Today I Learned What It Costs

Description:

As discussed in the podcast episode, financial investments are needed to both slow down climate change and prepare for climate impacts. Students investigate projects and data to learn about the opportunities of multisolving to make smart decisions for our future.

Skills & Objectives

SWBAT

- Explain that extreme weather events are increasing in severity around the world as a result of climate change.
- Understand that decision-makers must balance the cost of adaptation and mitigation (reducing carbon dioxide emissions) with the increasing costs of inaction.
- Describe adaptation and multisolving stories that are exciting and interesting to them.

Skills

- Reading graphs
- Reading maps
- Summarizing case studies

Students Should Already Know That

- Climate change is already increasing the severity (and, in some cases, frequency) of extreme weather events such as storms, flooding, droughts, and wildfires.

Standards Alignment:
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.
HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.
HS-ETS1-3 Evaluate a solution to a complex real-world problem.
HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.
RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text.

Disciplinary Core Ideas:
ESS2.D Weather and Climate
ESS3.B Natural Hazards
ESS3.C Human Impacts on Earth Systems
ESS3.D Global Climate Change

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How To Use These Activities:

Pages with the circular "TILclimate Guide for Educators" logo and dark band across the top are intended for educators. Simpler pages without the dark band across the top are meant for students.

Each of the included activities is designed to be used as a standalone, in sequence, or integrated within other curriculum needs. A detailed table of contents, on the next page, explains what students will do in each activity.

A Note About Printing/Materials

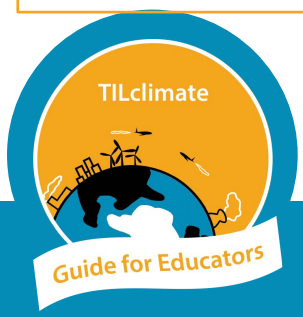
All student pages are designed to be printable in grayscale.

The worksheets do not leave space for students to answer questions. Students may answer these questions in whatever form is the norm for your classroom – a notebook, online form, or something else. This allows you, the teacher, to define what you consider a complete answer.

Social-Emotional Learning

The Extreme Weather activity has the potential to carry an extra emotional load for students whose families or communities have been impacted by storms, floods, fires, or other destructive events. When considering this data, keep in mind that students may find these events difficult to talk about. For more information on discussing climate change in a trauma-informed manner, please see "How to Use TILclimate Guides" at https://climate.mit.edu/til-what-it-costs-educator-guide.

Podcasts in the Classroom: Throughout these Guides for Educators, we invite students to think about how they would share their learning with family and friends. One way to do this is to encourage your students to create their own podcasts - they're shareable, creative, and have multiple options for embedded assessment. We would love to hear any podcasts or see any other projects you or your students create! Email us at tilclimate@mit.edu, Tweet us @tilclimate, or tag us on Facebook @climateMIT.



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Detailed Table of Contents

Answers to "Get to Know the Data"

1a. 2017 ($240.5-451.7B)

1b. Generally rising, with dips in 2010 and 2016.

1c. Severe Storms (total per decade: 1980s: 7, 1990s: 14, 2000s: 27, 2010s: 71)

2a. Texas, Louisiana, and Florida ($200B+ each).

2b. US Virgin Islands ($100-200B), Louisiana ($50-100B); Puerto Rico, South Dakota, and North Dakota ($20-50B each).

2c. Drought: Texas (17), Kansas (17), Alabama (15), and Georgia (15). Flooding: Louisiana (10), Texas (9), Arkansas (9).

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Climate Change Costs

This Educator Guide includes a data investigation and two collections of case studies. Educators may pick and choose among the pieces of the Guide, as suits their class needs.

Parts of this Guide may align with the following topics:

- Engineering: Design solutions to climate challenges
- Life/environmental science: Changes in weather impacts
- History/social science: Government, civics, and decision-making
- ELA/nonfiction: Communicating about complex topics

MIT Resources

We recommend the following as resources for your own better understanding of climate change or as depth for student investigations. Specific sections are listed below:

- Climate Science, Risk & Solutions, an interactive introduction to the basics of climate change. https://climateprimer.mit.edu/

  Chapter 02 The greenhouse effect and us
  Chapter 06 Predicting climate
  Chapter 08 What are the risks?
  Chapter 10 What can we do?

- MIT Climate Portal Explainers are one-page articles describing a variety of climate topics. New Explainers are posted monthly. https://climate.mit.edu/explainers

  Climate-Resilient Infrastructure
  Sea Level Rise
  Urban Heat Islands
  Coastal Ecosystems and Climate Change
  Cities and Climate Change
  Greenhouse Gases
  Renewable Energy

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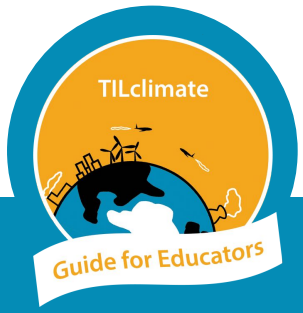
Wrap-Up Discussion Questions

- Consider a recent news article, podcast, video, or social media post you saw that talked about money for climate-related adaptation or energy change. How did the author balance the costs of a changing climate with the costs of the action suggested?
- Which of the multisolving ideas excites you the most? Why?
- What questions were you most interested in investigating with the billion-dollar-disaster data? Why? What did you learn?
- Which of the adaptation case studies did you find the most interesting? Why? How do you think those communities decided on those actions?
- What other questions do you have about adapting to climate change? How might you answer these questions?

Climate Solutions

Climate solutions can be thought of as falling into four categories outlined below. Across all categories, solutions at the community, state or federal level are generally more impactful than individual actions. For example, policies that increase the nuclear, solar and wind mix in the electric grid are generally more effective at reducing climate pollution than asking homeowners to install solar panels. For more on talking about climate change in the classroom, see “How to Use This Guide”.

- **Energy Shift**
  How do decision-makers make the switch from carbon-producing energy to carbon-neutral and carbon-negative energy?
- **Energy Efficiency**
  What products and technologies exist to increase energy efficiency, especially in heating and cooling buildings?
- **Adaptation**
  How can cities and towns adapt to the impacts of climate change?
- **Talk About It**
  Talking about climate change with friends and family can feel overwhelming. What is one thing you have learned that you could share to start a conversation?



What solutions are the most exciting in your classes? We would love to hear from you or your students! Images, video, or audio of student projects or questions are always welcome. Email us at tilclimate@mit.edu, Tweet us @tilclimate, or tag us on Facebook @climateMIT.