

Today I Learned About Farming a Warmer Planet

Description:

How are farmers affected by climate change? And how do farms affect climate change? Agriculture is at the intersection of many climate impacts. Students investigate plant hardiness zone shifts, and then read case studies about agroecology.

Skills & Objectives

SWBAT

- Name some impacts of climate change on agriculture.
- Name some impacts of agriculture on climate change.
- Understand the role of agroecology as a solution to agriculture and climate change.

Skills

- Map-reading
- Understanding and summarizing case studies

Students Should Already Know That

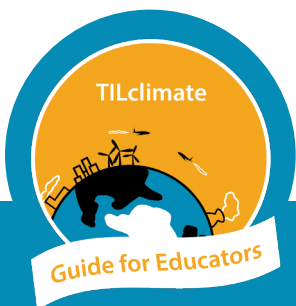
- Agriculture includes all activities related to providing food for humans, including growing crops for human consumption, raising animals for human consumption, and growing crops for animal consumption.
- Agriculture is heavily impacted by changes in temperature, growing season, precipitation, flooding, drought, insects, and diseases. All of these factors are affected by climate change.

Standards Alignment:

HS-ESS3-5 Analyze geoscience data and the results from global climate models
HS-ETS1-3 Evaluate a solution to a complex real-world problem
HS-LS2-7 Evaluate 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

Disciplinary Core Ideas:

ESS2.D Weather and Climate
ESS3.A Natural Resources
ESS3.C Human Impacts on Earth Systems
ESS3.D Global Climate Change
LS4.D Biodiversity and Humans



Today I Learned About Farming a Warmer Planet

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.

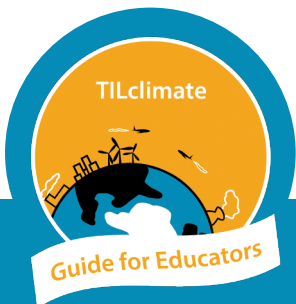
A Note About Printing/Materials

All student pages are designed to be printable in grayscale, except for the maps on pages 2&3. Larger versions of these maps are provided. A few copies of this page could be printed color for students to share, or the image projected in the classroom.

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.

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.

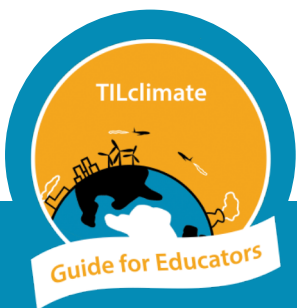
We encourage you to share this Guide under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.



Today I Learned About Farming a Warmer Planet

Detailed Table of Contents

Page	Title	Description	Time (min)
	Podcast Episode	Students listen to TILclimate: TIL about farming a warmer planet, either as pre-class work at home or in the classroom. https://climate.mit.edu/podcasts/til-about-farming-a-warmer-planet	10-15
1-3	Plant Hardiness Zones	Students study shifts in the USDA's Plant Hardiness Zone maps and consider the impacts on farmers and food systems.	15-20
	Plant Hardiness Maps	Large versions of maps on page 2&3 for students to share (printed in color), to be projected in the classroom, or shared digitally.	n/a
4-6	Agroecology (internet required unless teacher chooses & prints case studies)	Students are introduced to the concept of agroecology – an ecological lens on agriculture – and then investigate case studies from the United Nations.	30-45+



Today I Learned About Farming a Warmer Planet

Agriculture and Climate

This Educator Guide includes a map-reading activity and a case study review. 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:

- Physical science: Impacts of heat-trapping gases on climate, impacts of soil erosion, etc.
- Life/environmental science: Ecological balance with agriculture.
- History/social science: Social impact of agriculture, famine, and human migration.
- ELA/literature: Connections to books about farming.
- ELA/nonfiction: Understanding and conceptualizing case studies.

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. <https://climate.mit.edu/explainers>
 - Food Systems and Agriculture
 - Fertilizer and Climate Change
 - Soil-Based Carbon Sequestration



Today I Learned About Farming a Warmer Planet

Wrap-Up Discussion Questions

- How is agriculture impacted by changes to the climate?
- How is agriculture contributing to climate change?
- As human populations grow, how can we balance increased need for food with the impacts of modern agricultural practices?
- How does agroecology increase the resilience of farms to climate hazards?
- What climate hazards do you think are the biggest issue for farmers in your area? How do you think they are adapting to these challenges?
- What other questions do you have about the relationship between food, land, and climate change? How would you investigate 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.

