



# Our Ecological Footprint Activities

ASSOCIATION  
OF ZOOS &  
AQUARIUMS

## Landfill in a Bottle

### **Audience/Group Setting**

This activity is geared towards a classroom setting where students will be able to observe their projects over a period of time.

### **Goal**

To understand the impact that waste has on the environment and how to make responsible decisions about what is done with waste.

### **Objectives**

By the end of this activity, participants will:

- Understand how household/school waste breaks down in a landfill.
- Recognize the impact of waste on the environment.
- Be informed and empowered on ways to reduce, reuse and recycle.

### **Big Idea/Main Message**

Decisions that individuals make when purchasing goods and foods as well as how individuals dispose of materials has a large impact on the environment.

### **Environmentally Responsible Behavior Addressed**

Make wise purchases of goods and food.

### **Background Information**

Consumers can make a significant impact on the environment simply by the choices that they make at the store. For example, according to The Environmental Paper Network organization, research conducted by the Alliance for Environmental Innovation found that if 1 ton of 30% recycled content paper was purchased by consumers instead of paper made from virgin trees, it would save the equivalent of 7.2 trees, 2,100 gallons of water, 1, 230 kW of electricity, and 18 pounds of air pollution.

Much of what we buy quickly becomes waste and is thrown away. Approximately one-third of this waste comes from packaging according to the Clean Air Council. All of this waste requires armies of dump trucks (burning fossil fuels) to collect it in towns and cities all over the world and take it away.

According to a report by Environmental Defense called “Trash and the City,” Manhattan uses diesel trucks to carry garbage 7.8 million miles every year. That would be the equivalent of circling the earth 312 times every year. The Clean Air Council estimates that Americans throw away an average of 230 million tons of garbage per year and about 2.5 million plastic bottles every hour. Some of this waste gets recycled, but most of it ends up in landfills or the ocean. The good news is that you and your students can do something right now to reduce your impact on the environment and protect its inhabitants.

## Materials Needed

- 2 liter pop bottle per student
- Paper bags
- Dirt (from a yard, not a bag)
- Newspaper to cover the tables
- Spray bottle with water
- Pieces of trash (i.e. aluminum, lint, paper, orange peel, plastic bag)

## Staff

This activity will require a teacher to facilitate.

## Length of Activity

The initial set-up of this activity will take about 30 minutes. The entire project will require a month. Throughout this month it is up to the teacher how often they would like to have the students spend observing their landfills.

## Set Up

Gather all of the materials. Have the student bring different trash items from their home. Encourage them to bring a variety of different materials.

## Procedures

1. Before beginning the project get students thinking about waste by asking some or all of the questions below.
  - a. *What do people throw away?*
  - b. *What do you throw away?*
  - c. *Can pollution come from the trash that you throw away?* Yes, pollution to the environment can come from many sources.
  - d. *What can pollution affect?* Pollution affects both plants and animals, including humans. It can even affect the way an ecosystem functions. Pollution, such as carbon dioxide emissions, also affects the earth's climate.
  - e. *How does pollution affect humans and animals?* List specific ways such as causing plants and animals to become threatened or endangered or even decreasing biodiversity by causing plants or animals to become extinct from specific areas (*extirpated*).
2. To help students gain a better understanding of how household/school waste breaks down in a landfill have students bring a few pieces of trash from home (such as paper, plastic, tin, aluminum, cardboard, etc.) or collect trash from your own school. Be sure to include a few food items. *Provide students with exact lists of garbage to bring to class so as to avoid any health concerns.*
3. Explain to students that they will be creating a miniature landfill using a few pieces of garbage and a 2-liter bottle.
  - a. Cut the top off of a 2-liter bottle (1-liter bottles may also be used).
  - b. Cover the sides of bottle with a light eliminating shield (such as a paper bag or other opaque item). This will keep any extra light from getting into the 'landfill' and only allow it to hit the surface (as the sun naturally would).
  - c. Alternatively layer dirt (from the yard, not from a bag) with the pieces of garbage.

- d. Mist the top of the dirt with approximately 1/8 cup of water.
- e. Set the bottle near a window so that it will receive exposure to the sun or if possible set bottles outside.
- f. Be sure to add water to your landfill daily or as necessary to keep the soil lightly moist.
4. Ask students, *where do items in the landfill come from?* Answers should include that people generate the waste, including themselves.
5. Have students make and record observations about their landfills at least once a week. You may also consider having students hypothesize about which items may break down the fastest or not at all.
6. Once students have made a few observations ask them the following questions.
  - a. *What simple changes you can make in order to keep items that don't break down out of landfills or ways to keep harmful items out of landfills?* Answers might include: recycling, produce less trash, produce trash that will not stick around as long, use cloth shopping bags, etc.
  - b. *How can you reduce trash and pollution by making wiser purchases?* Have the students brainstorm different ideas and write them down. You might choose to make copies of the list for the students to take home. Below are some examples ways that you can help.
    - i. Buy products with less packaging or products that have reusable or recyclable packaging.
    - ii. Buy products that are packaged in materials that are made with recycled products.
    - iii. Purchase organic foods, which are grown without the use of pesticides and synthetic fertilizers which are harmful to the environment.
    - iv. Take a reusable lunch box and containers to work or school instead of paper lunch bags and wrappers that get thrown away.
    - v. Check out books from the library instead of buying your own.
    - vi. Purchase items in bulk. This usually uses less packaging and is cheaper.
    - vii. Buy or make your own household cleaners that are environmentally friendly.
7. After 1 month have students take apart their landfill to see how the items have changed. *If possible make this a quarter or semester-long project with students recording their observations over the course of many months and finally taking apart the landfill for further observations at the end of the quarter or semester.*

### **Extensions**

Arrange a field trip with your class to waste management facility. Before your trip, brainstorm different questions to ask. While you are there, have the students write about their experiences and thoughts in a journal. You may also choose to include photos and drawings.

### **National Science Education Standards**

Science as Inquiry  
 Nature of Science  
 Science and Technology in Society  
 Populations, Resources and Environment  
 Evidence, Models and Explanation

### **Resources**

Environmental Paper Network  
[www.environmentalpaper.org](http://www.environmentalpaper.org)  
 Clean Air Council  
[www.cleanair.org](http://www.cleanair.org)