



Waste in our Food System Elementary Facilitator Notes

Objectives:

- Students will understand what happens to the food we don't eat and where it goes "after us".
- Students will demonstrate an understanding of how food system waste should be properly disposed of.
- Students will learn about the many ways in which we can reduce our impact on the environment by minimizing our food-related waste.



Recipe Category: Food: Outside the Box



Cooking Time: 30mins+ (*Choose from this collection of activities according to time available*)



Level of Difficulty: Grade 3-8



Recipe Ingredients:

THE WAYS WE WASTE

Intro to Key Concepts:

- Chalk or whiteboard marker
- Three "Ways We Waste" pictures
- A small garbage bin - black

WHERE SHOULD WE PUT OUR FS WASTE?

Which Bin Is Which?

- Small garbage bin – black
- Landfill picture
- Small recycling bin – blue
- "Recycling is Magic" sheet
- Small green bin
- Green Bin Processing picture

Three Bin Relay Races:

- Three Bin Sorting cards x2 sets
- Small garbage bin - black
- Small recycling bin – blue
- Small green bin

Maze Activity Sheet:

- Maze Activity Sheets (for grade 3/4)

WHERE DOES OUR FS WASTE GO "AFTER US"?

Toronto Green Bin Journey:

- Map of Canada/USA (to show Michigan)
- 1/3 pie chart
- Rope to outline green bin >5m
- Green bin processing picture
- Plastic veggies or cut outs X6
- Household items (e.g. wooden spoons, disposable cutlery, paper plates, saran wrap...) X6
- Hawaiian leis ("yard waste") x5
- Truck costume or prop

- Gardening gloves x4 sets
- Pegs x4
- "Dufferin Organic Processing Facility" sign
- Large catering spoons x6
- Blender (optional)
- Mason jar with muddy water
- Unfinished compost (anaerobic)
- Finished compost or vermicompost
- Worm bin (optional)
- "Aerobic Processing Facility" sign
- Handheld fans (can be folded from paper)

WHAT KIND OF IMPACT DOES FS WASTE HAVE ON THE ENVIRONMENT?

Landfill Salads

- Test tube – one per student
- Grated raw purple beets (and any other grated salad veggies)
- Cooked whole grains such as quinoa, rice or barley
- Vinaigrette dressing (can also be made as part of the workshop)
- Chop sticks or other long, skinny stirrers

WHAT CAN WE DO TO REDUCE OUR FS WASTE?

Pledge

- Postcards
- Pens

HANDOUTS

- Composting handout (FoodShare)
- Green Bin handout (City of TO)
- Toronto Recycling Guide (City of TO)



Curriculum Links:

Gr	Subject	Ontario Curriculum Links
3	Science & Technology	<p>Understanding Life Systems <i>Growth and Change in Plants</i></p> <p>1. Assess ways in which plants have an impact on society and the environment, and ways in which human activity has an impact on plants and plant habitats. (O)</p> <p>1.2 Assess the impact of different human activities on plants, and list personal actions they can engage in to minimize harmful effects and enhance good effects. (S)</p> <p><i>Soils in the Environment</i></p> <p>1. Assess the impact of soils on society and the environment, and of society and the environment on soils. (O)</p> <p>1.2 Assess the impact of human actions on soils, and suggest ways in which humans can affect soils positively and/or lessen or prevent harmful effects on soils. (S)</p>
4	Science & Technology	<p>Understanding Life Systems <i>Habitats and Communities</i></p> <p>1. Analyse the effects of human activities on habitats and communities. (O)</p> <p>1.1. Analyse the positive and negative impacts of human interactions with natural habitats and communities, taking different perspectives into account, and evaluate ways of minimizing the negative impacts. (S)</p>
5	Science & Technology	<p>Understanding Matter and Energy <i>Properties of and Changes in Matter</i></p> <p>3. Demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change. (O)</p> <p>3.6 Explain how changes of state involve the release of heat or the absorption of heat. (S)</p> <p>3.7 Identify indicators of a chemical change (gas, change in colour, precipitate). (S)</p> <p>Understanding Earth and Space Systems <i>Conservation of Energy and Resources</i></p> <p>1. Analyse the immediate and long-term effects of energy and resource use on society and the environment, and evaluate options for conserving energy and resources. (O)</p> <p>1.1 Analyse the long-term impacts on society and the environment of human uses of energy and natural resources and suggest ways to reduce these impacts. (S)</p>
6	Science & Technology	<p>Understanding Life Systems <i>Biodiversity</i></p> <p>1. Assess human impacts on biodiversity and identify ways of preserving biodiversity. (O)</p> <p>1.1 Analyze a local issue related to biodiversity, taking different points of view into consideration; propose action that can be taken to preserve biodiversity and action the proposal. (S)</p>
7	Science & Technology	<p>Understanding Life Systems <i>Interactions in the Environment</i></p> <p>1. Assess the impacts of human activities and technologies on the environment, and evaluate ways of controlling these impacts. (O)</p> <p>1.1 Assess the impact of selected technologies on the environment. (S)</p> <p>1.2 Analyse the costs and benefits of selected strategies for protecting the environment. (S)</p> <p>Understanding Earth and Space Systems <i>Heat in the Environment</i></p> <p>3. Demonstrate an understanding of heat as a form of energy that is associated with the movement of particles and is essential to many processes within the earth's systems. (O)</p> <p>3.2 Identify ways in which heat is produced. (S)</p> <p>3.8 Identify common sources of greenhouse gases and describe ways of reducing emissions of these gases. (S)</p>

8	Science & Technology	<p>Understanding Structures and Mechanisms <i>Systems in Action</i></p> <ol style="list-style-type: none"> 1. Assess the personal, social, and/or environmental impacts of a system, and evaluate improvements to a system and/or alternative ways of meeting the same needs. (O) <ol style="list-style-type: none"> 1.1 Assess the social, economic, and environmental impacts of automating systems. (S) 3. Demonstrate an understanding of different types of systems and the factors that contribute to their safe and efficient operation. (O) <ol style="list-style-type: none"> 3.1 Identify various types of systems. (S) 3.2 Identify purpose, inputs and outputs. (S) 3.9 Identify social factors that influence the evolution of a system. (S)
---	----------------------	---

THE WAYS WE WASTE

INTRODUCTION TO KEY CONCEPTS:

What is the “Food System”?

- **Food:** Plants, animals, grains, dairy, beverages and other edible products...
- **The places food is produced:** Farms, greenhouses, gardens, cattle ranch, dairy farm...
- **The places food is processed:** Factories, warehouses, kitchens...
- **The places we buy food:** Restaurants, cafeterias, markets, kiosks, farmers’ markets, supermarkets, food terminal, cafes...
- **How food gets around (and to us!):** Transport systems, shipping etc...

Who is involved in our Food System?

- | | |
|----------------------------------|--------------------|
| ▪ Farmers and Producers | ▪ Advertisers |
| ▪ Transporters | ▪ Purchasers |
| ▪ Chefs, cooks and home cooks | ▪ Sales people |
| ▪ Processors (e.g. in factories) | ▪ Eaters... |
| ▪ Packagers | ▪ Everyone! |

Show the three **Ways We Waste** pictures (see below) to the students one at a time and discuss in more detail the ways that waste is created in our Food System. You can add the pictures to the actual "garbage bin" after discussing each one:

1. Food Waste:



Why might people throw away food? (*Record ideas on the board)

- *Too full to eat it all*
- *Took too much onto their plate, or someone else served them too much*
- *Didn't get around to eating/cooking the food and so it went bad/out of date*
- *Don't like what's on their plate*
- *Not interested in eating it another time as leftovers*
- *It was rotten, damaged or diseased*
- *It was left over from another process (e.g. skins from vegetables, bones from meat)*
- *By accident (e.g. ripe fruit falling from a tree before being picked)*
- *It was too small/too big/wrong shape/wrong colour to sell (e.g. supermarkets)*

2. Packaging Waste:



What foods are usually packaged – and why? (*Record ideas on board)

- *Foods that have travelled and need protection (e.g. imported peppers)*
- *Foods that need to be stored (e.g. flour)*
- *Foods that are processed (e.g. cookies)*
- *Foods that are preserved (e.g. canned goods)*
- *Foods that need to be kept separate from other foods (e.g. meat)*

- *Liquids*
- *Foods that need to be contained (e.g. dried beans)*
- *Foods that retailers want to look nice or convenient for customers, or seen as “clean”*



3. Disposable Containers or Utensils Waste:

Define “disposable”- *Intended to be used once and thrown away.*

When and why do people use disposable containers or utensils for food?

- *Take-out containers and cups*
- *Paper and plastic bags*
- *Paper, plastic or Styrofoam plates and cups*
- *Plastic cutlery or wooden chopsticks*
- *Paper napkins*
- *Plastic (saran) wrap and tin foil*

Why?

- For convenience
- So there are no dishes
- Because a restaurant cooked your food
- If you’re on-the-go and can’t carry stuff like containers around all

Discuss some alternatives to using disposable items such as these... such as glass jars, brown paper bags, Tupperware.

WHERE SHOULD WE PUT OUR FOOD SYSTEM WASTE?

WHICH BIN IS WHICH?

What three bin options do we have when we want to throw something away?

How can you tell which is which? (*Show each bin as it’s suggested*)

- **Garbage Bin** – black bin, or otherwise unlabelled bin

- >> *Waste Becomes Landfill*: Giant piles of garbage that are buried underground, polluting the soil, surrounding waterways, and releasing greenhouse gases into the air.
- *Show the Landfill picture
- **Recycling Bin** – blue bin
 - >> *Waste Becomes New Products*: Collected and sorted at a processing plant and then sold to privately owned companies who create new products out of it (e.g. toilet paper, fibre glass, roof shingles, CDs...)
 - *Show the “**Recycling is Magic**” sheet with the old and new recycled products
- **Green Bin** – green bin
 - >> *Waste Becomes Compost*: Taken to processing plants and then broken down to create compost for farmland and parks (*more on this later for older students*)
 - *Show the **Green Bin Processing picture**

Remember!
“Reduce, Reuse, Recycle”

Sometimes people forget that it’s even more important to **use less** in the first place, or at least try and re-use as much as possible!

Which bin does Food System waste go into?

All three! (*Record brainstormed examples)

- **Recycling** – e.g. Cardboard cereal box, pop bottle
- **Garbage** – e.g. Plastic (saran) wrap, clear plastic berry container
- **Green Bin** – e.g. Banana peel, leftover stew, chicken bone

THREE BIN RELAY RACES:

Using the two sets of *Three Bin Sorting cards*, run a relay race where two teams of students need to sort each type of waste into the correct bin. You can then discuss how they chose to sort them.

- Fruit scraps – Green bin
- Vegetable scraps – Green bin
- Pop bottles – Recycling
- Cereal box – Recycling
- Plastic fruit container – Garbage
- Paper bag – Green bin or Recycling
- Cans – Recycling
- Plastic bags – Garbage
- Chop sticks – Garbage
- Egg shells – Green bin
- Bottles – Recycling
- Coffee grounds and tea leaves – Green bin
- Old bread – Green bin
- Chicken bones – Green bin
- Plastic wrap – Garbage
- Polystyrene cups – Recycling
- Glass jars – Recycling

Maze Activity Sheet (suitable for Gr 3/4):

Hand out the food-related waste *Maze Activity Sheets*. Students have the option of finding their way from their “leftovers” to the recycling bin, garbage bin or green bin.

- *All answers are correct, as the Styrofoam plate can be recycled, the plastic fork is for garbage and the pizza crusts go into the green bin!*
- *Students can also colour the landfill site on the back of the page.*

WHERE DOES OUR FOOD SYSTEM WASTE GO "AFTER US"?

TORONTO GREEN BIN JOURNEY:

Now that we know where there might be waste in our food system, let's talk about what actually happens to the green bin waste once you've disposed of it...

Green Bin Program:

What is the "green bin" program all about?

- Its purpose is to redirect "organic" materials from a privately owned Michigan Landfill and turn them into compost. Organic materials are basically anything that can break down naturally.
 - *Why Michigan? The Keele Valley landfill site in the city of Vaughan closed in 2002 so all of Toronto's garbage is trucked to Michigan! (*show map)*
 - This means the city pays 3x more in disposal costs of garbage than before... So it makes sense for them financially to reduce the amount of garbage we produce!

How much of our overall household waste do you think can be put into the green bin?

- *About one third (or 1 in every 3) *Show the 1/3 pie chart*

Let's find out what *really* happens in the **green bin** program...

Create a large circle using the rope, to create your "green bin" in the middle of the room.

**Show the picture of the Green Bin Processing (again)*

Read the narrative below, or have students take turns reading each step while their peers act out the scenarios.

Facilitator Notes:

- *Select a student to be the main character of the story.*
- *Allocate a student to each of the plastic fruits and vegetables (or cut outs), random household items (e.g. wooden spoon, paper, yoghurt containers, plastic fork, Saran wrap...) and Hawaiian leis as "yard waste".*
- *Have the main character pretend to "toss" the random objects into the circle or green bin as they go about their daily duties.*

1. You've been really busy today, cooking, gardening and generally helping to clean up around the house. In an effort to tidy up, you accidentally threw a bunch of stuff into the green bin, not realizing that the green bin is special. Over the day, you threw in some fruits and vegetables that were rotting in the fridge, some garden scraps from weeding the yard and all sorts of random household stuff that you no longer need.

- *Select a student to be the garbage collector. Use the truck costume or prop*
- *Have the garbage collector herd the green bin contents together and direct them out of the circle.*

2. The stuff in your green bin gets picked up by the collectors each week. They leave the empty green bin behind so you can re-use it over and over. I guess all that stuff you threw in there must have been fine, they seemed to have taken it all, right? Wrong.

■ *Have the garbage collector truck the green bin contents towards the "Dufferin Organic Processing Facility" and deposit them there.*

3. Your green bin material is then taken to one of two places, the Dufferin Organic Processing Facility, or to a City Transfer Station, to be taken to a different facility. This is because the one at Dufferin can only handle so much!

- *Hand out the gardening gloves and/or pegs for noses (it's smelly!) to four students, who will be green bin sorters.*
- *Using a stopwatch or clock, give the sorters a very short time period to collect all of the inappropriate materials and remove them from the bunch (the time will depend on the age group). The sorted (or removed) students can re-join the class.*
- *The sorters don't have much time in real life, as the waste is constantly moving on a belt to the next stage, so the quicker the better!*

4. At the Processing Facility, your green bin material is then sorted by people, to remove large, unwanted stuff that may have ended up in the bin by accident, or as an act of carelessness on our part. Ready, set, go!

- *Have the students who haven't volunteered yet use large, stainless steel spoons to "mix up" the remaining green bin contents, taking this opportunity to remove any unwanted items that the sorters missed earlier.*
- *You could use an actual blender to act as the timer for this stage (e.g. students mix and screen when the blender is on, and stop when it's off).*

5. Once sorted, part of the process is to add water to the mixed up green bin contents. A "hydropulper", or large blender is used to blend up the green bin materials, creating a thick liquid. Unwanted bits, such as plastic (from bags or diapers), stones and glass are screened out or removed by a process called "settling" – where these items float to the top.

- *The students left at this stage can link arms, to form a "sludge".*
- *You can tighten the rope around the group to symbolize the anaerobic tank. Older students could hold their breath to symbolize the lack of oxygen.*
- *Use a sealed container of sludgy looking liquid (e.g. muddy water) and some unfinished compost to compare the two. But what about the gas?*

This gas, otherwise known as "biogas", or methane and carbon dioxide is a known greenhouse gas. There are some examples of using these gases for energy or fuel instead of fossil fuels, however the Toronto Green Bin program is not one of these...yet. They do have plans underway to harvest this renewable, natural gas as an energy source.

6. Okay, so now that we've sorted, mixed, watered and blended, we have our nice gooey, liquidy pulp ready to be broken down. This stuff is then transferred into a large, closed tank where it's broken down "anaerobically" – meaning, without oxygen. Anaerobic composting produces two things, 1. A solid material, and 2. A gas... ****Change of State!**

- *Pulling on one end of the rope, herd the whole sludgy group to the “Aerobic Processing Facility”.*
- *Use the hand-held fans to “aerate” the group.*
- *Show some finished vermicompost to compare with the anaerobic stuff. You can show the worm bin as an option here too.*

7. This unfinished compost is then transported again, to another processing facility to be composted “aerobically”, or with oxygen this time, to create a finished product. When oxygen is involved, there are all kinds of interesting creatures that help out with the process.

****See Also:**

Field to Table School’s *Rotten Apple Party* Workshop for more related activities.

8. The finished product is used on city parks and gardens as compost.

(optional)

9. Older Students:

Analyze and then summarize the green bin journey as a “system”. *What were the inputs, outputs and processes?*

WHAT KIND OF IMPACT DOES FOOD SYSTEM WASTE HAVE ON THE ENVIRONMENT?

LANDFILL SALADS

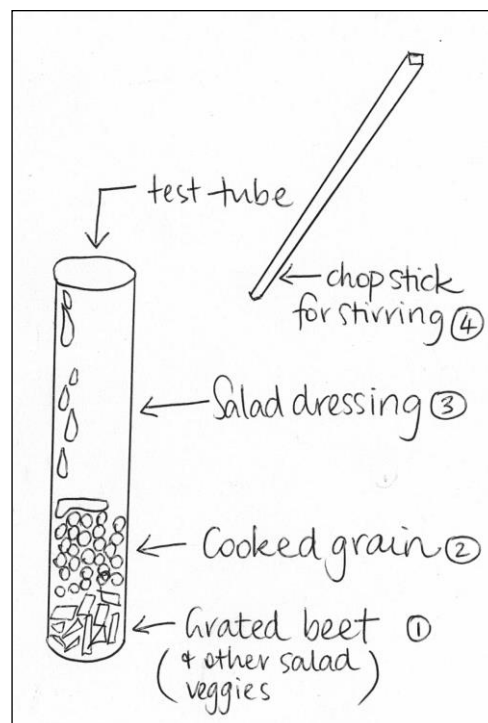
All of our garbage ends up in landfills. These giant piles of random trash are buried underground to form garbage-filled mountains. *What kind of affect do you think this has on the environment?*

- The land needs to be cleared (called “de-forestation”) to create the landfill in the first place
- The animals relying on that habitat have to leave because they’ve lost their home or they get sick from all the junk and pollution
- There is a loss of biodiversity of plants and animals due to deforestation
- The garbage starts to break down over time, oozing hazardous waste into surrounding waterways and soil
- The decomposing garbage releases gases such as methane and CO₂ (known Greenhouse gases) into the air

To show the affect of landfills on the environment, make individual “landfill” salads with the students.

1. Hand out test tubes, or small drinking glasses to each student
2. First, they need to add their garbage, which in this case is freshly grated (this is important for maximum “bleeding”) raw purple beet. *Notice how it leaves a colour on your fingers? It’s already starting to “break down”...*

3. Next, add your soil to cover up your landfill. This can be any light-coloured, cooked whole grain such as quinoa, rice or barley. *Anything happening yet?*
4. Now we need some surrounding waterways. This will be your landfill salad dressing (which can be any kind of vinaigrette). Add this to your salad. *Water ways travel under ground in what's called the "water table", so even though it seems far away – they're all connected!*
5. Over time, the garbage in your landfill continues to break down at different rates, depending on what it is. You landfill shifts and moves over time. *Put you thumb over the top of your test tube and give it a good shake! Or, using a chop stick or other long skinny object to stir up your landfill.*
6. Your students should notice the "bleeding" of the purple colour from the beets throughout their other salad ingredients (including the soil and the water). This is what happens in real life too. Landfills have a negative affect on our environment.
7. Lastly, stick your nose into the top of your test tube. Does it have a smell? What does it smell like? *Oh no! The air has been polluted too!*
8. Eat and enjoy your salads together!



WHAT CAN WE DO TO REDUCE OUR FOOD SYSTEM WASTE?

BRAINSTORM SOME POSITIVE STEPS FOR CHANGE:

- Really think about how hungry you are and choose that amount of food
- Wait until you are finished what's on your plate before getting seconds
- Don't stop using the green bin, it's better than landfill for organic waste
- Choose foods that don't have unnecessary packaging and minimize plastic bag usage at the store
- Use reusable containers, plates, mugs and cutlery, rather than plastic, Styrofoam or paper ones
- Eat-in more and take-out less
- Choose "whole foods" instead of processed ones
- Learn to cook a few basic, simple and cheap meals (share with your friends on reusable plates and cutlery!)
- Compost your own scraps (provide handouts to those that are interested).

PLEDGE:

Using FoodShare postcards or another kind, ask students to write a note to their future selves, and how they personally are going to reduce their food-related waste. Collect or return to FoodShare – make sure they write the name of their school!

Postcards FoodShare receives will be posted back to students in 3 months time!

EXTRA ACTIVITY IDEAS!

****Please make a special request for any of these activities if receiving a Field to Table Schools workshop.***

BUTTON MAKING:

In teams, have students create a button design to showcase what they've learnt today. It needs to be related to waste in the food system!

Each team can have their button made, to be used in the classroom (e.g. for the weekly green bin monitor) back at school.

MAGNET MAKING:

Make magnets with recyclable materials, cutout photos of food waste or mini plasticine sculptures as a reminder of what can go in the blue or green bin. You can find magnetic strips from most craft stores. Use glue sticks or a hot glue gun to attach to the back of the strips.

ARTICLE REVIEW (GR 7&8):

Review the Star article, "How We Waste Food", and discuss:

http://www.thestar.com/news/2008/05/25/how_we_waste_food.html.

JUNKY CRAFTS:

Using leftover food packaging, containers or eating utensils, create arts and crafts with the class. The junk can be collected by the class in the lead-up to the workshop.

You'll need:

- Glue
- Scrap Paper
- Markers
- Glitter etc.
- Scissors
- Pens
- Tape

GARBAGE GRABBER:

This activity is designed to get students moving and learning about what type of waste goes where. You will need a wide-open space to play.

Create signs to hang around the student's necks with one type of waste written on each (e.g. Landfill, Recycling, Compost). You'll also need the *Three Bin Sorting Cards* from the relay races activity.

1. Designate three students with the roles of compost, recycling bin and landfill. They can have a list of appropriate materials they can receive, if needed.
2. The Compost and Landfill can receive a maximum of 3 students with cards due to limited capacity. Recycling can receive an unlimited amount.
3. Scatter the *Three Bin Sorting Cards* on the ground. On your cue, have students pick one card and find the appropriate type of disposal for it. Give them a short time limit (10 seconds, 30 seconds, etc.) that is appropriate for the age group. Repeat with students choosing a new card, if time allows.

4. For an extra level of difficulty, have the three Compost, Recycling and Landfill students moving around during the game!
5. For those students with cards leftover (not matched up with the method of disposal), discuss what happens to them – trucked to another landfill site, resources & energy needed to do this, etc.

WASTE PIZZA AUDIT:

1. Perform a food waste audit at your school (e.g. cafeteria waste of food, recycling and garbage by weight).
2. Make a pizza art piece to show the different types of waste and how much of each type your school produced. This can either be done as a large pizza for the whole class, or in smaller groups using the same data.
3. You can use scraps of that kind of waste to make up each slice of the pizza, for example:
 - a. Food Waste: dried pasta, dried legumes, grains and other non-perishables
 - b. Recycling: juice containers, paper bags etc
 - c. Garbage: plastic wrap, clear plastic containers etc
4. Make a real pizza to demonstrate your results! Choose different toppings for each segment.

LUNCHBOX DETECTIVES:

Students sort through their own lunch boxes (or a fictitious lunchbox) and divide the waste from it into green bin, recycling bin or garbage bin.

- Discuss ways to reduce lunchbox waste based on what you find. For example, wrapping a sandwich in saran wrap vs. using a reusable container.
- Create waste-free lunch posters, cards, or E-Newsletters to put up or distribute around the school. Host a waste-free lunch day at school.

GREEN BIN MEMORY:

Make memory cards (2 sets) with images of items that can go into the Green Bin. For example:

- | | | |
|------------------|--------------------|--------------|
| ▪ coffee grounds | ▪ brown paper bags | ▪ bones etc. |
| ▪ banana peels | ▪ egg shells | ▪ tea bags |

Play a game of memory and learn about what goes into the green bin at the same time!

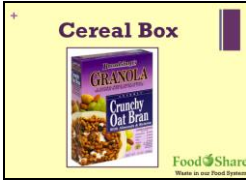


Serving Suggestions:

Three 'waste bin' pictures look like this:



Three Bin Sorting Cards look like this:



The Maze Activity Sheet looks like this:



The Green Bin Processing , Landfill Site and Recycling Magic pictures looks like this:



The 1/3 Pie Chart looks like this:



The Star article "How We Waste Food" looks like this:

<http://www.thestar.com/printarticle/429617>

