RUTGERS–NEW BRUNSWICK
School of Environmental and Biological Sciences

Lesson Thirteen

Environmental Impacts of Food Waste and Solutions to Food Waste

USDA NIFA
New Jersey Department of Environmental Protection
Robert Wood Johnson Foundation

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Lesson Overview

In this lesson, students will understand what food waste is and how it also wastes energy, water, land, money, and effort by human workers and others. This lesson will also discuss the relation of food waste to its impact on Earth's resources and the environment. Students will learn how food waste ends up in landfills which contributes to greenhouse gas emissions. By understanding the problem that is food waste, students will continue to understand the importance of methods to reduce food waste to protect the Earth. Methods concerning how they themselves can implement methods to reduce food waste at home and at school.

Next Generation Science Standards

5-ESS3-1: Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Science and Engineering Practices

- For this lesson, students are engaged in the following Science and Engineering Practices:

Obtaining, Evaluating, and Communicating Information:

- Students will use information from reliable media presented to explain phenomena pertaining to landfills and why they are harmful for the planet.

Cross Cutting Concepts

- Systems and System Models — Earth's atmosphere is an important part of the earth's climate system and is influenced by food waste.

Cause and Effect

- Every day human activities, such as throwing away uneaten foods, add heat-trapping gases to the atmosphere (cause) which causes the earth's temperature to rise and is harming ecosystems and human life.

Disciplinary Core Ideas

In addition, this lesson aligns with the following Disciplinary Core Ideas:

ESS3.C: Human Impacts on Earth Systems
5-ESS3-1: Food is wasted at all stages of the food system including in agriculture, industry, and everyday life which contributes to global warming but there are several ways to reduce food waste and help protect Earth's resources and envir.onments.

ELA Integration

RI.5.7: ***5-ESS3-1*** Draw on information from a digital source demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

Purple italicized words are web links for more information.

Lesson Thirteen

Driving Question(s)

- How does food waste impact the planet?
- Can our food choices and what we do with extra food that we don't eat influence the earth's climate system?

Observable phenomena

Images of a demonstration of food waste producing methane.

Behavior Change Objectives

As a result of the lesson, students will:

- Discuss two new habits they will try out to reduce food waste at home.

Learning Objectives

Students will be able to:

- Name all six resources that are wasted when food waste happens.
- Describe how food waste contributes to climate change.
- Identify two ways to reduce food waste.

Keywords

food waste | landfill | methane | greenhouse gases | resources | environment | energy

Before you Begin

- Before beginning this lesson make sure students are broken up into groups (the same groups as previous lessons or new groups, choice made by the teacher). Introduce today's lesson as The Environmental Impacts of Food Waste and Solutions to Food Waste.
- Review the entire lesson
- Review the eLearning game
- Prepare the Food System and Food Waste cards and cut them in advance. Make enough copies for each group to have all food system cards, one sheet of Food Waste Cards, and one sheet of the Environmental Impact Cards.

Materials

- Presentation Slides and Worksheets
- Computer/Chromebook/Technology
- Video: ***youtube.com/watch?v=6goQG1uw 8A&list=PLKx8NLAujm_nCPmzHM3eU-KiaqMvaH55Zw&index=7***
- Card Game Materials
- Exit Ticket

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Lesson Thirteen

Warm-up/Review

Together as a class, ask students to answer the following review questions:

1. What are greenhouse gases? Can we name one or two that we remember?
2. Where in the food system does food waste occur the most?

Observable Phenomenon

Observing a landfill, Generating questions:
Introduce the observable phenomenon which is photos of an experiment involving fruit and veggie scraps and water added to bottles with deflated rubber balloons attached to the tops. The photos (in the slides) show what is happening to the balloons over the period of a few days. Students can discuss in groups or as a class, what they are observing; what they think is happening inside the bottles; why or how the balloons are inflating; and/or what the experiment is meant to demonstrate. Students should also generate questions that they have about what's happening in the photos and why. What observations can they make about how different items in the bottles impacted how much or how little the balloon on that bottle was inflated? Do they think they could replicate this experiment in class or at home?

Images for this observable phenomenon were taken from the video, "Sustainability and the Methane Gas Landfill Experiment!" from the YouTube Channel, "Clayton's Exploration Station".

Video Lesson

- Watch the video in advance, if possible and observe points that are ideal to pause video and discuss or reflect with the class
- Play Video embedded in the slides
- Video debrief: Using the worksheet, students will identify two greenhouse gases that are produced as a result of food waste and identify ways that people can reduce waste.
- After the video, call on students to answer questions from the debrief.
- Use the chart in the slides to fill in examples as a class of what environmental impacts they think might occur in different parts of the food system.

Lesson Thirteen

Main In-Class Activity

In small groups, using the same Food System cards used previously, students are given about five minutes to work as a group and assemble a model of a food system again. Then, they will then be given another several minutes to add the Environmental Impact Cards to the food system where they think environmental impacts are occurring. They add "Food Waste" cards by either stacking or placing them next to the Food System cards.

Exit Ticket

Together as a class, review and play the eLearning game embedded in the slides. Remind students where to find the game at home or during free-time if they want to play. Remind them that playing the game helps them earn Climate Change Hero Points on the Class Point sheet.

Time permitting, allow students to go back to the lesson 5 handout 'The Food System' and complete the final column titled 'environmental impacts.' Summarize today's lesson with the student then pass out the Exit Ticket. The teacher collects exit tickets and reviews student answers. Make minor adjustments to the next lesson based on data received.