



RUTGERS-NEW BRUNSWICK
School of Environmental
and Biological Sciences



Lesson Five

Food Systems, Resources, and Outputs





Lesson Overview

As a foundation for thinking about the relationship between food and climate change, students will further develop their understanding of the concept of a food system. Lesson 5 further develops an understanding of food's journey from farm to plate (and beyond) as it takes place over the different food system stages.

Next Generation Science Standards

5-ESS3-1: Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.

5-PS3-1: Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS2-1: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

Science and Engineering Practices

- Developing and using models
- Obtaining, Evaluating, and Communicating Information

Cross Cutting Concepts

- Systems and system models
- Energy and Matter

Disciplinary Core Ideas

ESS3.C: Human Impacts on Earth Systems

PS3.D: Energy in Chemical Processes and Everyday Life

LS1.C: Organization for Matter and Energy Flow in Organisms

LS2.A: Interdependent Relationships in Ecosystems

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

Driving Questions

- What are resources/inputs, and what are outputs, and how are these concepts relevant to understanding food systems?
- What are some of the human and natural resources/inputs that are used throughout food systems? What are some of the outputs/impacts of food systems, on the environment and on people?

Observable phenomena

What are resources/inputs? Make a list of resources/inputs you have used today based off the last food item you had.

Blue italicized words are web links for more information.





Learning Objectives

Students will be able to:

- Understand the concept of resources/inputs, and suggest specific environmental and social resources/inputs that are needed at each food system stage.
- Understand the concept of outputs from food systems, and suggest specific outputs, including greenhouse gasses, from each food system stage.

Behavior Change Objectives

As a result of the lesson, students will:

- Identify what resources/inputs are required throughout food systems.
- Identify outputs of food system processes.

Keywords

Food system | stage | resources (environmental and social) | inputs | outputs | production | food processing | distribution | consumption | waste management | components | interactions | food waste, harvesting | landfill

Sources used in the development of this lesson

- Sobal, Jeffery, et al. 1998. "A conceptual model of the food and nutrition system." *Social Science & Medicine* 47(7): 853-863.
[doi.org/10.1016/S0277-9536\(98\)00104-X](https://doi.org/10.1016/S0277-9536(98)00104-X)
- Sustainable Food Center. 2020. "What makes up a food system? Breaking it down into 4 parts."
sustainablefoodcenter.org/latest/blog/what-makes-up-a-food-system-breaking-it-down-into-4-parts

Before you Begin

- Review the video and make sure you know which key words and definitions you want to share with students.
- Load eLearning game 2 and review the game so you understand what students will be doing.
- Prepare to show slides to class.
- Make enough copies of handouts.

Blue italicized words are web links for more information.



Materials

- Presentation Slides and Worksheets
- Computer/Chromebook/Technology
- Video: [youtube.com/watch?v=HIYTPPsjdA4&list=PLKx8NLAujm_nCPmzHM3eUKiaq-vaH55Zw&index=3](https://www.youtube.com/watch?v=HIYTPPsjdA4&list=PLKx8NLAujm_nCPmzHM3eUKiaq-vaH55Zw&index=3)
- Exit Ticket

Background Information

NGSS requires 3rd-5th grade to understand what a system is and understand that it has components and interactions. Students should understand that a system is a group of related parts that make up a whole and carry out specific functions. When students are in middle school, they will go further into details with systems, understanding that interactions within systems include, inputs, outputs, and processes. Some of these interactions can be briefly explained in 3rd and 5th grade to provide students with a better understanding of how a system works.

1st Phenomenon: What are resources/inputs? Lead a class discussion.

1. Have students define what they think resources/inputs are? Then have them recall the last thing they ate today. Have them think about the resources/inputs that would have been used to make and get that food item to their mouth. Discuss as a class.

2nd Video: Getting to Know the Food System

1. To review Food Systems from yesterday have students watch the video Getting to Know the Food Systems.
2. Throughout the video the teacher can pause when key terms are defined and write them on the board for students to see. (For example, resource, matter, and systems.) Having these on the board will help when they move into the game and activity. Students should fill out their video guide handout while watching the video or after watching the video.

3rd eLearning Game: The Food System

1. On the class board/smart board, the teacher demonstrates eLearning game: The Food System. Remind students that they can earn points toward the Climate Change Hero Challenge for playing the games. You can also ask how they are doing with the other activities on the Challenge sheet that was introduced in Lesson 3.
2. Using the Food System Diagram handout, have the students independently or in pairs work through the game to fill in the definition for each stage of the food system.
3. Come back as a whole class to review each step of the system and make sure students have correct information. You can use the game or have slides in presentation going through each step. Tie back to the banana video and the examples they noted from there.



4th Group Activity – Different Foods Going Through the Food System (cont.)

1. The teacher introduces the activity, “In the last lesson we focused on one banana. Now let’s think about a food item that is made from multiple food items. Each group will have a food item that is commonly found in school lunchrooms. Your group’s goal is to think about how this food traveled through each of the five food stages to get to your lunch tray.”
2. The teacher assigns each group one of the food items: milk carton, oatmeal, frozen chicken strips, fruit salad, cooked hamburger patty. The teacher can also allow groups to pick so long as each group has a different food item. If there are more than 5 groups, allow for repeats at teacher’s discretion.
3. The teacher instructs students to look at the corresponding handout. Each member of each group will be the designated note taker for at least one stage. Give students a minute to decide as a group who will take notes for each stage, and who will be the first
4. Using a computer and/or their notes from the previous lessons, students will research to determine each part of the worksheet and what would be the best answers. Teachers remind students that there are specific resources/inputs or energy needed at each stage, while outputs are what the end products of each stage can be. Remind students that they will not fill out the environmental impacts until they move into lesson 13.
5. Depending on the time the teacher leads a whole class discussion, giving each group the chance to share their food item and the process it goes through in the food system. It would be helpful to make a class list while each group presents to see the commonalities and differences between each group.
6. The teacher concludes with a short summary of the lesson and activity. Summary points can include:
 - A. Food systems are all the processes that are involved in bringing food to our plates.
 - B. People can reduce the use of resources/inputs in food systems by making better choices. This will reduce harmful outputs like pollution and greenhouse gases. We’ll learn more about that next time.

Exit Ticket

- Teacher passes out Exit Ticket.
- The teacher collects exit tickets and reviews student answers. Make minor adjustments to the next lesson based on data received.

