Pollution Solutions

Education Resources: 3rd-5th Grade

Students will learn how trash and pollution end up in our waterways and how this impacts the lives of the animals and people that depend on clean water. Thinking critically about their own habits, students will strategize ways to reduce the amount of waste they produce as a class and track their waste reduction on a graph.

Standards Alignment

MLS:

3.LS3.D.1 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

4.ESS2.A.1 Plan and conduct scientific investigations or simulations to provide evidence how natural processes (e.g. weathering and erosion) shape Earth's surfaces.

4.ESS2.B.1 Analyze and interpret data from maps to describe patterns of Earth's features.

5. ESS2.A.1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

NGSS/ILS:

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.

5-ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Pollution Solutions 3rd-5th

Pre-Visit Lesson

45 minutes

Objectives:

- Students will learn what pollution is and why it is unhealthy for the environment
- Students will understand how trash and pollution moves from land to our waterways
- Students will think critically about how their own actions contribute to pollution

Materials:

- photos showing animals entangled with or living among trash/pollution
- clay
- plastic container (shoe box size)
- confetti (or small paper shreds)
- water
- white board/chalk board

Lesson Plan

Engage

If possible, show students some photos of animals living among or entangled in trash or pollution. Keep in mind some students may find such photos disturbing, so we recommend avoiding graphic photos.

Define the word *pollution*: something in an environment that has harmful of poisonous effects. Ask students to give some examples of pollution. Examples may include: trash, chemicals, plastic, etc. Write the examples on the board under the heading “pollution”. Why does it matter if there is trash or chemicals in our environment?

Explain that sometimes things we throw away end up in our rivers, lakes, and eventually flow to the ocean. Since trash doesn’t belong in these places, it can cause harm to the animals that live in these areas. Pollution in water also affects humans because we all need water to survive. Guide students to understanding that trash in the water leaks chemicals and is not good for humans and other animals.

Explore

How does trash and pollution get in our rivers? If possible, create a model in a plastic container using clay. You may choose to have students make models themselves in small groups, or do it together as a class.

Form the clay into a landscape with a hill and a river, and describe these feature to your students. Pour a small amount of water into your “river”. Next, sprinkle paper confetti or other

small pieces of “trash” on the landscape. Then pour a cup of water, simulating rain, on the hill or highest point in your model. Watch the pieces of trash in your model get washed down to the river, which should be the lowest point in your model (modification for 4th grade standards: you may choose to use a topographical map to show how water flows from high elevation to low and washes debris into our waterways and eventually the ocean).

If you are not able to create a model, explain that trash and pollution on the ground get washed into our rivers, lakes, and streams when it rains, and all rivers ultimately flow into the ocean.

This means trash and pollution not only is unhealthy for our local environment, but it eventually pollutes our oceans too.

Explain

Ask students (in small groups or with the class) to share what they noticed about the demonstration. Next, ask them to share what they wonder about the demonstration and how trash gets into rivers. Guide them to understand that rain washes things left on the ground into streams and rivers.

Define the word *litter:* trash left lying on the ground outside. Ask youth to explain how trash ends up on the ground. Answers may include people littering, or leaving trash on the ground, wind blowing trash out of trash cans or dump trucks, or animals like raccoons getting into trash cans and leave trash on the ground. Emphasize that not all litter is done purposely but there is so much trash in the world that it can be difficult to keep it contained.

Elaborate

What might happen to animals when there is a lot of litter in the rivers or oceans? How does litter change an animal’s home? What might happen if an animal mistakes a piece of trash or plastic as food? What can we do to keep litter out of rivers and the ocean?

Evaluate

Ask students to think about what they ate for lunch. Write a few examples on the board. Now ask students to think about how these items were packaged. Challenge students to think of alternatives that would create less trash or waste. Answers may include choosing brands that use less packaging, buying unwrapped foods from a local market or vegetable stand, or buying in bigger quantities and portioning out in reusable containers.

Pollution Solutions 3rd-5th

During Visit Guide

The following discussion points for each gallery of the St. Louis Aquarium will help make the most of your field trip by engaging your students and asking them to recall information discussed in the pre-visit lesson.

Conservation & Education Center

What's your Watershed?

- Using our topographic watershed map as reference, discuss how the surface of the Earth causes rain water to make its way into rivers and eventually the ocean

Plastic Bottle Sculpture

- Learn about humanity's excessive use of single-use, or throw away, plastic bottles while viewing our sculpture of over 5,000 plastic bottles.

Species Discovery

- Explore some local species and research being done to protect them
- These animals are affected by our human actions directly, since they are our neighbors

Digital River Clean-up Game

- This multi-player touch screen game teaches gamers about conservation topics and our collective responsibility to keep waterways healthy

Get Involved! Action Kiosks

- Take an eco-quiz on our touch-screen tablets and discover the impact your lifestyle habits have on the planet – while learning tips to be more eco-friendly (youth and adult quizzes available)

St. Louis Aquarium at Union Station

Confluence Gallery

- Explain that this is an example of our local habitat, and the animals you see here live in our area
- Remind students that these animals are our neighbors, and our human actions, like pollution, affect our local species

Global Rivers

- Rivers all over the world provide fresh water to humans, animals, and plants, making life possible

Changing Rivers

- Discover human and natural changes to a river and how they might impact a river ecosystem

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During Visit Guide *(continued)*

- Encourage students to get their hands wet and explore the interactive water table!

Ocean Shore

- Explore the amazing animals in our touch tanks and help students build reverence for ocean animals
- Splash and play in the river table while experimenting how the volume of water flow impacts erosion and river morphology.

Shark Canyon

- Watch in wonder as over 60 sharks and rays swim above you! These amazing creatures live in the ocean – the same place that receives 9 billion tons of plastic pollution each year
- Keeping water clean is important to help all animals that live in or drink water – yes, that includes humans!

The Deep

- View some very unique animals that live in the depths of the ocean
- Trash has been found even in the deepest areas of the ocean – evidence that we need a solution for the pollution humans are creating!

Pollution Solutions, 3rd – 5th

Post-Visit Lesson

45 min

Objectives:

- Students will think critically about the relationship between human actions and the health of the environment
- Students will evaluate their personal choices and develop strategies to reduce their impact on the environment
- Students will practice creating and interpreting graphs

Materials:

- graph paper
- photo of recycling symbol
- pictures of items that are recyclable

Lesson Plan

Engage

Ask students to recall their field trip to the Aquarium. What was their favorite part? What was one thing they found surprising? What did they learn about how trash and pollution impact animals?

Explore

Ask students to think about what they ate for their last meal. Now think about how these food items were packaged. Have students write down each item they ate and how this item is typically packaged. Allow students to share their answers with the class.

Introduce the word *recycling*, and define it as: taking waste and converting it to a usable item. For example, when glass bottles are recycled, the glass is heated up until it melts and can be reshaped into a new glass bottle. Students may recognize the green arrows in a circle, which is the recycling symbol found on recycling cans and on the bottom of bottles, containers, and other items.

Not all items can be recycled. Provide a list or graphic that shows recyclable items and items that are not able to be recycled. Ask students to circle the items on their list that are recyclable. Walk around and help students identify commonly recyclable items.

You may choose to go more in depth and explain that the number found in the middle of the arrows symbol on products is a label that tells us what kind of material that item is made out of – which tells us whether it is recyclable or not. Different recycling facilities are able to recycle

different types of items. Encourage students to ask their family about what items they are able to recycle at home (if parents are unsure, they can check with their recycling service to learn what types of items/plastics they are able to recycle).

Explain

Plastic pollution is a big issue because plastic doesn't break down like cardboard or paper, and it is used a lot in packaging. Plastic will never disappear or decompose. It only breaks into smaller and smaller pieces, where it may be accidently eaten by animals. Animals can also become tangled in plastic pollution, which is harmful to them.

We don't always know where our trash or recycling goes when we throw it away. Sometimes items blow out of trash cans with the wind or are accidentally dropped and washed into our rivers when it rains. Reducing our waste is the best way to help the planet.

Write the phrase, "Reduce, Reuse, Recycle" on the board, and explain that this is in order of importance. Reducing our waste has the biggest impact, then reusing things is the next best option. If we must purchase throw-away items, always recycle what you can.

Elaborate

Track and graph your class' daily waste at lunch each day. Ask students to count how many items they throw away and how many they recycle. Graphing can be done as a class and displayed on the board, or you may choose to give each student a piece of graph paper and make their own graphs.

Encourage students to talk to their families about the project, and set goals as a class. You may choose to inform your students' households of this project to influence the types of items packed in students' lunches each day. For students who buy school lunch, discuss how buying food in large quantities uses less packaging, and any other relevant information about your school's lunch program, such as: Do they use plastic portion cups, and are they recyclable? Do they recycle the cardboard boxes, cans, or other containers the food comes in? Are the lunch trays throw away material like Styrofoam, or are they washed and reused?

Get students excited by setting goals and brainstorming ways to lower their waste as a group. Each day after recording scores, compare your daily score to previous days, and discuss any differences.

Evaluate

After a week of tracking your class' lunch waste, ask students to share what they found to be most difficult in reducing their waste. What was surprising about this experience? What easy solutions did you find to reduce your waste?

What great ideas did your students come up with to reduce their waste? What sparked your students' interest or motivated them the most? We encourage you to share your results and student work with us by emailing arodgers@stlaquariumfoundation.org with the subject line, "Pollution Solutions".

Special thanks to all our contributing authors for our online educational resources: Michael DePung, Scott Ellis, David Gammon, Monique Hite, Caitlin Horn, Jasmine Jones, Nick Jury, Nissreen Kheir, Katie Lodes, Andrew Miller, Anna More, Debra Myrick, Jennifer Proffitt, Mallika Raman, Matt Scheibel, Alyse Schoeffel, Jessica Schrage, Missy Schuepfer, Hannah Shaughnessy, Keale Siebert, Beverly Velloff, Laura Wesselmann, and Carol York.