# Maple Syrup’s Connection to Climate Change

**Author**
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**Grade Level**
7

**Duration**
3 class periods

## National Standards

**GEOGRAPHY STANDARDS**

**ELEMENT FIVE. Environment and Society**
Standard 15. How physical system affect human systems. Standard 16. The changes that occur in the meaning use, distribution, and importance of resources.

**NEXT GENERATION OF SCIENCE STANDARDS**

**MS-ESS3-3.** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

**MS-ESS3-5.** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

## Common Core Standards

**ELA COMMON CORE**

**Reading Standards for 6-8 for Literacy in History/Social Studies**

**Key Ideas and Details**
6-8.RH.1 Cite specific textual evidence to support analysis of primary and secondary sources. (Extension Idea)
6-8.RH.2 Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

**Craft and Structure**
6-8.RH.4 Determine the meaning of words and phrases as they are used in a text, including vocabulary specific to domains related to history/social studies.

**6-8 Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects**

**Text Types and Purposes**
6-8.WHST.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes. (Extension Idea)

a. Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
b. Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
c. Use precise language and domain-specific vocabulary to inform about or explain the topic.
d. Establish and maintain a formal style and objective tone.
e. Provide a concluding statement or section that follows from and supports the information or explanation presented.

**Production and Distribution of Writing**
6-8.WHST.4 Produce clear and coherent

## Other Arizona Standards

**SOCIAL STUDIES STRAND 4**

**Geography**

**Concept 1: The World in Spatial Terms**

PO 1. Construct maps, charts, and graphs to display geographic information.

PO 3. Interpret maps, charts, and geographic databases using geographic information.

**Concept 2: Places and Regions**

PO 1. Describe the human and physical characteristics of places and regions.

PO 3. Compare the historical and contemporary interactions among people in different places and regions.

PO 4. Describe how a place changes over time.

**SCIENCE**

**Life Science**

PO 4. Evaluate data related to problems associated with population growth (e.g., overgrazing, forest management, invasion of non-native species) and the possible solutions.

PO 5. Predict how environmental factors (e.g., floods, droughts, temperature changes).
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writing in which the development, organization, and style are appropriate to task, purpose, and audience.
a. Produce clear and coherent functional writing (e.g., formal letters, envelopes, procedures, labels, timelines, graphs/tables, experiments, maps, captions, charts, diagrams) in which the development, organization, and style are appropriate.

temperature changes) affect survival rates in living organisms.

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<td>HI-28: interpreting information in functional documents (e.g., memos, directories, search engines, manuals, recipes, graphic organizers).</td>
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Overview

Students should be aware that our global temperatures are changing and this change can affect how people live and our economy.

Purpose

In this lesson, students will learn about the weather and landscapes of the New England States while making connections between the maple syrup industry and climate change. Students will also learn to create and interpret a climograph. This lesson includes strategies for diverse learners (ELLs).

Key Vocabulary

Temperature: how hot or cold something is
Precipitation: water falling from the clouds like rain or snow
Graph: mathematical way to show connections between information
Tapping: putting a tube in a maple tree so the syrup will drip out
Climograph: a graph that shows precipitation and temperature over a long time
Sap: juice in a plant (like blood in a human)
Weather: the daily temperature and precipitation
Climate: average of the temperatures and precipitation of a place taken over many years

Materials

- Pre/Post Test Engaging Questions
- Computer and LCD projector
- PowerPoint of maple syrup products, New England, and seasons
- United States map
- Background Information on New England and the Maple Syrup Industry reading
- Climograph Activity worksheet
- Completed Climograph
- Writing Assignments worksheet
- Climate Change Extension Idea
- Case Study 2 The Maple Sugar Industry
- Lesson Scoring Guide
- Youtube of the maple syrup industry

- Pure maple syrup
- Karo syrup (optional)
- Pancake syrup (optional)
- Cups
- Paper towels
- Colored pencils
- Vocabulary cards
- Vocabulary Test and Answer Key

Objectives

The student will be able to:

1. create a climograph.
2. interpret a climograph.
3. use observation skills.
4. summarize their findings in writing.

Procedures

Prerequisite Knowledge: Students know some of the reasons for global climate change.

SESSION ONE

Engage:

a. Begin the session by having students complete the Pre/Post Test Engaging Questions worksheet. Collect and set aside for later. (Preparation: Adapting content, Linking to Background)

b. Show the pictures of some products made from maple syrup and ask if anyone has ever tasted pure maple syrup before. Have classmates share their descriptions of pure maple syrup. (Preparation: Adapting content, Linking to Background)

Explore:

a. Distribute maps of the United States. Tell the students that maple syrup comes from the northeastern region of the U.S. and we often call that part of our country, the New England states. Ask why do think we call these the New England states? Have students color in the New England states. (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut) (Application: Hands on)
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b. Instruct students to watch for clues as to what the landscape is like in the New England States. Then watch YouTube video of the maple syrup industry. http://www.youtube.com/watch?v=XnRXXhvDCZM

(Scaffolding: Comprehensible Input) Record students’ impressions of the landscape on the white board. (Application: Promotes Engagement)

Explain:
a. Have students read Part I of Background Information on New England and the Maple Syrup Industry. Show the slides in the PowerPoint of the four seasons.
b. Now have the students read Part II of the reading. Then have students discuss why they might think the Maple Syrup Industry might be having difficulty. However before sharing ideas with the large group, have students share within their small groups so that ELLs have an opportunity to rehearse their answers. (Integrating Processes: Speaking) Ask groups to share out their ideas. (Integrating Processes: Listening)
c. End this session by explaining the vocabulary words associated with this lesson. Allow ELLs to take home vocabulary cards so they are prepared for Session Two. (Integrating Processes: Reading, Scaffolding: Comprehensible Input)

SESSION TWO

Elaborate:
a. Begin this session with an oral review of the vocabulary associated with this lesson. Have students pair/share with a partner and define the words as you call them out. (Application: Promotes Engagement)
b. Read together the instructions for creating a climograph (climatograph) of Burlington, Vermont. Explain how the climograph will be graded and used for a writing assignment. Then model how to plot the temperature and rainfall for a couple of the months. (Scaffolding: Modeling) Distribute two color pencils to each group. Allow students to partner up and complete the graphing activity. (Grouping Options: Partners)(Application: Hands on)
c. As students complete the climograph, allow students to taste the pure maple syrup. If you wish, you can also bring in imitation maple syrup and Karo syrup for a comparison to the pure maple syrup. (Application: Hands on) (Application: Promotes Engagement)

SESSION THREE

Evaluate:
a. Distribute the Writing Assignments (Part I, II, and II). Explain how the work will be graded.
b. When students are done with all parts, they will complete the Post Test.
c. Students can also complete a vocabulary quiz on the words associated with this lesson.

Assessment

Students will score
• 80% on the Post Test for a geography grade to be considered mastery. (Assessment: Individual or Group, Written)
• A 4 or higher on the 6 Traits Writing Rubric in the area of Ideas and Organization to be considered mastery on the writing assignments. (Assessment: Individual or Group, Written)
• 80% or higher on the vocabulary quiz. (Assessment: Individual, Written or Oral)
• 80% or higher on the creation of the climograph. (Assessment: Group, Written)
• 80% or higher on the Vocabulary Test. (Assessment: Individual, Written)

Extensions

More capable students can do the Climate Change Extension Idea instead of Part III of the Writing Assignment.

Students can compare Arizona trees to those found in the New England area by using, What Tree Is That? Interactive tree identification field guide http://www.arborday.org/trees/whatTree/

Students can write a report comparing and contrasting the weather of Arizona to that of the New England States. The report would include both the climograph of New England already completed and a new one for Arizona.

Sources


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YouTube video: Tapping Trees for Vermont Maple Sap
http://www.youtube.com/watch?v=XnRXXhvDCZM

Province Town Museum-June 2013 exhibit.

Google Images
http://energyquest.ca.gov/projects/thermometer.html

New York Agriculture in the classroom.


Climatograph Worksheet from

Information on Maple Trees and Climate from
http://serc.carleton.edu/eslabs/weather/1c.html