New Earth Classroom

ACTIVITY 6
ZERO WASTE (30-40 minutes)

LEARNING OBJECTIVES

1. Students will examine how landfills have evolved over time, why our dependency on them has increased, and how they are harmful to the environment.
2. Students will investigate the greenhouse gas methane and how human activities increase amounts of methane in the atmosphere.
3. Students will identify items that are thrown in the garbage and end up in the landfill.
4. Students will discuss and analyze possible paths of the waste stream: composting, reusing, recycling and disposing in a landfill.
5. Students will consider ways that "garbage" is a resource that could be reused or recycled.
6. Students will discuss the concept of "zero waste" and how some communities have been able to achieve this.

KEY WORDS

landfill, throw-away society, anaerobic decomposition, methane, climate change, reuse, recycle, compost, resource, zero waste

EQUIPMENT

- Cardstock strips (1 sheet of 8½" x 11" cardstock cut into 4 8½" x 2¾" strips; 1 strip per student, plus some extras)
- Markers or crayons
- Masking tape, tacks or magnets (something to affix signs to a wall, board or bulletin board)
- Waste Stream Signs (on quarter-sheets of posterboard): Compost, Reuse, Recycle, Landfill
- Photo of a landfill

SUMMARY & PREPARATION

To prepare the classroom for this activity, display signs (Compost, Reuse, Recycle & Landfill) on the board or wall. Hang the signs just above students' eye level with plenty of room underneath so students can tape or tack their cardboard strips under each heading.

Students brainstorm what items are in their garbage cans at home and write these items down on cardstock strips. They can be asked to notice what items are being thrown away at home in advance, or the kids can just brainstorm during the activity.

Once students write down items, the class discusses each waste stream category displayed on the wall: Landfill, Reuse, Recycle, Compost. Then each student hangs his/her item under the appropriate heading. This encourages the students to think about their waste as a potential resource. Once all items are placed, the class confers about whether each item is placed appropriately.

WHAT IS IN YOUR GARBAGE?

I. WHAT IS IN YOUR GARBAGE?

A. Give each student one blank cardstock strip, and pass out the markers or crayons.

B. Have students write down an item on the cardstock strip that is in their garbage cans at home. Remind them to write large and clearly so words can be seen from a distance.

C. Have extra cardstock strips on hand in case students need another.

D. Once all students have finished, discuss the four possible waste stream paths (see following sections).

LANDFILL

II. LANDFILL

A. What is a landfill? (show photo of a landfill)
A landfill is a site where garbage is buried or dumped, compacted, and covered with soil. Garbage is layered in this manner until the landfill is "full."

B. Why do we use landfills?

1. Humans have always produced waste, but over time, we have needed more and more landfill space because of:

   a. An increase in human population
   b. Increased possessions & consumerism
   c. The rise of the **throw-away society**.
   (Since the 1950s, many products have not been designed to last for lifetime use. Consumers are encouraged to replace and upgrade rather than repair and reuse products.)
   d. An increase in the manufacturing, packaging and disposal of electronic devices (video games, computers, cell phones, dvd players, appliances)
   e. Single use packaging (plastic, Styrofoam, aluminum cans), which takes up about ⅓ of landfill space.
   EXAMPLES:
   - Plastic water, soda & juice bottles
   - Pre-packaged food
   (For example, people used to buy just the amount of meat they needed from butchers, who would wrap the meat in paper. Now meat is sold in pre-weighed amounts on a Styrofoam tray and wrapped in plastic.)
   - Prepared meals that come in plastic trays
   - To-go Styrofoam & plastic packaging from restaurants

C. Problems with landfills

1. **Methane** gas is released as a result of **anaerobic** decomposition (decomposition without oxygen) of organic waste (food scraps, wood, paper). Landfills are one of the nation's largest sources of methane, which is a far more potent greenhouse gas than carbon dioxide and a major contributor to **climate change**
Methane is harmful because:

   a. Methane (CH_4) traps more heat in the atmosphere per molecule than carbon dioxide (CO_2), making it many times more harmful than carbon dioxide for 12 years after it is released

b. After about 12 years in the atmosphere methane oxidizes to become carbon dioxide.
When methane burns, it gives off carbon dioxide.

c. Methane is invisible, odorless and flammable. It is the main component of natural gas. Fewer than 1 in 5 landfills capture methane gas for energy production, but even at these sites, a lot of methane still leaks into the atmosphere.

2. Chemicals (used in cleaners, insecticides, paints and solvents that people throw away) cause leaching in landfills, contaminating surrounding soil and groundwater. Municipalities now line the bottoms of landfills with plastic to try to prevent leaching. Water running off the tops of landfills needs to be collected, tested, and disposed of safely.
3. These problems (methane emission and leaching) also occur at landfills that are already closed and covered up. Closed landfills can continue to emit toxins for more than 50 years.
4. Decomposition occurs very slowly in landfills. Plastic bags and water bottles may take up to 1000 years to decompose and can lead to microplastics entering the ocean.
5. Landfills are getting full, and we are running out of landfill space.
6. Landfills smell bad (from emissions of gasses like ammonia and hydrogen sulfide), they are unsightly, and garbage spreading into surrounding areas can harm wildlife.

REUSE

III. REUSE

A. We can reuse things by finding new uses for them instead of throwing them away.

B. For example, if you outgrow a sweatshirt, you could give it to a friend or the thrift store instead of throwing it away. When old clothes get holes in them, you could use them as cleaning rags or in pet beds.

RECYCLE

IV. RECYCLE

A. Recycling means to convert waste materials into new materials that can be used.

B. We can recycle items like plastic bottles, aluminum cans and corrugated cardboard.

C. The EPA (Environmental Protection Agency) estimates that about 75% of all waste is recyclable.

COMPOST

V. COMPOST

A. Composting is the aerobic decomposition of organic materials (food scraps, leaves, grass clippings and tree branches) into a nutrient-rich soil.

B. We can compost things like apple cores, banana peels, leftover pasta, autumn leaves and grass clippings, right in our own backyards. In a backyard compost, we would avoid adding meat or dairy because they might attract animals to our compost bin or pile.

C. Food is the single largest component taking up space inside US landfills. The US discards more food than any other country in the world, about 120 billion pounds every year. That is estimated to be almost 40% of the entire US food supply and is equal to about 325 pounds of waste per person. The amount of food wasted in America each year is about equal to 130 billion meals.

VI. Invite students to come up to the wall or board and tape or tack their items written on cardstock strips under the appropriate heading (Landfill, Reuse, Recycle, Compost).

VII. Once all items have been placed, discuss each category and the items placed in it as a class.
Begin with Reuse, then Recycle, Compost and Landfill. By saving "Landfill" for last, students may find that something that they thought was garbage could be reused, recycled or composted.
Possible discussion points:

A. What is something new that you learned from this activity?

B. A **resource** is something that can be used to benefit someone or something. How can we think of garbage as a resource?

C. Garbage isn't waste until it's wasted, and it's not garbage until it's thrown away. Instead of burying things we no longer want in the ground, we can save energy and money by composting, reusing & recycling.

ZERO WASTE

VIII. Some communities are adopting the practice of "zero waste."
Zero waste means to conserve resources by engaging in responsible production, consumption, reuse and recovery of products, packaging and materials. Zero waste practices do not include burning "garbage" or putting "waste" in the land, water or air.

A. Why adopt zero waste?

1. It reduces emisisons of greenhouse gasses that would be produced during the manufacturing of new materials. It takes twenty times less energy to make an aluminum can from recycled materials than raw materials.
2. It reduces emissions of methane from landfills, caused by the anaerobic decomposition of organic materials.
3. It saves resources by reusing "waste" materials.
4. It saves food and turns unwanted food back into soil (to grow more food!).
5. It saves landfill space.

6. It is good for the economy. Reducing, reusing and recycling creates ten times more jobs than the disposal of garbage.
7. It helps build community. Clothing, furniture and other items people would have thrown away can be given to community members who need them. Unwanted food can be redistributed to shelters and food banks. Compost can be used in school and community gardens to grow more food. People work together to create and implement solutions,

B. Concepts of zero waste: “The 5 Rs:”
   1. Refuse
   2. Reduce
   3. Reuse
   4. Recycle
   5. Rot

C. Communities that have adopted Zero Waste Policies
   1. Kamikatsu, Japan
      - This remote village recycles, composts or reuses more than 80% of its waste.
      - Residents sort their garbage into 45 different types and separate and wash everything before sending it to recycling centers.
      - The village reduces waste through initiatives like giving new parents cloth diapers and housing a “swap-shop” where residents can leave items for others to take and use for free.
   2. Taiwan
   3. Vancouver, Canada
   4. San Francisco, CA
   5. Cappanori, Italy
   6. Thiruvananthapuram, India
   7. Flanders, Belgium

H. Suggested follow-up activity: have students research a zero waste community and the actions that community is taking to minimize their waste. How has the community benefited? What are some of the challenges? How might a zero waste project be undertaken in the students’ own community?