



The creation of this curriculum has been funded in part through a N.O.A.A. Outreach and Education Grant.

## Lesson 8: Single Use Plastics

**Description:** An introduction to single use plastics and the issues that they have created in the environment.





Upon completion of this lesson students will be able to:

Provide examples of alternatives to single use plastic.

## Concepts:

1. Single use items are only used once, or for a very limited amount of time.
2. Plastics can last for many years in the environment.
3. There are alternatives for single use plastics.

## Outcomes:

Upon completion of this lesson students will be able to:

1. Define the term "single use plastic."
2. Provide examples of plastic found in watersheds and on global beaches.
3. Provide examples of alternatives to single use plastic.

---

## Outline:

- I. Pre-Lesson Activity (Complete during a previous day)
  - II. Set up (20 min.)
  - III. Introduction (10 min.)
    - a. Learner Level Assessment
    - b. Behavior Guidelines
  - IV. Create a Bag, Save a Turtle (30 min.)
    - a. Why are Single Use Plastics an Issue?
    - b. Create Your Own Reusable
  - V. Conclusion and Review (5 min.)
  - VI. Follow-up Activities
    - a. Using your Reusable
    - b. Creating Alternatives
    - c. Who's Banning the Bag?
    - d. Create Your Own Cleanup
    - e. Animals Affected by Marine Debris
  - VII. Additional Resources
    - a. Sources
    - b. Vocabulary
-



**All students will need one repurposed T-shirt for this lesson in order to create a reusable bag.**

## I. Pre-Lesson Activity:

In order to help students understand the ubiquitous nature of single use plastic in modern society, this activity should be completed before this lesson is taught. You may recognize this exercise from the follow-up activity set in lesson one. Even if you completed that activity, this is a great time to review it and return to it using the school instead of the home setting:

### Tracking Plastics Challenge

Because plastics have become such an integral part of our lives, we often don't even notice all of the items they are used to create. In the introduction to her book *Plastic: A Toxic Love Story*, author Susan Frankel tries to keep track of all the plastic in her life for 24 hours. This helps her to fully recognize how plastic has come to be part of every facet of our lives. Having students repeat this experiment throughout the course of one school day may help them to recognize why plastic has become such a pollution issue in the world.

*Assessment (Outcome 1): Track every item that you touch during the course of one school day that is made of or contains plastic. Make a special note of items that are usually only used once before they are thrown away or recycled. This list should start from the time you enter the school until the time you leave, including lunch and recess. If you can't add to the list during a class period because you are otherwise occupied, stop and add to the list after the period is over. No need to list items twice, just add a check every time you touch an item a second time.*

## II. Set up (20 min.)

This lesson requires a screen and projector to show visuals to the class. It's up to the instructor whether to use videos to teach students how to create a bag from a T-shirt. If you would like to share these videos with the class, you will need an internet connection. If you would prefer to demonstrate creating bags with the students, watch these two videos beforehand and create examples:

Two no sew bag options:

### Simple bag, easiest with younger students:

<https://youtube.com/watch?v=R5MLI5zKQ9o>

### Bag with frill options:

<https://youtube.com/watch?v=lShYJKJ62eo>

The materials for this activity are:

- One repurposed T-shirt for each student to use for creating a reusable bag.
- Sharp scissors for each student

**PLEASE NOTE:** DURING THIS LESSON, PARENT OR COMMUNITY VOLUNTEERS WILL BE NEEDED TO HELP STUDENTS. A MINIMUM OF 5-7 ARE REQUIRED TO HELP TEACH TECHNIQUES AND MONITOR SAFETY.



**Because plastics have become such an integral part of our lives, we often don't even notice all of the items they are used to create.**

### III. Introduction (10 min.)

#### a. Learner Level Assessment

Ask students to take out the list that they created in the pre-lesson activity. Have students organize the items on the list into two categories: items meant to be used for less than a day, and items meant to be used for more than a day. This list should only take into consideration an item's intended use and not whether it was repurposed after that. Compile a class list of all items that were meant to be used for less than a day. These types of items are generally referred to as single use or disposable plastics. They are items that are created for the purpose of being used very briefly and then disposed of.

*Assessment (Outcome 1) Using your class list, create a class definition of single use plastic. Ask students what these items have in common and how they are different from other items. If time allows, have students work in small groups to create a compare/contrast list. Have each small group present their discussion points to the class or to other groups.*

#### b. Behavior Guidelines

Some lessons and activities in this curriculum require tools and/or physical activity, so there may be a need to discuss behavior expectations before activities. In this lesson, students will be using scissors to cut fabric. Sharp scissors will work best and can be dangerous if students are not familiar with how to use them. If they don't have much experience with scissors, or if you're teaching this lesson to younger students, you may want to go through scissor etiquette and technique when you reach that point in the lesson.

Scissor etiquette and technique points include:

- Don't ever cut toward your hand.
- If possible, keep the material you're cutting stretched tight.
- It will be easier to cut with scissors using the back of the blade, closest to the handle.





**Plastic doesn't  
 biodegrade  
 or corrode,  
 and unlike glass  
 it isn't an  
 inert material.**

## IV. Create a Bag, Save a Turtle (30 min.)

### a. Why are Single Use Plastics an Issue?

In lesson four, we learned about how polymers break down and how long they last. Let's take another look at the "How Long Until It's Gone" chart below.

*Assessment (Outcome 1) Using the class definition created in the introduction of this lesson, identify the single use plastics on the chart. Students can do this activity as a class, in small groups, or individually. Next, have students identify the other single use items that are not plastic listed in the chart.*



#### Single Use Plastics:

- Plastic beverage bottles
- Disposable diapers
- Foamed plastic cup
- Plastic bag
- Cigarette filter



**The International Coastal Cleanup is the largest global cleanup effort focused on cleaning up beaches and waterways.**

**Other Items that could be considered single use:**

- Apple core
- Newspaper
- Orange or banana peel
- Waxed milk carton
- Paper towel
- Aluminum can
- Tin can
- Glass bottle

If all of these items can be considered single use, then what's the big deal with plastic? In lesson four, we learned that plastic doesn't biodegrade or corrode, and unlike glass it isn't an inert material. To better understand the issue of single use plastics, let's take a look at the most common items found on the beach in 2015. The International Coastal Cleanup is the largest global cleanup effort focused on cleaning up beaches and waterways. In 2015, this is what the nearly 800,000 people from nearly 100 countries who participated collected:



<http://www.oceanconservancy.org/our-work/international-coastal-cleanup/2016-ocean-trash-index.html>

*Assessment (Outcome 2): Identify as a class which of the top ten most commonly found items are single use plastics. (All except glass beverage bottles and metal bottle caps).*



**Eating plastic can harm and even kill sea turtles, and they are one of many species affected by this issue.**

Discuss as a class or brainstorm in small groups how these items that are commonly found in the ocean can affect animals there. One well researched example is turtles mistaking plastic bags and film as jellyfish they commonly eat. Here is a picture taken by Pamela Plotkin, Ph.D., the director of the Texas Sea Grant College Program, of samples taken from sea turtle stomachs in her lab:



Photo courtesy of Pamela Plotkin

Each zip lock bag contains the stomach contents of one sea turtle. Do you recognize the plastic bag pieces in these samples? A study published in 2015 found that over half of all sea turtles on earth have eaten some type of plastic. Eating plastic can harm and even kill sea turtles, and they are one of many species affected by this issue.

### **B. Create Your Own Reusable**

Depending on the time available and the age of the students, choose a no sew bag option and have students create their own reusable bag.

#### **Two no sew bag options:**

##### **Simple bag, easiest with younger students:**

<https://youtube.com/watch?v=R5MLI5zKQ9o>

##### **Bag with frill options:**

<https://youtube.com/watch?v=lShYJKJ62eo>

**PLEASE NOTE:** DURING THIS SECTION OF THE LESSON, PARENT OR COMMUNITY VOLUNTEERS WILL BE NEEDED TO HELP STUDENTS. A MINIMUM OF 5-7 ARE REQUIRED TO HELP TEACH TECHNIQUES AND MONITOR SAFETY.

*Assessment (Outcome 3) Have students create a reusable bag as an example of an alternative to single use plastic.*

By creating a bag of their own out of an old T-shirt, students are reusing an old item to create something new and also creating an alternative to single use plastic bags. While this is a great way to reuse an old shirt, the only way that the bag will actually reduce the amount of plastic bags students use is if they use it. Every time they use their reusable, one less plastic bag is created to replace a bag they would have used. This is an important point to discuss with students.





**The only way it makes sense environmentally to replace single use items with reusable items is to use the reusable items enough times to equal out the environmental costs it takes to create them.**

## V. Conclusion and Review (5 min.)

In this lesson, students created their own definition for single use plastic, learned about the most common items found on global beaches, explored some of the consequences of marine debris, and created their own reusable bag.

It's important to emphasize to students that the only way it makes sense environmentally to replace single use items with reusable items is to use the reusable items enough times to equal out the environmental costs it takes to create them. Reusable items are generally durable and take more raw material and energy to create. Despite their environmental costs, plastic bags are cheap and easy to make. Review the graphic below to consider initial environmental cost with students:



### CHANGING IMPACTS

After eight uses, not including washing, a reusable plastic bag has a lower environmental impact than a single disposable plastic bag. Numbers given are per 1,000 bags.<sup>a</sup>

<sup>a</sup> Except for single-use polyethylene, which is per 1,500 bags to account for their smaller carrying capacity.

SOURCES: California State University, Chico, Research Foundation; Joseph Greene

Credit: Shutterstock (all)/C&EN

According to the graphic, how many times is it necessary to use a (newly created) reusable bag before it becomes better for the environment to produce than a plastic bag? What cost factors are not taken into account on this chart? Discuss environmental costs of single use plastics with students.

*Assessment (Outcome 3) Ask students why the reusable bag that we created during this lesson is different than the ones shown in this chart. Discuss the value of using repurposed items to replace single use plastics.*





**The ocean is downhill from nearly everywhere, so removing trash from anywhere may keep it from ending up in the ocean.**

## **VI. Follow-up Activities**

### **a. Using Your Reusable**

Have students track their use of their new reusable bag. Work with them to create a chart of when they used their bag and for what. At the end of a given tracking period, have students write about the benefits and challenges of using a reusable bag. In small groups or in pairs, have students compare notes.

### **b. Creating Alternatives**

During this lesson, we created a reusable bag from an old shirt. Most of us have items in our homes that we no longer use. Ask students to choose one single use plastic item from the ICC top ten list found above and create an alternative for it using something from home they are no longer using for its original purpose.

*Assessment (Outcome 3) Have students present their single use plastic alternatives to the class.*

### **c. Who's Banning the Bag?**

Either in class or at home, have students research bag bans around the country. Here are some focus questions: Where are bag bans in effect? Where have they been overturned? Are bag bans the solution to reducing plastic bags in the environment? Which groups represent the two sides of the issue? Organize a class debate to explore these topics after students have conducted their research.

### **d. Create Your Own Cleanup**

Arrange a cleanup with students. Depending on time and resources, this cleanup can take place on school grounds, at a local watershed, or in a local area of concern. The ocean is downhill from nearly everywhere, so removing trash from anywhere may keep it from ending up in the ocean.

*Assessment (Outcomes 2 and 3): Use the ICC Data Card to track your findings. Make special note of the single use plastics you find. Discuss their source and possible prevention measures.*

### **e. Animals Affected By Marine Debris**

Have students choose one single use plastic item from the ICC top ten chart. Research which ocean species are affected by that item and how they are affected. Have students present their findings to the class.



**Single use plastics: Items that were meant to be used only once or for a very brief amount of time before they are disposed of.**

WashedAshore.org  
541-329-0317  
325 2nd St. SE,  
Bandon, Oregon 97411

## VI. Additional Resources

### a. Sources

- **American Chemistry Council**  
<https://plastics.americanchemistry.com/Education-Resources/Publications/#Resource-EnvironmentalProfileAnalyses>
- **California State University, Life cycle assessment of plastic bags:**  
[http://trueusablebags.com/pdf/lca\\_plastic\\_bags.pdf](http://trueusablebags.com/pdf/lca_plastic_bags.pdf)
- **Chemical and Engineering News, “Breaking the Plastic Bag Habit”**  
<http://cen.acs.org/articles/92/i37/Breaking-Plastic-Bag-Habit.html>
- **Clemson University Press, Life cycle assessment of plastic bags:**  
<https://cup.sites.clemson.edu/pubs/grocery-bags/grocery-bags.pdf>
- **Franklin Associates, Life cycle inventories**  
<http://fal.com/projects.html>
- **Global Change Biology**  
<http://onlinelibrary.wiley.com/doi/10.1111/gcb.13078/full>
- **NOAA**  
[https://marinedebris.noaa.gov/sites/default/files/Gen\\_Plastic\\_9-20-11%281%29.pdf](https://marinedebris.noaa.gov/sites/default/files/Gen_Plastic_9-20-11%281%29.pdf)  
[https://marinedebris.noaa.gov/sites/default/files/OR%26R\\_Plastic\\_In\\_the\\_Ocean\\_Infographic\\_FINAL.pdf](https://marinedebris.noaa.gov/sites/default/files/OR%26R_Plastic_In_the_Ocean_Infographic_FINAL.pdf)
- **Ocean Conservancy**  
<http://oceanconservancy.org/our-work/international-coastal-cleanup/2016-ocean-trash-index.html>  
[http://act.oceanconservancy.org/site/DocServer/ICC\\_Eng\\_DataCardFINAL.pdf?docID=4221](http://act.oceanconservancy.org/site/DocServer/ICC_Eng_DataCardFINAL.pdf?docID=4221)
- **Plastic: A toxic love story**  
Freinkel, S. (2011). Plastic: A toxic love story. Boston: Houghton Mifflin Harcourt.
- **Treehugger.com**  
<http://treehugger.com/culture/paper-bags-or-plastic-bags-everything-you-need-to-know/page5.html>
- **United Nations Environmental Program, Marine Plastic Debris and Microplastics**  
<http://unep.org/about/sgb/Portals/50153/UNEA/Marine%20Plastic%20Debris%20and%20Microplastic%20Technical%20Report%20Advance%20Copy.pdf>

### b. Vocabulary

In this lesson, these are words that may be unfamiliar to students. In this context, they have the following definitions:

**Single use plastics:** Items that were meant to be used only once or for a very brief amount of time before they are disposed of.

**Ubiquitous:** “Existing or being everywhere at the same time: constantly encountered: widespread.” Merriam-Webster

**Repurpose:** To use an item for a purpose other than that it was created for.

**Biodegrade:** “To slowly destroy and break down into very small parts by natural processes, bacteria, etc.” Merriam-Webster

**Photodegrade:** “Chemically degrade by the action of light.” Merriam-Webster



## 2016 Washed Ashore Fact:

**80% of marine debris comes from land; from streets to streams to rivers to oceans.**

**WashedAshore.org**

541-329-0317  
325 2nd St. SE,  
Bandon, Oregon 97411

## Washed Ashore Mission Statement:

Washed Ashore builds and exhibits aesthetically powerful art to educate a global audience about plastic pollution in oceans and waterways and spark positive changes in consumer habits.

## How We Fulfill Our Mission:

Our travelling exhibit of sculptures made completely of marine debris moves around the country in order to reach as many people as possible. Through both educational programs and interactions with our art and signage, we help audiences understand the problems of plastic pollution and marine debris. We offer educational programming at exhibit sites and support materials to educators interested in spreading awareness about plastic pollution through community art.

In order to create the sculptures we build, we first collect trash that has been removed from beaches through community beach cleanups and individual volunteers. This trash is then washed, sorted and prepared for the creation process. Each sculpture is designed and directed by a lead artist and then created through a collaboration of Washed Ashore team members, volunteers, students and artists.

## Washed Ashore Facts as of 2016:

- Over 65 giant sculptures have been created.
- Over 35,000 pounds of marine debris have been processed.
- Over 12,500 volunteers have contributed to this project.

## Marine Debris Facts as of 2016:

- Every ocean and every marine environment contain pieces of our trash.
- 80% of marine debris comes from land; from streets to streams to rivers to oceans.
- Plastic pollution is becoming one of the most common items in the sea and has entered the bottom of the ocean food chain.



## National Standards Addressed:

### Next Generation Science Standards

#### 5-LS1-1.

**Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.**

[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]

#### 5-ESS3-1.

**Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.**

#### MS-PS1-3.

**Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.**

[Clarification Statement: Emphasis is on natural resources that undergo a chemical process to form the synthetic material. Examples of new materials could include new medicine, foods, and alternative fuels.] [Assessment Boundary: Assessment is limited to qualitative information.]

#### MS-ESS3-3.

**Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.\***

[Clarification Statement: Examples of the design process include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts can include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or the removal of wetlands), and pollution (such as of the air, water, or land).]

#### MS-ESS3-4.

**Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.** [Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy).

Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.]

## National Common Core Language Arts Standards

- **CCSS.ELS-LITERACY.W.6.3:** Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.
- **CCSS.ELA-LITERACY.W.6.5:** With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.

## National Curriculum Standards for Social Studies

- **Thematic Standard #2)** Time, Continuity, and Change: Include experiences that provide for the study of the past and its legacy.
- **Thematic Standard #3)** People, Places and Environments: Include experiences that provide for the study of people places and environments.
- **Thematic Standard #7)** Production, Distribution, and Consumption: Include experiences that provide for the study of how people organize for the production, distribution and consumption of goods and services.
- **Thematic Standard #8)** Science, Technology, and Society: Include experiences that provide for the study of relationships among science, technology, and society.
- **Thematic Standard #9)** Global Connections: Include experiences that provide for the study of global connections and interdependence.
- **Thematic Standard #10)** Civic Ideals and Practices: Include experiences that provide for the study of the ideals, principles and practices of citizenship in a Democratic Republic.