



Everblue Education

Pla-Stick It in the Trash

This month's lesson explores solutions to plastic pollution in the ocean. It is based on a 2019 paper by Portland State University researcher Katie Conlon who digs into the shortcomings of repurposing marine plastics as a solution to the plastics problem. These repurposed ocean plastics end up in products like activewear made from discarded plastic fishing nets, stuffing plastic bottles with other plastic trash to make 'eco bricks', making sculptures with marine trash, or paving roads with plastic waste. While these actions are great for raising awareness of the amount of plastic waste on our planet, they don't address an economy that continually produces huge amounts of plastic, far more than can ever be repurposed or recycled. To significantly reduce the amount of plastic entering our oceans, we will ultimately need to put the responsibility to deal with plastic packaging back on producers, rather than only consumers. This lesson will get students thinking about the trash that is around them in their everyday environment, where it comes from, and where it ends up. Anytime you ask questions to better understand how the world works, you are doing science! It doesn't take a special kind of person to be a scientist, just exploration and curiosity.

Everblue is a 501(c)(3) nonprofit dedicated to encouraging ocean-conscious living by increasing scientific literacy. Our online education resources connect current science to daily life, allowing you to learn about the ocean at your fingertips! Stay in touch by following @oceaneverblue on your preferred social media platform or by visiting our website at www.oceaneverblue.org.

To help us keep the ocean ever blue, please share this program with the teachers and parents you know so we can spread ocean science far and wide. Partnering with marine scientists from around the world who study all parts of the ocean, we've created simple and engaging activities based on recently published papers! These activities connect you and your students to current research while fulfilling education standards for reading, math, science, and writing. Even though the activities are created for grade school, they're fun and informative for parents and siblings, as well! More activities will be available to download for FREE off of our website, with a new lesson added every month.

Research Paper:

Adaptive injustice: Responsibility to act in the plastics economy. *Conlon. 2019.*

Grade Level:

Adaptive for Grades 3-8

Timing:

30 minute segments over 5 days

Materials:

Trash bags, garden gloves, paper, writing utensil, glue, colored writing utensils, smartphone (optional.)

Next Generation Science Standards

| | | |
|--|---|---|
| Science & Engineering Practices: Carrying out Investigations Analyzing Data | Crosscutting Concepts: Patterns Stability and Change | Disciplinary Core Ideas: Earth and Human Activity |
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Activity Overview

| Title of Activity | Learning Cycle Stage | Time |
|-------------------------|--------------------------------|------|
| Plastic Scavenger Hunt | Invitation, Exploration | |
| Turning Trash into Data | Concept Invention, Application | |
| Repurposing Rubbish | Application | |
| Reflection | Reflection | |

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Activity

Plastic Scavenger Hunt

For this activity, you'll need a timer and an open space where students can collect items. If you have one student, have the student compete with themselves against the clock. If you have multiple students, have them compete against each other. Let's get familiar with the kinds of plastic we have in our homes! Find an open space in your house that can be "home base." Notes to you, the instructor, are in *italicized text*. Have all of the students sit in home base while you read them the following:

1. Plastic is a really useful object, and in fact, it makes a lot of our life possible! What is one good way you can think of that plastic helps us?
 - a. *Think of medicines, computers, long-term food packaging, and other things that currently need plastics.*
2. However, plastic can also create a lot of nasty waste. Name one way that plastic is not good for our lives.
 - a. *Think of pollution and chemicals in plastics.*
3. The first step in fixing any problem is recognizing that it exists, so first, we're going to run around the house and find out what kinds of plastic are in our lives!
 - a. *Have the students stand up and get ready to run.*
4. You have 30 seconds to explore the house and find as many items as you can that are made out of plastic. Remember the items and make it back to home base before the timer is up! When we're all back at home base, we'll share the items that we found.
 - a. *You can make this game into a friendly competition by challenging students to find and remember more items than their peers. When the students come back, have them list items they found that were made of plastic. Then, read them the following:*
5. Great job identifying plastics in your house! But did you know there are two main types of plastic? Reusable plastics are items that are made of plastic but meant to be durable and used over and over, such as a computer monitor, plastic tupperware, and plastic parts on home appliances like laundry machines and ovens. Single-use plastics are items that are not meant to last a long time, and are usually only used once, such as plastic to-go bags, plastic straws, and thin plastic packaging on food or around other items. Single-use plastics are a much bigger polluter than reusable plastics, and are seen more often in the ocean. Can you guess what the top plastic polluter items are?

- a. See Appendix II for a list of The Ocean Conservancy's Top 10 litter items collected on their global cleanups in 2019.
6. Let's run around the house again, but this time, only count single-use plastics! You have 30 seconds. Ready, get set, go!
 - a. When students come back, have them compare the single-use items they found.
7. We have one more chance to find plastic in our homes. This time, only count reusable plastics! Ready, get set, go!
 - a. When students come back, have them talk about the pros and cons of making reusable items out of plastic. Talking points could be: durability, wear and tear, potential for breaking, can it be recycled or reused when done, etc.

Reflection questions:

1. Were you surprised by the number of plastic items you found?
2. Did you find more reusable or single-use plastics in your house?
3. What are the pros and cons of reusable versus single-use plastics?
4. What are ideas you have for other things we can use besides plastic to produce these household items?

Turning Trash into Data

For this activity, you will need paper and a writing utensil to record trash collected. Optional: if you as the educator have a smartphone available, download the Marine Debris Tracker app. If your students have a smartphone or tablet, they can also download the app. More information about the app is available at <https://debristracker.org/>. When you log into the app, you can choose which dataset to contribute to. Many people choose to add to the NOAA dataset, so this option appears at the top, but you can pick whichever one from the list you would like! You will also need trash bags and gloves to keep you safe when picking up litter.

This activity is designed to engage students of all ages. The first level of the activity will get students started with a simple cleanup. The following levels will build upon each previous level, becoming more advanced to engage higher level thinking. You can go through as many or as few of the sections of this activity as you like, depending upon the age and engagement of your students. It's up to you! We suggest that you read the description of the different levels before beginning and ask your students which level(s) they are interested in.

Plastic trash is a big problem in natural ecosystems all over the world. Because of this, there are people in many places trying to help fix this problem by doing cleanups on beaches, along rivers, and even in city parks and along roads. Scientists want to know more about what

kinds of plastic trash are the most common in different areas so they can better understand how this pollution is affecting the ocean. Plastic trash is a bummer, but there's good news; you can help scientists collect the data they need! Helping professional scientists collect data is called **citizen science**. So today, we are going to be citizen scientists and clean up our community!

Level 1: Budding Explorers

Grab your trash bags and head outside with your students, whether it is to a local beach, river, park, storm drain, or even the sidewalks of your own neighborhood. You do not need to live by the ocean to prevent trash from entering the ocean.

1. Upon arriving, explain that as students are conducting the cleanup, they will be recording every piece of trash they find, regardless of whether or not they pick it up. If you have a smartphone, you will also enter every piece of trash into the Marine Debris Tracker app,
 - a. If you have very young students and/or only one or two students, this will be a group activity. If you have multiple students, this can be an individual activity (or small teams) so you can make it into a competition! If your students have smartphones, they can also download the app and track as they go.
2. Before students start picking up trash, inform them that there are some things that they should NOT pick up, but should still be recorded in the app:
 - a. Anything too large to carry
 - b. Medical waste (needles, band-aids, masks, gloves, baby diapers, etc.)
3. If you are:
 - a. Staying on Level 1: When you have finished with your cleanup, end with a discussion with your students. What kinds of trash did they find? What did they find the most of? The least? Did they find things that they use?
 - i. If you're using the Marine Debris Tracker app, remember to log all of the items your students found! Remind them that this information is going to be used by professional scientists to help them understand the plastic problem and that although it may feel small to pick up trash, that kind of help can make a big difference!
 - b. Going on to Level 2: Read on!

Level 2: Emerging Investigators

1. Before beginning the cleanup, tell your students that they will be paying attention to the labels on the litter they find. If they find a piece of trash with some kind of branding (i.e. a Coca Cola can, a Reece's peanut butter cup wrapper, a Starbucks coffee cup, etc.), have them categorize the item both by what the item is and what brand made the item. If you have multiple students, they can work in teams, or go solo. This type of investigation is an example of a type of **audit**.

2. At the end of your cleanup, gather your students and ask them what brands they found the most of.
3. Ask students to think about what would happen if these companies were required to reduce the amount of plastic they produced. How would it affect the amount of trash we find? Would this influence other companies to do the same? *Hint: almost definitely yes.*
4. What about if these companies used reusable packaging that the consumer could return when empty? By the way, this kind of system is called a **circular economy**! Brainstorm some ideas for what this system could look like.

Level 3: Advanced Analysts

Now that your students have conducted their trash audit, it may be clear that certain brands and companies are producing large amounts of single use plastic that end up as litter. Lead your students through the following discussion questions on solutions to the plastic problem.

1. Do you think that it should be the responsibility of the producer (the companies making plastic products and packaging) or the consumer (you and I) to deal with plastic pollution? Is that where the responsibility is now?
 - a. If students answer the consumer, why do they think consumers should be responsible?
 - b. If students answer the producer, do they think that individual action can make a significant difference? Why or why not? Even if not, should individuals still make efforts to reduce their plastic use?
2. What are some actions that you as an individual can take to reduce the amount of plastic that exists in the world?
3. What are some actions that companies could take to produce and use less plastic? What can we do as individuals to make these changes happen?

Information for educators: Production companies create far more plastic waste and carbon emissions than any individual. Cleanups and reducing personal plastic use can only make a small difference if companies are continuing to flood the “plastic economy” with products that are made of, and packaged in, plastic. Because of this, it is critical that companies find ways to drastically reduce or eliminate plastic from their production line in order to stop the flow of plastics into the natural environment. One way to do this is for companies to take back any packaging they use for their products and reuse, recycle, or repurpose it (think the milkman of bygone days; when their bottles of milk were empty, people would set them out to be collected and refilled). This removes the responsibility from the consumer and encourages companies to move away from single use.

One way to affect these changes in company operation is to vote! Even if you’re too young to vote, it’s important to start educating yourself now so that when you can vote, it’s easier to understand which candidates will do the most to protect the environment. Ask the adults

in your life, if appropriate, who they are voting for and why they made their decision. It's also important to understand who has the power and control over environmental issues; local, state, and other federal offices are just as important as presidential elections for getting action on environmental initiatives.

In the meantime, you can vote with your wallet! Choosing products that are plastic-free and/or made from natural materials encourages companies to make more of those instead of their current plastic-filled products.

Repurposing Rubbish

For this activity, you will need the print-out sheet in Appendix II, colored writing utensils, and glue (tape works well if you're short a glue stick.)

Read the following introduction to your students before beginning the lesson:

Ocean plastic, or marine debris, is a *huge* pollution problem, but it's easy to overlook since the ocean is so far away and many plastics are too tiny to see with our eyes. Out of sight, out of mind, right? And the middle of the ocean is about as out-of-sight as it gets. To fix this, many artists have taken up the cause and started to use their crafting skills to help people see how big and important plastic pollution is. Take Washed Ashore, for example - this Oregon-based organization collects plastic that people pick up on the beach and turns it into huge ocean sculptures that can be displayed anywhere, from towns to zoos to museums.



photo credit: Oregon Zoo, Smithsonian Ocean, Washington Post

Awesome ocean art like Washed Ashore can help shed light on the issue of plastic pollution, and help people see types of plastic items they use every day in a sculpture. In this activity, you'll get to be an artist, and a scientist, *and* a teacher - you'll create awareness art, then use your scientific knowledge of plastic to educate your friends and family on what you've learned!

Level 1: Sea Sculptors

1. Have your parents or siblings help you find clean pieces of trash in a trash can in your home, and collect them in a tupperware.
2. Bring your full trash tupperware to a table or countertop and separate the trash into five piles based on color.
 - a. Pile 1: blue/green/purple pieces
 - b. Pile 2: black pieces
 - c. Pile 3: white/clear pieces
 - d. Pile 4: red/pink pieces
 - e. Pile 5: yellow/orange pieces
3. Using the color-by-numbers print-out in Appendix II, glue pieces of trash onto the shark according to color.
4. Use any colored writing utensils you have to add your own flair to your shark art, then sign your masterpiece!
5. Take a picture with your art creation and have your parents email it to family and friends, or post it on social media, with a caption of one thing you learned about marine debris from this lesson.
 - a. If you post your photo on social media, don't forget to tag @oceaneverblue and use our hashtag #keeptheoceaneverblue, and we'll give you a shoutout!
6. After your photoshoot, talk about these reflection questions with your parents or educators!
 - a. How can ocean art be used to help people change their plastic use habits?
 - b. How can ocean art be used to convince companies to use and produce less plastic?

Level 2: Investigative Artists

1. Want to take this activity to the next level? Instead of just collecting trash from your trash bin, spend a week collecting the trash that you make on a daily basis.
2. Each day, clean and organize your waste into types and colors of trash. Use the same five color organizing numbers listed above.
3. At the end of the week, use the plastic waste you and your family created over a week to make your shark art, take your photo, and educate your friends!
4. After your photoshoot, talk about these reflection questions:
 - a. Were you surprised by the amount of trash you made in a week?
 - b. In this activity, we connected ocean art with numbers of personal plastic used. How does this make your art even more impactful?

Reflection

As you and your student are cleaning up, talk to your student about what you just did together. Here are some guiding questions to help shape your conversation.

- What was your favorite part of our activity today?
- What is something that you learned about plastic and our ocean?
- Did you notice any patterns during our activity today?
- What is something you wonder about plastic litter?
- What surprised you the most during our activity today?



Appendix I - Instructor Support

Ocean Vocabulary

- **Adaptive injustice** - This is the idea that those who are affected by and find creative solutions to adapt to a problem are not necessarily those *responsible* for solving it. In this case, the communities who find ways to deal with plastic pollution (repurposing, creatively recycling, etc.) are not responsible for the inflow of plastics.
- **Audit** - An environmental audit is a way to take a close look at where plastic pollution is coming from, particularly by identifying the companies and industries responsible for generating plastics that end up in the environment.
- **Circular Economy** - A circular economy aims to eliminate waste by reusing and recycling materials.
- **Microplastic** - Small bits of plastic in the environment. Large pieces of plastic break down into extremely small pieces that can be harmful to ocean life.
- **Plastic** - Plastics refer to many different kinds of materials derived from petroleum (oil) that can be formed into many different shapes and textures. These products can take hundreds of years to fully decompose.
- **Single-use plastic** - Single-use plastics are materials made of plastic that are only intended to be used once, then discarded (like food wrappers). These plastics are often not able to be recycled.

Appendix II - Attached Lesson Materials

The Ocean Conservancy's 2019 Cleanup Data Graphic



Color-by-Numbers Shark (next page)

