LESSON 3.4
HOW TO CAPTURE PLASTIC POLLUTION

GRADE LEVEL	TIME
6-8, 9-12	60 MINUTES

Objective:

Plastic pollution can become marine debris when it is swept up by stormwater and enters a sewer system that has outlets into local waterways. Once plastic pollution becomes marine debris, it has a negative impact on our communities and ecosystems. Many communities have installed various forms of screens, nets, or other physical structures that capture trash and litter before it enters the sewer systems. In this activity, students will learn about the design and management of trash capture technologies that have been installed in watersheds across the country. Students will then design a trash capture device that could be installed in their community.

Instructions:

1. As a class, review the New York City's Department of Environmental Protection Case Study: How New York City is Keeping Our Water Waterways Trash Free.
2. Using the Engineering Design Sheet, each student should design their own capture technology by completing the first five steps. They can draw a picture, describe in words, or construct a model of a trash capture technology.
3. Explore the Environmental Protection Agency's Trash Free Waters Program's Trash Capture Technology Websites and the Trash Capture Technology Example Sheet as a class, in small groups, or independently.
4. As a class, in small groups, or independently, fill out the Trash Capture Technology Comparison Chart for different trash capture technologies. Ask students to think about the advantages and disadvantages of different types of trash capture devices, including the cost of installation, the amount of maintenance required, and any unintended consequences (ie: flooding, debris accumulation, etc.).
5. Have each student present their trash capture device to the class. Each student can evaluate their own model and 2 other students' designs on the Comparison Chart.
6. Have students revisit the Engineering Design Sheet to complete the last step - "Improve" - to make any modifications to their design.
7. Extension activity – explore opportunities for trash capture

Materials:

- Environmental Protection Agency's Trash Free Waters Program: Projects
- Engineering Design Sheet
- Trash Capture Technology Example Sheet
- Trash Capture Technology Comparison Chart
- Trash Capture Technology Innovation Chart
- Trash Capture Technology Reflection Sheet
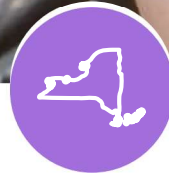- Arts and Craft materials to design, draw, construct model trash capture devices

Learning Standards:

SCI:

5-ESS3-1, MS-ESS3-3, HS-ESS3-4, 3-5-ETS1-1, MS-ETS1-3, HS-ETS1-3

GLLP: 6

technologies in your community.

    a.   As a group or independently, encourage students to walk around their school or neighborhood or visit a local park to look for storm drains or drain outfalls.

    b.   If you students cannot go outside, use the New York State Department of Environmental Conservation's Combined Sewer Overflow Website and Google Earth Map to identify outfalls.

    c.   On a printed map of your local community or watershed (or hand drawn map of their school or neighborhood), have students make recommendations of which trash capture technology may be appropriate for different locations.

Plastic
Pollution
and You

Name: _____ Class: _____ Date: _____/_____/_____

	DESCRIBE: What is the problem you're trying to solve?
	BRAINSTORM: What are some possible solutions to this real world problem?
	DESIGN: Draft a sketch or diagram of your solution. What size will it be? What materials will it be made of?
	CREATE: Use your plan to draw or create a model of your design.
	TEST: If possible, try out your design.
	IMPROVE: How well did your design work, or do you think it would work? Can you make your design better? How?

Plastic
Pollution
and You

TRASH CAPTURE
TECHNOLOGY
EXAMPLE SHEET

Name: _____   Class: _____   Date: _____/_____/_____

TRASH NETS
Large intersecting mesh placed at the end of a storm or sewer drain or pipe that allows water to pass through but captures trash and litter that is larger than the mesh size. These devices must be secured to the drain or pipe so they can withstand the flow of storm water but also be removable when the nets are full and must be replaced.


CURB INLET COVERS
Screens, grates, or other physical devices that allow for water to pass into the storm drain but block trash, litter, and other debris from entering. These structures require routine collection of blocked debris by street sweepers, garbage collection, or volunteers. If debris accumulates to a point that water cannot enter the storm drain, standing water and flooding can occur.


LITTER BOOMS
Floating chain link that traps trash and litter that is on the surface of a body of water. Often placed near the end of drains or pipes to capture debris that is coming out or at a river junction within a watershed. Requires regular collection of debris based on accumulation or water conditions.
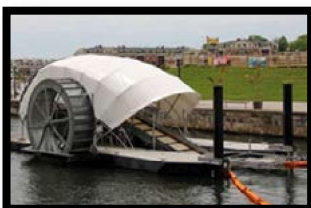
TRASH SKIMMING VESSELS
Autonomous or crew operated boats or other floating water crafts that collect trash using skimmers, conveyor belts, or other mechanical methods to remove floating debris. Baltimore's Water Wheel and the Seabin Project are examples.
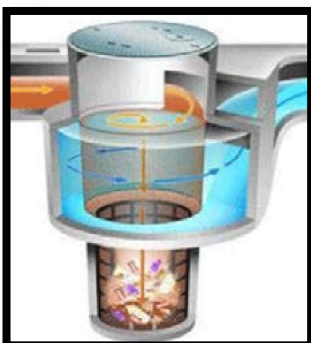
INLINE DESIGNS
Physical devices placed inside sewer pipes that separate and collect trash, litter, and other debris. These devices require complex engineering and construction as well as ongoing debris collection.

Plastic Pollution and You

Name: _____   Class: _____   Date: _____/_____/_____

1. Describe the problem of plastic pollution.

_____

_____

_____

_____

_____

_____

2. What impact could Trash Capture Technologies have in trying to solve this problem?

_____

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_____

_____

_____

_____

Plastic Pollution *and You*

Name: _____   *Class:* _____   *Date:* _____/_____/_____

Trash Capture Technology Name	What are the advantages of this trash capture technology?	What are the disadvantages of this trash capture technology?	Are there any unintended social, cultural, economic, environmental, and/or public health impacts from this technology?
Curb Inlet Cover			
Trash Nets			
Litter Booms			
Trash Skimming Vessels			
Inline Designs			

Plastic Pollution and You

Name: _____   *Class: _____*   *Date: _____/_____/_____*

Trash Capture Technology Name	What are the advantages of this trash capture technology? Does it meet the criteria? Is it feasible? Is it creative?	What are the disadvantages of this trash capture technology? Is it ineffective and/or unrealistic?	Are there any unintended social, cultural, economic, environmental, and/or public health impacts from this technology?
Your Design:			
Other Students Design: 1.			
Other Student Design: 2.			

Plastic Pollution and You

Name: _____   *Class:* _____   *Date:* _____/_____/_____

1. Choose one technology from the table:

    _____

2. Would you choose this technology for your community? Why or why not?

    _____

    _____

    _____

    _____

3. What is one thing that could be done to improve this technology?

    _____

    _____

    _____

    _____