

Sustainability: The High Cost of Not Eating Locally

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Grade Level 8
Duration 2-3 class period

National Standards

GEOGRAPHY
Element 5: Environment and Society
 14. How human actions modify the physical environment.

NEXT GENERATION SCIENCE STANDARDS
Performance Expectation:
 MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

AZ Standards

ELA
Writing
Text Types and Purposes
 8.W.1 Write arguments to support claims with clear reasons and relevant evidence.
 b. Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.

SCIENCE
Earth and Space Standard
 8.E1U4.8 Construct and support an argument about how human consumption of limited resources impacts the geosphere.

Arizona Social Science Standards

GEOGRAPHY
The use of geographic representations and tools helps individuals understand their world.
 8.G1.1 Use geographic tools and representations to analyze historical and modern political and economic issues and events. Key tools and representations include but are not limited to maps, globes, aerial and other photos, remotely sensed images, tables, graphs, and geospatial technology

SIOP Elements		
Preparation Adapting content Linking to background Linking to past learning Strategies used	Scaffolding Modeling Guided practice Independent practice Comprehensible input	Grouping Option Whole class Small groups Partners Independent
Integrating Processes Reading Writing Speaking Listening	Application Hands on Meaningful Linked to objectives Promotes engagement	Assessment Individual Group Written Oral

Arizona English Language Proficiency Standards
Grade 6-8
Basic
Listening and Reading
 Standard 1 By the end of each language proficiency level, an English learner can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing.
 B-1: determine the central idea or theme and explain how they are supported by using some text evidence.
 B-2: recount specific details and information in a variety of texts.



Speaking and Writing

Standard 3 By the end of each language proficiency level, an English learner can speak and write about grade appropriate complex literary and informational texts and topics.

B-3 compose informational text that includes details to develop a topic while using appropriate conventions.

B-5: use examples of precise language and domain-specific vocabulary within informative texts.

Standard 4 By the end of each language proficiency level, an English learner can construct grade appropriate oral and written claims and support them with reasoning and evidence.

B-1: construct a claim about a topic or text.

B-2: supply a reason that supports the opinion and is based on some textual evidence.

B-3 use grade appropriate words and phrases.

B-4: provide a concluding statement to an opinion.

Listening, Speaking, Reading, and Writing

Standard 6 By the end of each language proficiency level, an English learner can participate in grade-appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.

B-1: participate in discussions about familiar topics and texts.

B-2: participate in written exchanges about familiar topics and texts.

B-5: contribute relevant information and evidence to collaborative oral and written discussions.

Standard 7 By the end of each language proficiency level, an English learner can conduct research and evaluate and communicate findings to answer questions or solve problems.

B-1: gather information from multiple provided resources to answer questions.

B-2: paraphrase observations/information notes with labeled illustrations, diagrams, or other graphics, as appropriate.

B-3: cite sources used in research.

B-4: restate the main idea using evidence from text or presentations.

Overview

As we prepare students to become global citizens, one of the most pressing concerns is human impact on the environment and sustainability. How can we create sustainable food systems with a minimal impact on the environment? The concept of food miles has received an increasing amount of attention over the last decade as climate change patterns have become ever more apparent. While there are many other factors which impact the sustainability of the food system and its environmental impact, this lesson provides a tangible way to introduce sustainability to middle school students and help them become informed consumers. It also helps give them a more global perspective of sustainable food systems.

Purpose

In this lesson, students learn to evaluate the environmental impact of consuming food that is not produced locally. Students will look at some of their favorite foods to map where they are produced, calculate the distance the food travels from where it is produced to their plate [food miles], and how this impacts the physical environments. This lesson

includes strategies for teaching diverse learners.

Key Vocabulary

food mile: distance food travels from where it is produced to where it is eaten

pollution: when something is added to the air, land, or water that makes it not safe or suitable to use

eating locally: eating food that is grown/produced nearby (less than 100 miles)

greenhouse gases: gases that trap heat in the Earth's atmosphere and cause the Earth to get warmer

global warming: gradual rising of the Earth's temperature.

Materials

- Chromebook or iPad/Internet
- Variety of food items: boxed foods, canned foods, produce
- Exploration 1: Food Origins worksheet
- Why are Food (F) or Food Products (FP) Transported? List
- Exploration2: Environmental Impacts worksheet
- Elaborate: How Far Did Your Food Travel?

- Vocabulary Cards
- Vocabulary Test
- Environmental Reasons to Eat More Seasonally Infographic
- Evaluate: What is the Cost of Not Eating More Local Foods?
- The Cost of Not Eating Seasonally Writing Rubric
- World map from Arizona Geographic Alliance, <http://geoalliance.asu.edu/sites/default/files/maps/World-at.pdf>
- US Map from Arizona Geographic Alliance, <https://geoalliance.asu.edu/sites/default/files/maps/US-NAMES.pdf>

Objectives

The student will be able to:

1. Use maps to locate information.
2. Use maps to measure distance.
3. Construct and support an argument.
4. Explain the cost(s) of not eating seasonally using key vocabulary and evidence to support their claim.

Procedures

Prerequisite Knowledge: Students should have been introduced to the earth's atmosphere, the greenhouse effect, and have a basic understanding that human behavior impacts the environment. Students should know how to read a map.

SESSION ONE

Engage:

- a. Show students a basket containing several different food items. (Be sure to leave the state/country of origin labels on the produce items.) Ask students, "Where do these food items come from?" After allowing students think time, have them share with their shoulder partner. Ask students to share their ideas. Reveal the state or country of origin for each food item. **(Preparation: Linking to Background; Grouping option: Partners, Whole class)**
- b. Remind students that the earliest people were hunters and gathers. When food supplies ran out, they moved on. The introduction of farming meant that people did not need to travel to find food. Rather, they could grow their own crops and raise animals. They began to build permanent homes and establish themselves in small communities. The food the people ate was grown locally. As cities emerged, farming and

agriculture were moved to the outskirts of the cities. As technology improved crop production, cities continued to grow, taking over agricultural lands. As transportation improved, farmers were able to ship fruits, vegetables, and livestock over greater and greater distances. **(Preparation: Linking to past learning)**

- c. Explain that today they will investigate where certain foods originate, calculate the "food miles," and explore the advantages and disadvantages of transporting food over long distances.

Explore 1:

- a. Divide students into groups of four and distribute the Exploration1: Food Origins worksheet. Ask the groups: "Why do we transport food?" Instruct them to list their ideas on Exploration1: Food Origins. Have students share within their small groups before sharing ideas with the large group so that ELLs have an opportunity to rehearse their answers. Place this sentence frame on the board to help guide the responses. "One reason we transport food is . . ." Ask groups to share out their ideas. **(Grouping Option: Small Groups, Whole class; Preparation: Linking to Background; Integrating Process: Speaking; Application: Promotes engagement)**
- b. Project Why are Food (F) or Food Products (FP) Transported? List so students can add to what they have already identified.

Explore 2:

- a. Distribute the Exploration2: Environmental Impacts worksheet. Ask students: What are the environmental impacts of transporting food long distances? Have partners Think – Pair – Write: **(Grouping Option: Partners; Integrating Processes: Listening, Writing)**
- b. Show video: Field to Fork - Episode 2 "Food Miles" (1.16 min) <https://www.youtube.com/watch?v=b7rn5hH5XN8>
- c. Ask: What new vocabulary words were used in the video clip? Students should come up with food miles, pollution, and eating locally. Discuss terms with students and share Vocabulary Cards so students have a visual image as well as the definitions. Have they heard any of these words before? In what context? Then introduce the other two vocabulary words: greenhouse gases and global warming. **(Scaffolding: Modeling, Comprehensible input)**
- d. Working individually, have students write their answer to the question: What are the

environmental impacts of transporting foods long distances?

- e. **Exit Ticket/Closing:** Provide students with the following questions and sentence frames for completing their Exit Ticket: What did you learn today?

Today I learned . . .

- What is the cost of not eating seasonally/locally?
- The cost of not eating seasonally is . . .

Explain: How Far Did Your Food Travel?

- a. Distribute the Elaborate: How Far Did Your Food Travel? worksheet and a US and world map.
- b. Tell the students that we will learn about how far food travels by looking at some of our favorite recipes. So I am going to share one of my favorite recipes and we will fill in the I Do section of your worksheet. Example: I love guacamole. The four main ingredients are avocados, lime, cilantro, and tomatoes. Write these in the first box. Now to find where these ingredients come from we can use:
<https://www.agmrc.org/commodities-products/foodsearcher-tool/> or just use Google to ask: Who is the largest producer of _____?
- c. Model finding the 4 foods you selected on the internet. Then use the internet to find that location on the US or World map. Then model measuring the distance from your city to that location using the map scale. Record your work on the I Do portion of the worksheet and have students copy as you record. Sample response from Phoenix Arizona:
- Avocado--(Michoacán, Mexico) 1438 miles
 - Lime – (Jalisco, Mexico) 1,205
 - Cilantro – (southern coast California) 440
 - Tomatoes –(southern California) 440
 - TOTAL FOOD MILES: 3523 miles
- (Scaffolding: Modeling; Application: Linked to objectives, Hands on)**
- d. We Do: Have students work individually or in a group to determine their favorite recipe. Have them look for that recipe online and write down the 4 main ingredients in the List of Ingredients. Then have students locate the state or country of origin of their four ingredients, plot where each ingredient was produced on the maps, and record how many miles it traveled to your city.
(Application: Linked to objectives, Hands on; Grouping Option: Independent or Small group)
- e. Call on students to share their maps and lists. Ask them:

- How many miles did your ingredients travel before they reached your plate?
 - Can any of your ingredients be found locally? If so, can they be found locally year round?
 - What can you infer about our food system?
 - How practical would it be to eat only food produced locally?
 - What foods would you be forced to give up?
 - What foods would you be willing to give up?
- f. Using page 2 of the Elaborate: How Far Did Your Food Travel? Worksheet, have students complete the statement: One advantage of transporting food long distance is ...Possible answers:
- We have access to virtually any food all year round.
 - Our food is cheaper due to lower production costs (cheaper labor, land is less expensive in many countries; climate is more favorable to growing more produce).
 - Some states/countries do not have enough land to produce food for their populations.
 - Climate limits what can be grown in a given location at a given time of year.
- g. On the worksheet have students complete the statement: What are some of the disadvantages of transporting food long distances...Possible answers:
- Increased food miles result in an increase in greenhouse gases.
 - Increased costs occur due to transportation costs.
 - Produce is not as flavorful since it is picked early so it can be shipped/stored.
 - Produce not as fresh since it needs to travel for hours/days before getting to a store.
- h. Have students complete the Exit Ticket using the sentence frames:
- One thing I learned today that surprised me was . . .
 - I can reduce my food miles by . . .
 - One question I still have is . . .
- (Assessment: Individual, Written)**

SESSION THREE

Warm-Up:

- a. Project or print and distribute the Environmental Reasons to Eat More Seasonally Infographic. Discuss the information that is shown visually. “Conventional Food” is interpreted as food grown in the usual way on large farms with pesticides and fertilizers to promote crop yield.

- b. Distribute the Think-Write-Share: What connections can you make to yesterday's lesson? Students can use these sentence frames:
- One connection I can make to yesterday's lesson is ____ because . . .
 - Another connection I can make is . . .
- Allow students to think-write for 2 minutes; partner share – 1 minute – which allows ELLs the opportunity to rehearse their answers and share with the whole class. (**Integrating Process: Speaking, Listening; Preparation: Linking to past learning**)
- c. Ask students what surprised them? What is the connection between carbon emission and the greenhouse effect? Possible sentence frames are:
- One thing that surprised me was . . .
 - I agree, what surprised me was . . .
 - The connection between carbon emissions and greenhouse gases is . . .
 - I agree/disagree because . . .

Evaluate: Distribute the Evaluate: What is the Cost of Not Eating More Local Foods? Assessment. Remind students to use the key vocabulary words and evidence from the food miles investigation to support their opinions. (**Assessment: Written, Individual**)

Assessment

Geography

The map work can be graded for accuracy. Mastery will be considered 80% or higher.

Geography and Science

The Exploration2: Environmental Impacts and the Elaborate: How Far Did Your Food Travel? worksheets can be graded for completeness and accuracy. Mastery will be considered 80% or higher.

ELA and Geography

The Vocabulary Test can be graded for language acquisition. Mastery will be considered 80% or higher.

The Explain portion of the Exploration 1: Food Origins and Exploration2: Environmental Impacts worksheets can be graded for claim, evidence, and reason. Mastery will be considered having all three elements in sufficient detail.

Geography, Science, and Writing

The Evaluate: What is the Cost of Not Eating More Local Foods? Assessment will be graded with the Sustainability: The High Cost of Not Eating Locally rubric. Mastery will be considered 12 points or higher.

Extensions

- ✓ Find the important import / export crops of various countries.
- ✓ Start a school or community vegetable garden,
- ✓ Write letters to your school food nutrition director to request that locally produced food be served in the cafeteria.
- ✓ Create a brochure, commercial, or poster informing others about the importance of eating locally.
- ✓ Compare food miles for various fruits and vegetable for different stores: Walmart, Whole Foods, Trader Joes, Sprouts, local farmers market, and the local grocery store(s).
- ✓ Compare food miles for same products at different times of the year, focusing on fruits and vegetables.

Sources

AgMRC Food Searcher Tool:

<https://www.agmrc.org/commodities-products/foodsearcher-tool/>

Environmental Reasons to Eat More Seasonally Infographic: <https://www.fix.com/blog/eating-with-the-seasons/>

Field to Fork - Episode 2 "Food miles"

<https://www.youtube.com/watch?v=b7rn5hH5XN8>

Food Miles.com:

<http://www.foodmiles.com/results.cfm>

World map from Arizona Geographic Alliance,

<http://geoalliance.asu.edu/sites/default/files/maps/World-at.pdf>

US Map from Arizona Geographic Alliance,

<https://geoalliance.asu.edu/sites/default/files/maps/US-NAMES.pdf>