

Plan, Shop, Chop!
Food Waste Sustainability Lesson Plan

**Outline:** This food waste lesson plan guides students through a meal planning simulation that highlights the impacts of wasted food including greenhouse gas emissions, use of landfill space, and loss of natural resources, human labor, and money. Students plan and shop for a meal then calculate and discuss the impact when an average of 40% of food is wasted in the United States.

**Grades:** 7th -12th

**Time:** 45-60 minutes

**NGSS alignment:** MS-ESS3-4, MS-ESS3-5, HS-ETS1-1, HS-ESS3-4

**Oregon Social Studies Standards alignment:** 8.21, HS.26, HS.49

**ProStart textbook connections**: Chapters 13 (newer edition) and 9 (older edition)

**Link to view or download presentation:** [**https://drive.google.com/file/d/1WELj48g3BnYa3DuoTXg2oQE\_WjD3OlS\_/view?usp=sharing**](https://drive.google.com/file/d/1WELj48g3BnYa3DuoTXg2oQE_WjD3OlS_/view?usp=sharing)

**Essential questions:** What is the impact of wasted food? What can students and families do to take action?

**Learning objectives:**

1. Students will understand the connection between food production and resource use (land and habitat, water, air,human labor, and time).
2. Students will understand the connection between food production, landfills, and climate change.
3. Students will have specific recommendations for home and work to prevent wasted food.

**Lesson materials:**

* Natural resource posters (3)
* Colored chips (to represent natural resources)
* Meal planning worksheets (9, in color)
* Calculations worksheets (1 per group, master copy in B&W)
* Clipboards or writing surfaces (ex. cardboard)\*
* Wet erase pens
* Tape
* Plastic containers (to hold resource chips)
* Small trash can or clear container (for collecting materials)
* Fake money (cut green paper)
* Plan, Shop, Chop! PowerPoint
* Calculators
* Food waste hierarchy activity page *(optional)*
* Banana supply chain activitycards *(optional)*

**\***These items are supplied by the instructor and are *not* included in the kit.

**Helpful vocabulary:** natural resource, nonrenewable, fossil fuel, greenhouse gas, composting,

**Introduction and Simulation (~20 min)**

* **Set-up (before students arrive):** Place natural resource posters (3) around the room with plastic containers of colored resource chips in front of each. Gather a set of materials for each group: clipboard, planning worksheet, wet erase marker, calculations worksheet, money (~40 dollars), and a small container.
* Break students into small groups (no more than 4 students) and let them know they will be working together to plan and shop for their own meal. Hand out materials.
* Allow students time to complete the planning worksheet (with colors) by selecting up to four food items in whole number units (students can choose as many units as they can afford) and calculating the cost. Encourage them to be creative and choose their favorite foods to feed the group. Money is the only limit to what they can prepare, and they should have enough money for everything.
* Have groups fill out the upper part of the main worksheet (B&W) with a description of their meal, total cost, and list of food items and units in the table. Collect the money spent from each group and set aside for later.
* Inform students they will now go “shopping” for some of the natural resources involved in producing the food items they chose. Students move around the room to visit each natural resource poster (land, water, and air) and collect the required number of chips for each item. Remind students to take the right number of chips based on how many units they used (for example, if students are using two units of an item, they take the number of chips listed under “2 units” on the poster) and to record all chips taken in the table. **Let students know that the “air” category includes both production inputs of fossil fuels (for example, fertilizers, machinery, and transportation) and outputs of greenhouse gas (for example, methane gas from cattle digestion) and is thus actually a measure of total greenhouse gas (GHG) emissions that enter the atmosphere.**
	+ - (Recommended): While students shop, collect the unspent money from each group and let them know they won’t need it for anything else during the activity.
* Once all groups have returned to their tables, begin a class discussion about the process. Possible discussion questions include: How did the process of collecting resources go for your group? Why did you pick the foods you picked? Was there anything unexpected? Which foods appeared to use the most and least resources? Why might that be? How are natural resources used in producing food? Some answers include chemicals and fertilizers as well as fuel and energy for irrigation and machinery, transportation, refrigeration, and processing.

**Wasted Food (~15 min)**

* Introduce the strawberry video and ask students to keep track while they watch of all the natural resources being used throughout the process.
* After the video, discuss with students: Can you relate to this video? What did you think was interesting about the video? What natural resources were used? Which of those resources were non-renewable (limited amount available on Earth)? What percentage of food is wasted in the United States? Allow students to guess and fill in the blank for worksheet question 2 with the correct answer (40%).
* Let groups calculate what percent of their natural resources were wasted, separate this number of chips from their piles, and dump them in a central “trash” container.
* View and discuss the slides with information about how much food and resources are wasted and ask students where they think waste occurs. Note that in high-income countries like the United States, most food loss occurs at retail and consumer levels (such as food thrown out in hotel buffets), rather than in storage, transport, and processing (such as lack of refrigeration for fresh milk). Also observe that the most commonly wasted foods are fruits, vegetables, and seafood, and how much food is wasted by consumers in restaurants.
* Prompt students to consider what else (beyond natural resources) is wasted, and move on to worksheet question 3 to calculate the money lost. Have groups report out 40% of their spending, add it up on the board, and then count this amount from what you collected and throw it in the “trash” with the natural resource chips. Discuss the cost of waste in homes, grocery stores, restaurants, etc. and brainstorm other costs this money could be spent on.
* Recognize that not all households experience an excess of food and remind students that one of the most important parts of preventing food waste is making sure edible food gets to people who need it, and that it’s not just people in other countries but in our district that could use that extra food. *Note: however you decide to discuss with your class, it’s important for teachers to recognize that many households experience food insecurity, particularly in Oregon, and that many students in our communities and schools face the opposite reality. This can be a sensitive subject for people. The slide notes offer some statistics and definitions.*
* Ask students why else (beyond natural resources and money) food waste matters, and discuss landfills and climate change. Food is the most common item in trash and rots in landfills to release methane gas, a strong contributor to climate change.
* Ask students to count how many arrows they see going up in the diagram (sources of greenhouse gases). Not only does agricultural production cause GHG emissions (including fossil fuel use and cattle farming), so does food waste. Food waste is such a large contributor to global climate change that Project Drawdown ranked “Reducing Food Waste” as #3 in a list of the 80 most important actions needed to combat global climate change (see www.drawdown.org).

**Solutions and wrap-up (~10 min)**

* Debrief and discuss with students: Why not waste food? What did you find surprising or interesting about the activity? What might you have done differently when meal planning?
	+ Answers: wasting food wastes money, fuel, time, water, and land/habitat, contributes to GHG emissions, creates more trash in landfills, and is unfair because many people don’t have the food they need.
* Give groups 2 minutes to brainstorm as many ways to prevent food waste as possible. Then, show students the photos and the categories (ex. “Plan ahead!”) and see if any can guess what solutions will appear. Optional: students can choose one activity they will commit to and write it on a shared poster in the room.
	+ (Recommended): during the brainstorm, collect chips and containers from all groups to make final clean up easier.
* You can also show examples of food waste prevention solutions from the ReFED report, which are examples of larger scale efforts for businesses and organizations like food donation systems, better packaging, and trayless dining.
* **After the lesson:** Collect all materials, return chips to containers, and clean wet erase marker off of planning worksheets.

**Optional Extensions**

* Pass out the food waste hierarchy activity to each group and ask students to rank the seven actions from most to least desirable (make sure the actions are mixed up at start and end). (~5 min)
* Pass out a set of banana supply chain activity cards (9) to each group. Students first try to put the steps in order at their table, then read aloud popcorn style and count all the natural resources used to produce a banana. (~20 min)
* Discuss and research the connection between food waste and wildlife, highlighting highly impactful crops like palm oil and soy.
* Include reading and activities from ProStart culinary textbook Chapters 13 (newer edition) and 9 (older edition) about repurposing food, composting, organics, and energy and water conservation. Sections like “Following through on sustainable products”, “What the industry can do”, and knowledge checks and chapter activities can reinforce student behaviors and learning.

*This lesson was modified August 2019 by Metro staff, Portland, OR.*