



HUMAN IMPACT UNIT

LESSON PLAN 6rd-8th grade

Topics

Earth Systems
Marine Debris
Microplastics
Run off
Remediation

Objectives

Students will be able to:

- Explain what a watershed is and apply the definition to the Long Island Sound watershed
- Identify solutions to runoff
- Construct an explanation for sources of microplastics
- Compare types of marine debris and identify their degradation time
- Evaluate ways to reduce contaminated waterways

Instructional Materials

Topic Video
Vocabulary Flash Cards

Assessment Materials

Video Reflection Worksheet
Video Quiz
Earth Systems Interactions Worksheet (answer PDF available)
Watershed Worksheet (answer PDF available)
Marine Debris Worksheets (answer PDF available)
Microplastics Worksheet (answer PDF available)
Remediation Worksheet (answer PDF available)
Clean-up Worksheet
PSA worksheet (microplastics)

Topic Articles

**Newsela allows you to adjust Lexile level*

<https://newsela.com/read/natgeo-freshwater-resources>

<https://newsela.com/read/plastics-artic-snow/id/55754/>

Related Materials

Links to videos and reading material that provides additional information on topics.

NOAA Resources



The National Oceanic and Atmospheric Administration (NOAA) is a partner of SoundWaters. These are additional resources you may use in addition to the other materials included above.

Microplastics

<https://oceanservice.noaa.gov/facts/microplastics.html>
<https://blog.marinedebris.noaa.gov/microplastics-and-disease-steelhead-trout>
<https://blog.marinedebris.noaa.gov/understanding-movement-microplastics-river-plumes>
<https://blog.marinedebris.noaa.gov/blue-crab-babies-and-microplastics>

Marine debris

<https://earthrespect.files.wordpress.com/2015/09/marine-debris.jpg>
<https://blog.marinedebris.noaa.gov/digital-debris-learn-about-marine-debris-online>
<https://oceantoday.noaa.gov/every-full-moon/full-moon-trashtalk.html>
<https://marinedebris.noaa.gov/curricula/marine-debris-monitoring-toolkit-educators>
<https://marinedebris.noaa.gov/discover-issue/trash-talk>
<https://marinedebris.noaa.gov/understanding-marine-debris-games-and-activities-kids-all-ages>
[https://marinedebris.noaa.gov/sites/default/files/publications-files/Be an Ocean Guardian Activity Book.pdf](https://marinedebris.noaa.gov/sites/default/files/publications-files/Be%20an%20Ocean%20Guardian%20Activity%20Book.pdf)

NOAA marine debris tracker app (would have to be downloaded to contribute data)
<https://marinedebris.engr.uga.edu/>

Point vs Non-Point source pollution

<https://oceanservice.noaa.gov/education/kits/pollution/016youcando.html>
https://oceanservice.noaa.gov/education/tutorial_pollution/welcome.html

Watersheds/ water movement/water cycle

<https://www.noaa.gov/education/resource-collections/freshwater-education-resources/watersheds-flooding-and-pollution>
<https://www.noaa.gov/education/resource-collections/freshwater-education-resources/water-cycle>
<https://www.michiganseagrant.org/lessons/>
<https://coast.noaa.gov/estuaries/curriculum/watershed-in-a-box.html>

Algae blooms

<https://oceanservice.noaa.gov/hazards/hab/>

NGSS Standards

Human Impacts: MS-ESS3-3

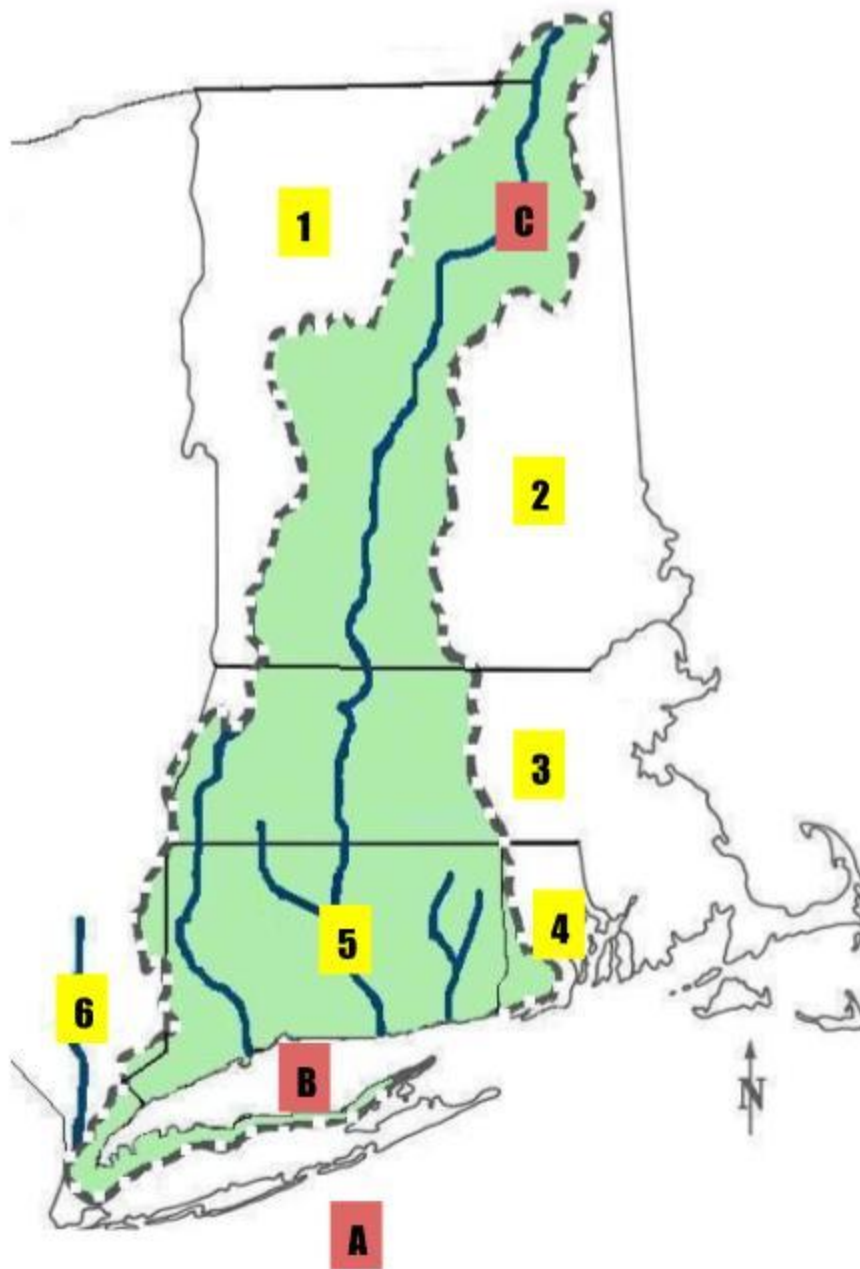
Ecosystems MS-LS2-5

Engineering Design: MS-ETS1-4

This is the Long Island Sound Watershed.

What is a watershed?

An area of land that water moves over until it gets to a larger body of water (like LIS)



Label the states in the watershed:

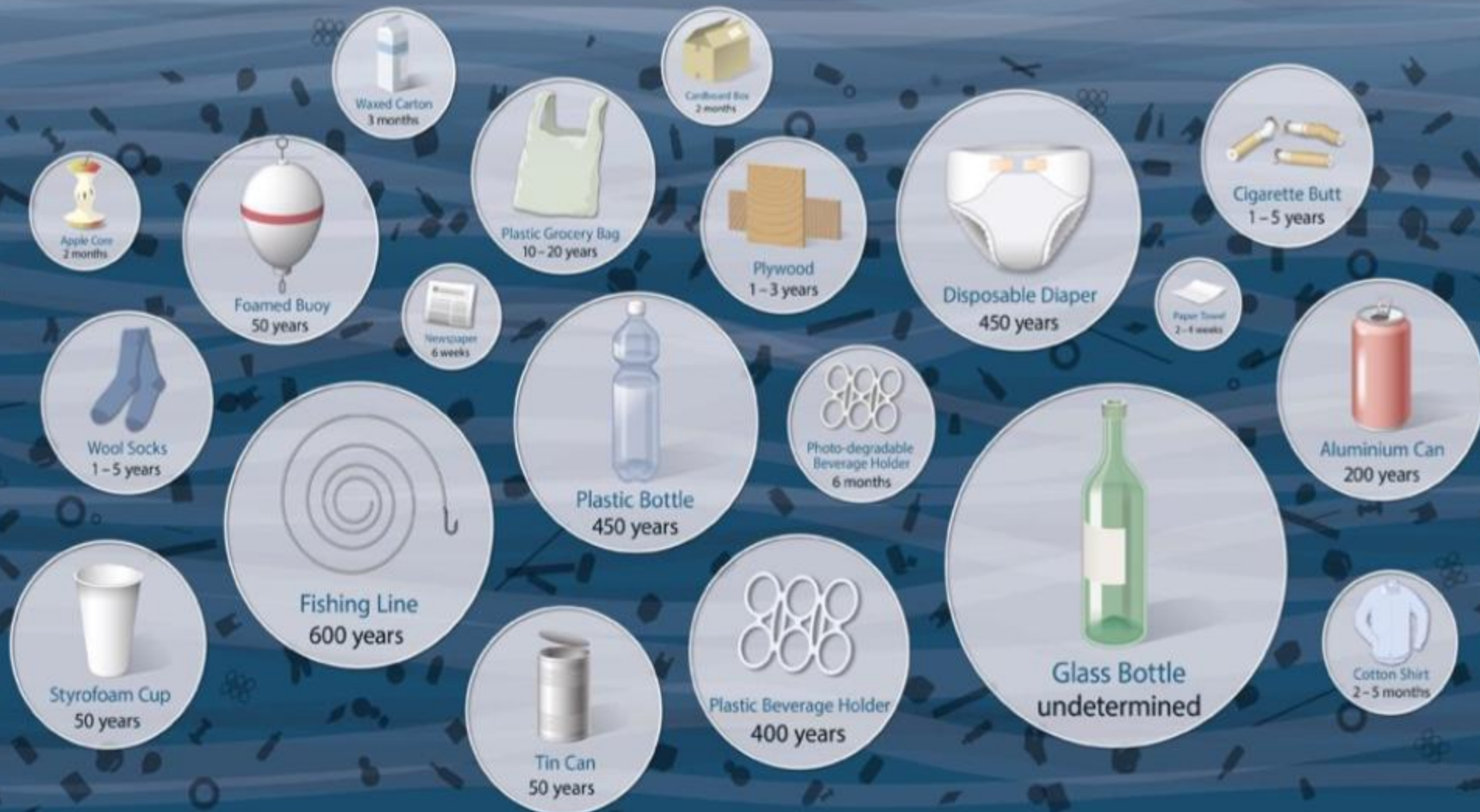
- 1) Vermont
- 2) New Hampshire
- 3) Massachusetts
- 4) Rhode Island
- 5) Connecticut
- 6) New York

Label the bodies of water

- A) Atlantic Ocean
- B) Long Island Sound
- C) (Blue line) River

HOW LONG UNTIL IT'S GONE?

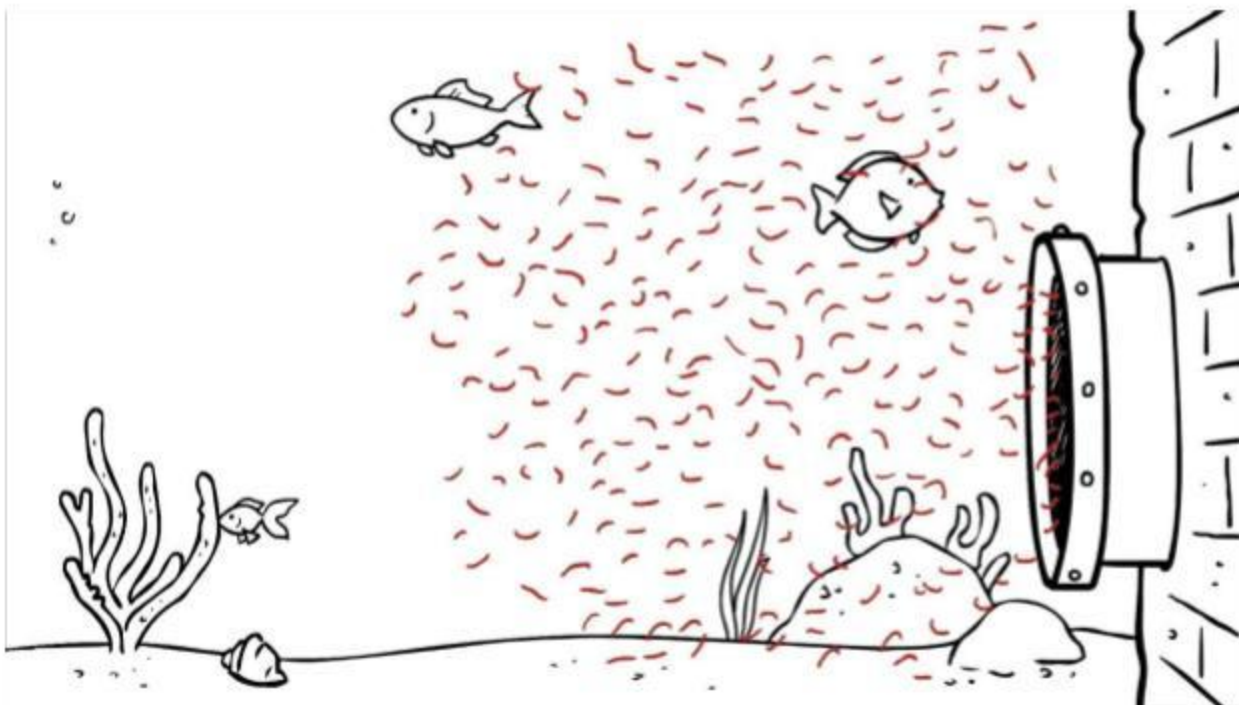
Estimated decomposition rates of common marine debris items



Estimated individual item timelines depend on product composition and environmental conditions.

Source: NOAA (National Oceanic and Atmospheric Administration), US / Woods Hole Sea Grant, US
Graphics: Oliver Lohr / Museum für Gestaltung Zürich, ZHdK

MICROPLASTICS



*The pipe in this picture is coming from a water treatment plant. **Explain what is happening in the picture and what effect it will have on this aquatic environment***

Since the pipe comes from a water treatment plant, the “red stuff” is probably microfibers or microbeads.

The fish are swimming around in it so they are probably eating it and will get eaten by a larger animal, so the microplastic will move up the food chain.

Some of the microplastics may also sink to the bottom or stay floating in the water, so it will continue to exist in the aquatic environment.

What is one thing you can do to help reduce the amount of microplastics going into Long Island Sound?



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There are many ways we have impacted the environment. Below are some of those impacts. Describe the remediation technique developed for each impact



It is estimated that the average American generates 4.5 pounds of waste a day, rapidly filling landfills..

Composting
Reducing single use plastic use
Beach cleanups



The development of roads and structures changed the movement of water, causing erosion.

Retaining walls
Building trenches
Planting vegetation



The addition of impermeable surfaces to the landscape increase the amount of water running off the land, carrying excess nitrogen.

Growing kelp!

RUNOFF

Runoff occurs when rain water moves over the earth. When that happens, the rain water can move different materials with it. Permeable and impermeable surfaces can affect the amount of runoff that happens.



How do you think each of these areas will be affected by runoff from a large rainstorm?

The grass is a permeable surface so it will absorb any water that falls onto it. If there is fertilizer on the lawn and it rains too much, then the rainwater will move the fertilizer toward the river or the storm drain

The road is an impermeable surface and any materials will move from the road to the storm drain, which connects to a larger body of water

The city is full of impermeable surfaces and lots of cars. As soon as it rains, the stormwater will carry all the chemicals (gasoline, oil, etc) and garbage towards the closest body of water.



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EARTH SYSTEM INTERACTIONS

The earth is divided into four major systems: geosphere (G), hydrosphere (H), atmosphere (A), and biosphere (B). These systems interact because they are related to each other.

Which systems are interacting in each one of these situations (use the letters G,H,A,B)

A deer taking a breath and then eating a piece of grass.	B, A
A windstorm in the desert creates dust clouds in the air	G, A
A wave crashes against a coastline and it starts to erode	H, G
A seedling sprouts up in a garden	B, G
A volcano erupts and many trees become uprooted and fall over	G, B
The tide rises causing mussels to open and feed on plankton	H, B
The leaves on a tree going through photosynthesis	B, A
Evaporation from a river that leads to heavy cloud cover	H, A
Daily rainstorms in a tropical rainforest creating a tree canopy	H, B



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