the type of content that would be most appropriate for their intended purpose. Once students choose an article, infographic, or video to explore, they will assess the source by investigating the publisher, accuracy of the content, bias or missing information, and intended audience.

Sources: [Implementing Digital Literacy in the Classroom | The Tech Edvocate](#), [How to Teach Digital Literacy in Any Subject | The Tech Edvocate](#), [6 Essential Steps: How to Teach Digital Literacy to Your Students | educationcorner.com](#)

Social Media Specific Tips

Your students may follow climate change influencers and activists online. Many of them offer relevant and fact-based climate news and engagement opportunities. Students need to be able determine the source and make an informed judgment about credibility. Here are some considerations that your students should keep in mind as they are learning about climate change through social media:

- Know that algorithms manipulate what you see on social media.
- Be aware that some content is trying to evoke a strong reaction and get users to share without confirming accuracy first.
- Is it primary or secondary information? Where else can the claim be confirmed? Unlike a scientific study published in a journal, there is little quality control over what appears on social media.
- Consider the motives of content creators.

MATH

To incorporate climate change into math classes, educators can use climate change models, data, and topics in a variety of mathematical contexts. For example, students can analyze the amount of rainfall in their state going back fifty years and then plot the data on a graph to see the change over time.

Below are lessons from Subject to Climate that use data and concepts related to climate change as part of lessons that require basic math skills. Each lesson includes teaching guides, educator slides, learning objectives, standards alignment, student worksheets and graphic organizers, pre-requisite knowledge requirements, and differentiation strategies.

GRADES K-2

How Does Your Garden Grow?

In this lesson, students measure plant growth rate and learn about the factors that affect plant growth. For this lesson, students need access to an outdoor space with living things to observe. Students will use math skills to measure the rate of growth, aligning with the Common Core Standard to represent and interpret data.

GRADES 3-5

Calculating your Carbon Footprint

In this lesson, students learn about climate change, calculate their carbon footprint, and take steps to reduce their carbon footprint. Students will record their activities in a journal and create math word problems about lessening their carbon footprint, aligning with the Common Core Standard to use the four operations with whole numbers to solve problems.



Photo by
Evie S. on
Unsplash



What are three words that come to mind when you view this picture?

 **SUBJECT to CLIMATE**

Solutions to Multiplying Plastics

In this lesson, students use multiplication to understand the problem of single-use plastics and how they impact climate change. They will use four operations to solve word problems and solve multi-step word problems with a variable, aligning with the Common Core Standard to use the four operations with whole numbers to solve problems.

GRADES 5-8

Ocean Warming Module

In this multi-lesson unit, students will listen to first-hand accounts, interpret data, analyze maps, and make predictions about the effect of ocean warming on lobster and black sea bass populations off the coast of Maine. This resource uses primary data from the National Marine Fisheries Services trawl surveys and sea surface temperature data from NASA. The data interpretation and predictions align with the Common Core Standard to summarize numerical data sets in relation to their context.

Graphing the Rise in Earth's Carbon Dioxide

In this lesson, students graph the increase in atmospheric carbon dioxide concentrations throughout their lifetime and calculate the percent increase in carbon dioxide concentrations between different points on their graph. This graphing exercises aligns with the Common Core Standard to represent real world and mathematical problems by graphing points on a coordinate plane and interpreting coordinate values of points in the context of the situation.

ART

Science, math, technology, and engineering help us explain and combat climate change. Art, like poetry, is a medium for processing the magnitude of the impact of climate change and strengthening students' connection to nature and the Earth.

Subject to Climate offers Art for the Earth lessons that explore how meaning is expressed through art and focus on specific environmental topics like fossil fuels, deforestation, and plastic pollution.

Energy And Art

In this lesson, students discuss and evaluate artwork by Jill Pelto, investigate renewable and nonrenewable energy, and demonstrate their learning through writing or drawing. This lesson aligns with the National Core Arts Anchor Standard to perceive and analyze the components of visual imagery that convey messages and identify how art is used to inform or change beliefs and values.



Destruction of Habitats

In this lesson, students learn about deforestation and analyze paintings featuring deforestation themes. They also learn about Nobel Prize recipient Wangari Maathai and design a climate action plan related to deforestation. This lesson aligns with the National Core Arts Anchor Standard to perceive and analyze the components of visual imagery that convey messages and identify how art is used to inform or change beliefs and values.

Plastic Pollution

In this lesson, students view images of plastic pollution around the world, watch a video on plastic pollution, and analyze artwork about plastic pollution. This lesson aligns with the National Core Arts Anchor Standard to perceive and analyze the components of visual imagery that convey messages and identify how art is used to inform or change beliefs and values.

Data Analysis

In this lesson, students analyze data, create line graphs, conduct research, and plan their data art project, activities that align with the National Core Arts Anchor Standard to elaborate on an imaginative idea and brainstorm multiple approaches to a creative art or design problem.

Watercolor Activities

In this lesson, students learn watercolor techniques, identify their target audience, create a rubric, and complete their artwork. This final lesson address multiple National Core Arts Anchor Standards: generate and conceptualize artistic ideas and work, apply criteria to evaluate artistic work, and relate artistic ideas and works with societal, cultural, and historical context to deepen understanding.

Here are eight artists who are exploring climate change through their art. Incorporate their art into existing lessons or share their stories to inspire students to create their own climate change-themed artwork.

Sara Black and Amber Ginsburg – These Chicago-based sculptors use art to investigate how people relate to and affect nature and ecosystems.

Rebecca Lee Kunz – A citizen of the Cherokee Nation of Oklahoma, Kunz uses natural materials like leaves and stones in her work. Some of her art uses Cherokee myths to explore questions of survival.

Terry Evans – A childhood spent in the prairies near Kansas City, Missouri, inspired Evans to create an “Ancient Prairies” series that explores personal connection and relationship to land and landscapes.

Madjeen Isaac – The daughter of Haitian immigrants, Isaac lives in Brooklyn and paints hybrid scenes that incorporate elements of the Caribbean and the Black diaspora. Her work often features landscapes that meld urban elements, the natural world, and community gardens.

Jack Coulter – A painter from Northern Ireland, Coulter’s “Future Generations” is based on climate activist Greta Thunberg’s activism.

Catherine Sarah Young – Young uses her background in both the sciences and art to create works that focus on the environment and global ecosystems.

Dana Jung – An illustrator based in Korea, Jung’s work captures the warm energy of people and the environment.

Source: [8 artists who are grappling with climate change and imagining a better world](#) | Yale Climate Connections

SOCIAL EMOTIONAL LEARNING (SEL)

Social emotional learning is a core component of youth development that is taught in a variety of subjects and settings. Climate change is relevant to SEL because considering the consequences of climate change may cause students to feel hopeless and overwhelmed. The American Psychological Association has called this sense of impending environmental doom *climate anxiety*. Below are strategies to support students' emotional wellbeing if they are experiencing climate anxiety.

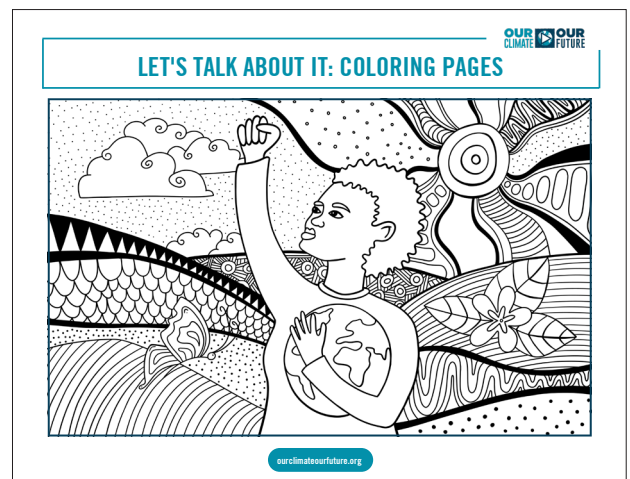
Climate Anxiety

In a 2021 PBS NewsHour survey of children and young adults, nearly two-thirds of respondents said climate change will affect where they decide to live, and a third said it would influence their decision to have children. Young people are increasingly worried about climate change and what it means for future generations.

Focusing on successes, innovations, and potential solutions and spending time in nature or doing other mindful activities can help students balance an appropriate sense of urgency to address climate change with a focus on emotional wellbeing and self-care.

Strategies to reduce address stress and anxiety in general can help students with their climate change-related worry and anxiety as well:

- **Focus on good news:** People in all parts of the world are tackling climate change on many levels, and there is progress to celebrate. Share good news and stories or people taking care of the environment. Ask students to research and share environmental success stories in their communities.
- **Spend time in nature:** Start a school garden, take a walk outside, or bring birds and birding into your classroom. Research has shown that time in nature improves mental and physical health and activates parts of the brain linked to feelings of empathy. In addition to decreasing stress and anxiety, time in nature can also improve short-term memory, increase Vitamin D, improve sleep, and increase creativity. An added benefit is that the most important factor in developing personal concern for the environment is positive experiences in the outdoors during childhood.*
- **Make time for art:** Research has shown that coloring for just 30 minutes can relieve anxiety and improve mindfulness. These free coloring pages from ACE/Our Climate, Our Future are climate/Earth-themed.



*Palmer, J. (1993) Development of concern for the environment and formative experiences of educators. Journal of Environmental Education 24: 26-30

Sources: What is 'climate anxiety' and why are so many young people suffering from it? | PBS NewsHour Classroom & Youth Takes: Climate Anxiety — Our Climate Our Future



Good News & Progress Related to Climate Change & Human Impact

- In California and Oregon, nearly 19 billion native seeds will be planted as part of efforts to restore land along the Klamath River that is currently dammed.
- Tesla is building a drive-in movie theater EV charging station in Los Angeles.
- More than 120,000 acres have been set aside as a conservation area in Idaho.
- Oklahoma has restored nearly 100 unhealthy streams thanks to water monitoring and regenerative agriculture.
- A Wyoming food forest* recently added a medicinal garden consisting of over 100 plants that have spiritual, medicinal or nutritional significance to the Northern Cheyenne Tribe and that help avoid the loss of traditional knowledge and plant varieties.
- Young environmentalists in Montana won a historic trial in which they argued the state's government was not doing enough to protect them from climate change.

*A food forest is a garden that provides food, medicine, and other products for human use.

Sources: [NPR](#) & [DOGONews](#)

SERVICE CLUBS & PROJECTS

Service projects are great extracurricular, extra-credit, and after-school program activities. These types of projects support student learning and development, create and enhance community relationships, encourage civic responsibility, and foster empathy, teamwork, and leadership.

These EPA resources include suggestions for service-learning projects and step-by-step instructions:

- Service-Learning Education Beyond the Classroom: This guide explains the benefits of service learning and provides examples for projects done by K-12 students throughout the country, from recycling or composting programs and preserving native plants to reducing household hazardous waste and buying recycled products. Each profile includes contacts who can provide information on how to start a similar program in your area.
- Tools to Reduce Waste in Schools: This resource supports schools and school districts in reducing waste by providing guidance about how to start or expand a waste reduction program.
- A Guide to Environmental Community Service: This booklet about environmental community service provides examples of volunteer projects related to reuse, recycling, composting, and household waste products. It is also available in [Spanish](#).

RELATABLE MEDIA CONTENT & POPULAR CULTURE

Regardless of subject, references to popular culture can make the topic of climate change more engaging and relevant for students. Below are examples of climate change references and content in popular culture that can be used to inspire students and enhance existing lessons.

Social Media

In EdWeek's 2023 poll, fifty-six percent of 14- to 18-year-olds reported they learn “some” or “a lot” about climate change from social media, like TikTok and YouTube. Social media is the third most-cited source of information on climate change, after teachers and parents. Young climate activists with social media followings include:

Vic Barrett, from New York state, felt the effects of climate change firsthand during Hurricane Sandy. A Fellow with the Alliance for Climate Education, he spoke at the COP21 U.N. Conference on Climate Change and at the U.N. headquarters in New York City. Follow Vic on Instagram [@vicbarrett_](#).

Isra Hirsi is the co-founder and co-executive of the US Youth Climate Strike. She was motivated to act by the Flint water crisis and emphasizes the importance of intersectionality in the movement for climate justice. Follow Isra on Instagram [@israhirsi](#).

Xiuhtezcatl is indigenous activist, musician, and the youth director of Earth Guardians. As a hip-hop artist, Xiuhtezcatl uses music to share powerful environmental messages. Follow Xiuhtezcatl on Instagram [@xiuhtezcatl](#).

Jerome Foster II is a climate activist, author, National Geographic Explorer, Smithsonian Ambassador, and Founder and Editor in Chief of The Climate Reporter. Follow Jerome on Instagram at [@jeromefosterii](#).

Music

Feels Like Summer | Childish Gambino This song by Donald Glover, whose stage name is Childish Gambino, has an environmental message: “*Air that kill the bees that we depend upon / Birds were made for singing / Waking up to no sound...*”

Trouble in the Water | Hip Hop Caucus This song featuring Common, Malik Yusef, Kumasi, Aaron Fresh, Choklate, and Laci Kay addresses the Flint water crisis, severe weather, and ocean pollution.

Truth to Power | One Republic Written and produced by OneRepublic frontman Ryan Tedder and T Bone Burnett, this call to action on climate change was written for the film, *An Inconvenient Sequel: Truth To Power*.

Movies

Movies that include environmental themes may not qualify as climate change education, but they do help students understand and appreciate our interconnectedness, the importance of biodiversity, and the beauty and gifts of the natural world. Examples include:

Dr. Seuss: The Lorax (Age 5+) A 12-year-old boy discovers the story of the Lorax, the grumpy yet charming creature who fights to protect his world.

Happy Feet (Age 8+) A colony of emperor penguins who sing and dance become trapped because of a shifting glacier.

WALL-E (Age 5+) A small waste-collecting robot embarks on a space journey that will decide the fate of mankind.

March of the Penguins (5+) Emperor penguins face threats and challenges as they journey to their traditional breeding grounds.

Monkey Kingdom (6+) A young monkey and her son, living among ancient ruins in the jungle, are forced from their home and seek safety amidst strange new creatures and surroundings.

My Octopus Teacher (8+) A filmmaker forges an unusual friendship with an octopus living in a South African kelp forest, learning as the animal shares the mysteries of her world.

April and the Extraordinary World (9+) A teenage girl, goes in search of her missing scientist parents.

David Attenborough: A Life on Our Planet (10+) A documentary about the many species and ecosystems on Earth and their journey to adapt and survive.

Source: [IMDB](#)

Podcasts

There are also age-appropriate and often peer-narrated podcasts about climate change, including:

Operation Earth – How to Be Cool to a Planet That’s Hot (30 minutes) This lively exploration and of climate change includes sounds effects and time travel. (Ages 5-12)

The Big Melt (multiple episodes around 30 minutes each) This series follows Sarah as she learns about climate change by speaking with experts, analyzing data, busting myths, and interviewing teens who are changing the world. (Ages 8-12)

1Point5: A Kids Climate Justice Podcast (multiple episodes around 30 minutes each) This podcast hosted by Zanagee Artis and Olivia Greenspan discusses climate justice and climate change solutions and includes interviews with experts and positive messages about teamwork, perseverance, and communication as

methods of fighting climate change. Note: The episode about Indigenous sovereignty includes a content warning with recommendations about how to support kids learning about residential schools and acts of violence against indigenous communities. (Ages 11+)

Books

Books that touch on environmental issues or climate change include:

The Watcher: Jane Goodall's Life with the Chimps by Jeanette Winter (Ages 3-8)

The story of Jane Goodall's life, from her childhood in London, to her time in the forests of Tanzania studying chimps, to her worldwide crusade to save the endangered chimps and their habitat.

The Great Kapok Tree by Lynne Cherry (Ages 4-8)

Featuring beautiful illustrations of lush rainforests and the plants and animals who live there, *The Great Kapok Tree* tells the story of a man trying to chop down a giant kapok tree in the Brazilian rain forest. While he sleeps, the forest's residents, including a child from the Yanomamo tribe, whisper in his ear about the importance of trees and how "all living things depend on one another."

One Tiny Turtle by Nicola Davies (Ages 4-9)

Beautiful illustrations help tell the story of an endangered loggerhead turtle who swims thousands of miles searching for food before returning to the beach where she was born to lay her eggs.

Water Day / El día del agua by Margarita Engle (Ages 4-9)

Plants, laundry, and even flushing wait for water day. A small village no longer has a water supply of its own, but one young girl and her neighbors get by with the help of the water man. When he comes to town once a week, water flows like hope for the whole familia, and everyone rejoices. In an author's note, Engle describes Cuba's worsening water crisis.

You Should Meet Kids Who Are Saving the Planet by Laurie Calkhoven (Ages 7-9)

Meet the environmentally minded kids who are coming up with ways to save the planet in this fascinating nonfiction Level 3 Ready-to-Read, part of a series of biographies about people "you should meet!"

The Wild Robot by Peter Brown (Ages 7-10)

Roz the robot discovers that she is alone on a remote, wild island with no memory of where she is from or why she is there, and her only hope of survival is to try to learn about her new environment from the island's hostile inhabitants.

The Last Bee Keeper by Pablo Cartaya (Ages 7-12)

The Last Beekeeper follows twelve-year-old Yolanda Cicerón as she fights to save the last known beehive in the world from extinction against nearly insurmountable obstacles — an environment completely changed by climate change and the greedy humans who will profit from the bees.

Thirst by Varsha Bajaj (Ages 7-12)

Minni lives in the poorest part of Mumbai, where access to water is limited to a few hours a day and the communal taps have long lines. Lately, though, even that access is threatened by severe water shortages and thieves who are stealing this precious commodity. Meanwhile, in the high-rise building where she

works, she discovers that water streams out of every faucet and there's even a rooftop pool. How did something as simple as access to water get so complicated?

Wildfire by Breena Bard (Ages 8-14)

Life in the country is sweet for Julianna and her family until a wildfire forces them to relocate to Portland, Oregon. The graphic novel format adds depth to Julianna's grief and anger as she adapts to her new school, works to create a home for her family's beloved goats, and finds ways to take action.

Hoot by Carl Hiaasen (Ages 9-12)

Everybody loves Mother Paula's pancakes. Everybody, that is, except the colony of cute but endangered owls that live on the building site of the new restaurant. Can the awkward new kid and his feral friend prank the pancake people out of town? Or is the owls' fate cemented in pancake batter?

Flush by Carl Hiaasen (Ages 10-12)

After his dad tries unsuccessfully to stop a casino boat from illegally dumping sewage in the harbor, Noah sets out to seek justice for the environment by proving that pollution from the boat is responsible for toxic beaches and floating fish.

Paradise on Fire by Jewell Parker Rhodes (Ages 10-12)

Addy's life was forever changed when her parents died in a wildfire. Now, after having been raised by her grandmother, she finds herself at wilderness camp with five other Black kids learning outdoor survival skills. When a fire sweeps the forest, will her newfound skills triumph over her haunting past?

Little Monarchs by Jonathan Case (Ages 10-12)

Ten-year-old Elvie and her caretaker, a biologist named Flora, are survivors in a world seared by the sun. On a quest for a vaccine that will cure "sun sickness," allowing humanity to live aboveground, they travel across the former western United States, following the butterfly migration. This innovative graphic novel includes map coordinates and compass headings so that the reader can see the same landscapes Flora and Elvie are passing through.

The First Rule of Climate Club by Carrie Firestone (Ages 10-13)

When Mary Kate Murphy joins a special science pilot program focused on climate change, the class opens her eyes to lots of things she never noticed before about her small suburban town. She starts a podcast on climate activism and rallies her friends to create lasting change in their local community and beyond.

Note: Although not all of the titles listed above are available on the First Book Marketplace, many were at the time this resource was published. Find additional books that include topics and themes related to the environment, ecology, and sustainability on the [First Book Marketplace](#).

There's even a climate change comic book, [Chakra Climate Action](#), which was released at the Climate Change Conference in Paris. It features the adventures of two superheroes trying to take action against climate change.



APPENDIX

USING SEARCH TIPS TO FIND CLIMATE CHANGE INFORMATION

NEXT GENERATION SCIENCE STANDARDS

SOURCES

USING SEARCH TIPS TO FIND CLIMATE CHANGE INFORMATION

LEARNING OBJECTIVES:

- Learn Google search techniques to refine and enhance internet search results.
- Use search techniques to find content about climate change on the Internet.
- Evaluate the credibility of content found the internet.

TIME:
45-60
minutes

STEP 1. Demonstrate how to use the Google search tips below to help students refine their search results.

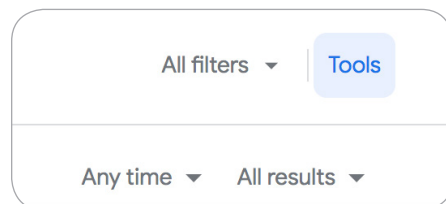
GOOGLE SEARCH TIPS

1. Use quotation mark to find exact wording: “greenhouse effect” or “human impact”
2. Use OR to get options: “climate change” OR “global warming”
3. Use a minus sign (-) in front of a word or site you would like to omit from your search: “greenhouse gases” -Wikipedia
4. Use “site:” to limit your search to within one website: [site:www.epa.gov](http://www.epa.gov) “fossil fuels”
5. To limit your search to a type of site, specify the domain suffix, such as *org* for nonprofits, *edu* for educational institutions, *gov* for government agencies, and *com* for businesses. You can include an OR to search for more than one type: [site:org](http://www.org) OR [site:edu](http://www.edu) “climate change data”

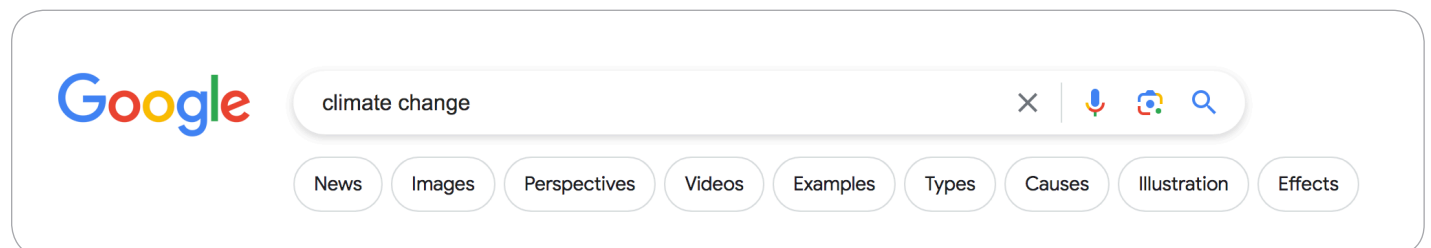
Source: [5 Must-Have Google Search Tips for Students](#) | Common Sense Education

You may also want to include additional tips, such as:

1. Using the Tools option to sort by date



2. Using the option bar to select only images, news, or videos.



STEP 2. Instruct students to find an article, video, infographic, or other resource that addresses some aspect of climate change. Have them use one of the Google search tips to increase their chances of finding credible sources about a specific topic.

Examples of topics include:

- The impact of deforestation on biodiversity
- The effect of sea level rise on coastal communities
- The connection between climate change and biodiversity
- The relationship between climate change and extreme weather

STEP 3. Once students have identified an online resource, ask them to complete the following pre-reading assessment activities *before* they start deeply reading or watching.

PRE-READING QUESTIONS

- What genre and what form is it? (e.g., an essay in an online magazine, an infographic on a government website, or an article in an online encyclopedia)
- What does the ‘About Us’ or FAQ page tell you about the information source?
- What seems to be the point of view of the website and its content?
- Is the website data heavy or opinion heavy?
- After scanning the article or infographic, do you see typos, spelling and grammar mistakes, or lots of advertisements?
- What do all these pre-reading assessments tell you about the credibility of the source?

STEP 4. Have students read the article or infographic or watch the video they selected. Once they have more deeply consumed the content, prompt them to analyze and reflect on what they read or watched.

POST-READING ACTIVITIES & QUESTIONS

- After reading or watching, who do you think is the intended reader, viewer, or subscriber? (e.g., the general public, students, or scientists)
- Do you think the writer or publisher is trying to convince you to believe something? If so, what?
- Choose one statement that is presented as a fact or a statistic from the article, video, or infographic and try to verify or disprove it by consulting 2-3 other online sources.
- What opinions or ideas are missing from this article, video, or infographic?
- What questions do you have after viewing or reading this content?
- What are two additional searches you could try to find additional information and answer your questions.

STANDARDS ALIGNMENT

Common Core
Standards



The following standards best align with this lesson plan:

The Common Core English Language Arts (ELA) Anchor Standards include several digital and media literacy components:

CCSS.ELA-LITERACY.CCRA.SL.2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-LITERACY.CCRA.SL.5: Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

CCSS.ELA-LITERACY.CCRA.W.6: Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.

Sources: [Anchor Standards for College and Career Readiness](#) | [Common Core State Standards Initiative & English Language Arts Standards](#) | [Common Core State Standards Initiative \(thecorestandards.org\)](#)

NEXT GENERATION SCIENCE STANDARDS

LS4.D: BIODIVERSITY AND HUMANS

What is biodiversity, how do humans affect it, and how does it affect humans?

Human beings are part of and depend on the natural world. Biodiversity — the multiplicity of genes, species, and ecosystems — provides humans with renewable resources, such as food, medicines, and clean water. Humans also benefit from “ecosystem services,” such as climate stabilization, decomposition of wastes, and pollination that are provided by healthy (i.e., diverse and resilient) ecosystems. The resources of biological communities can be used within sustainable limits, but in many cases humans affect these ecosystems in ways — including habitat destruction, pollution of air and water, overexploitation of resources, introduction of invasive species, and climate change — that prevent the sustainable use of resources and lead to ecosystem degradation, species extinction, and the loss of valuable ecosystem services.

Grade Band Endpoints for LS4.D

- By the end of grade 2. There are many different kinds of living things in any area, and they exist in different places on land and in water.
- By the end of grade 5. Scientists have identified and classified many plants and animals. Populations of organisms live in a variety of habitats, and change in those habitats affects the organisms living there. Humans, like all other organisms, obtain living and nonliving resources from their environments.
- By the end of grade 8. Biodiversity is the wide range of existing life forms that have adapted to the variety of conditions on Earth, from terrestrial to marine ecosystems. Biodiversity includes genetic variation within a species, in addition to species variation in different habitats and ecosystem types (e.g., forests, grasslands, wetlands). Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on — for example, water purification and recycling.

ESS3.C: HUMAN IMPACTS ON EARTH SYSTEMS

How do humans change the planet?

Recorded history, as well as chemical and geological evidence, indicates that human activities in agriculture, industry, and everyday life have had major impacts on the land, rivers, ocean, and air.

Grade Band Endpoints for ESS3.C

- By the end of grade 2. Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things – for example, by reducing trash through reuse and recycling.
- By the end of grade 5. Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments. For example, they are treating sewage, reducing the amounts of materials they use, and regulating sources of pollution such as emissions from factories and power plants or the runoff from agricultural activities.
- By the end of grade 8. Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of many other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things. Typically, as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.

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[Most Teens Learn About Climate Change From Social Media. Why Schools Should Care | edweek.org](#)

[SubjectToClimate](#)

[Teaching Climate Change Across Subjects | Edutopia](#)

[Teaching Climate Change in Every Subject | Edutopia](#)

[Using Fiction and Nonfiction to Explore Climate Change | MiddleWeb](#)

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Build THE Change