Lesson 4-8:
Beach Cleanup

Activity Summary

Students will participate in a discussion about **watersheds** and storm drains and how these are connected to the Channel Islands National Marine Sanctuary. Then, they will take part on a beach cleanup working in small groups. After collecting as much debris as possible, students will separate the trash in different groups or types of materials. They will weigh each group and calculate the percent that each type of debris represents out of all the trash found at the site. They will create a pie chart of the results, analyze it in their logbook and write 10 ways they can help eliminate beach litter.

Focus Questions

- How does trash end up on the beach?
- How can we prevent marine debris?

Learning Objectives

- Students will participate in a beach cleanup. During this activity students will have the opportunity to provide a service to the environment and the community while learning about recycling, reusing and reducing waste.
- Students will learn that what we do on land can affect our rivers and oceans.
- Students will contribute to a state-wide database used by scientists and resource managers.

Background Information

Litter or trash that finds its way to the ocean, also know as **marine debris**, has become a big problem along our coastlines and in oceans around the world. Marine debris is any man-made object that does not occur naturally in the marine environment. Common types of marine debris include plastic, glass, rubber, metal, paper, wood, or cloth. Some of the most frequently found items include cigarette butts, plastic bags and wrappers, caps and lids, plastic bottles, glass bottles, plastic straws, beverage cans, bottle caps, and cups and utensils.

Marine debris comes from many different sources. Beachgoers may leave behind food packaging and beverage containers, cigarette butts, or toys like shovels, pails, and Frisbees. Trash improperly or carelessly disposed of on land, even hundreds of miles from the ocean, can be blown or washed into rivers or streams, then carried to sea. **Storm water** runoff (water flowing along streets or the ground during

Grades 4 – 7

Field Lesson

Teaching Time

60-90 mins

Teacher Prep

1. Complete district-required fieldtrip requisitions and permission slips
2. Set up transportation
3. Gather materials
4. Make a copy of the inventory sheet for inventory

Materials

- Reusable gardening gloves for each student (use disposable rubber gloves if necessary)
- One garbage bag for non recyclable trash and one for recyclable trash per team of 3-4 students
- Dog or kitty litter scooper
- Scale large enough for weighing trash bags
- Calculators

Handouts:

- "Sources of Marine Debris," *(See page 4.8.6)*
- "Beach Cleanup Data Sheet," *(See pages 4.8.7 - 4.8.9)*. One copy per team of 3-4 students.

Vocabulary

marine debris
recycle
reduce
reuse
storm drains
storm water
watershed

Related Careers

local, national or international Coastal Commission beach cleanup coordinator
state beach ranger
environmental educator
restoration ecologist

Resources

1. www.vims.edu/bridge – Click on "Ocean Science Topics," then "Human Activities," then "Environmental issues," then "Pollution," and scroll to "Marine Debris & Pollution."
2. For information on city-run scheduled beach cleanups:Santa Barbara Creeks Division: www.sbcreeks.com
3. City of Ventura Community Services Department: www.cityofventura.net
4. City of Oxnard Planning and Environmental Services (805) 385-7858
5. California Coastal Commission: www.coastal.ca.gov

storms) can carry litter into **storm drains** that empty into nearby rivers or streams, eventually pouring into the ocean. Boaters may contribute to the problem too. Sometimes, trash is purposefully thrown overboard, or may accidentally fall into the water. In addition, fishing nets, lines, and other equipment can be lost at sea and end up as marine debris.

As well as being unsightly, marine debris poses a serious threat to marine animals. Trash can harm or even kill marine wildlife. Animals strangle and drown from getting tangled in marine debris, or suffer and die from eating plastics and other garbage.

Common items like fishing line, rope, or six-pack rings can entangle animals. Once entangled, an animal may be injured, unable to breathe, move, eat, or escape predators - all of which can be fatal. Plastics are particularly bad, because they take hundreds of years to break down and may continue to trap and kill animals year after year.

Birds, fish, and mammals often mistake marine debris, especially plastic, for food. Some birds even feed it to their young. With plastic filling their stomachs, animals may die of starvation. Sea turtles can mistake plastic bags for jellyfish, one of their favorite foods. Even whales have been found dead with plastic bags inside their stomachs. Ingestion of debris can block air passages and prevent breathing, ultimately causing death. Almost 90% of floating marine debris is plastic. Due to its durability, buoyancy, and ability to absorb and concentrate toxins present in the ocean, plastic is especially harmful to marine life.

Careful collection, handling, and disposal of trash, as well as reducing the amount of trash produced, can help solve the marine debris problem. The United States generates significant quantities of trash every year. Some is **recycled**. But most trash is disposed of, either buried in landfills or burned. Recycling can **reduce** the amount of trash requiring disposal. Recycling is the collection and reprocessing of materials, like plastic, glass, and metal, so they can be used again. Even better is to produce less waste in the first place, by reusing materials, using non-disposable items, or buying items with less packaging. Every item we recycle or **reuse** is one less piece of trash that can end up as marine debris.

At a time when environmental problems seem beyond individual action, marine debris is an area where people of all ages can make a real difference, just by disposing of trash properly, and reducing, reusing and recycling!

Here are some ways you can be part of the solution:

- Avoid buying items with excessive packaging.
- Purchase items in bulk instead of smaller sizes.
- Reuse items like bags and containers instead of throwing them away.
- Reuse boxes, envelopes, newspapers and other packing materials.
- Reuse paper or stationery for scratch paper
- Cut plastic six-pack holder rings, lowering the risk of entanglement if they make it to the sea.
- Hold onto your balloons! NEVER release balloons - they can end up in the ocean and be mistaken for food by hungry marine life.
- Recycle as many items as possible like cans, bottles, newspapers, cardboard, batteries, etc.
- Buy recycled products.
- Keep storm drains that flow into our waterways clean.
- Tightly secure trash in bags or trashcans.
- Participate in local beach, river or stream cleanups.

Learning Procedure

The day before the Beach Cleanup field trip:

1. Discuss the scientific method with your students (purpose/ question, hypothesis, etc.)

2. Have the students get in teams of 3-4 students. These will be the same teams that will work together during the beach cleanup.
   a. Ask the students to come up with a question they want to answer or a purpose for the beach cleanup trip
   b. Then, the students will come up with a hypotheses or possible answer to their question/purpose

On the day of the Beach Cleanup field trip:

3. Beach Cleanup **safety precautions**.
   - When doing an activity with children, provide adequate adult supervision.
   - Provide a first-aid kit, have emergency phone numbers nearby.
   - Let participants know not to pick up any broken glass or sharp objects.
   - Make sure every participant wears gloves.
   - Do not lift heavy objects.
   - Let participants know they should not get close to any animals or birds.
   - Leave animals where you find them.
   - Make sure to step on bare space free of animals such as snowy plover chicks or nests.
   - Establish a meeting point and time for participants on the clean-up day.
   - If you are walking near the surf, never turn your back to the ocean.
   - If you begin to feel very hot, dizzy or tired, notify an adult, drink water, and seek shade.

4. Before giving out the materials to the students, explain the method that will be used to collect debris on that day.

5. Students will first divide into two large groups. One group will comb the upper part of the shoreline while the other group combs the section close to the water line. The large groups will then divide into smaller teams of 3-4 students where each student will have a job: one will be the recorder, one will hold the trash bag and recyclables bag and two will be picking up the trash. The students can switch, so everybody will have a chance to pick up trash. Every piece that is collected will be recorded. The students must decide in which category the items belong.

6. Show the students the area they will be cleaning as well as the division line between the upper shoreline and waterline. Emphasize that the students should only work within their designated area and not to cross the diving line between the upper and lower shoreline.

7. Instruct students to fill out the information on page 2 (Name, School, Date, etc.)

8. Instruct the students to record any observations during the cleanup on page 2 (under Comments).

California Standards

Fourth Grade

- Science; Life Sciences 2.b, Investigation & Experimentation 6.b
- Math; Statistics, Data Analysis, and Probability 1.3
- Language Arts; Writing Strategies, Written & Oral English Language Conventions, Listening & Speaking Strategies

Fifth Grade

- Science; Investigation & Experimentation 6.a
- Math; Numbers Sense 1.2, Statistics, Data Analysis, and Probability 1.2, Math Reasoning 2.3
- Language Arts; Written & Oral English Language Conventions, Listening & Speaking Strategies

Sixth Grade

- Science; Ecology 5.b&e
- Math; Numbers Sense 1.4, Math Reasoning 2.4
- Language Arts; Written & Oral English Language Conventions

Seventh Grade

- Math; Numbers Sense 1.3, Statistics, Data Analysis, and Probability 1.1, Math Reasoning 2.4
- Language Arts; Written & Oral English Language Conventions, Listening & Speaking Strategies

Ocean Literacy Principles

6. The ocean and humans are inextricably interconnected. (e, g)

9. Distribute the materials to the students (clipboard and datasheet, bags, gloves, etc).
10. At their return from the cleanup, collect the bags separating them into recyclable ad non-recyclable items.

Survey #1

1. Weigh the trash and recyclables bags separately.
2. Add these two values to find a total weight for all the items collected.
3. Calculate what percent is trash and what percent is recyclable items by diving the weight of each by the total weight then multiplying by 100.

   Example:

   14 pounds of recyclable items / 58 pounds total = 0.24

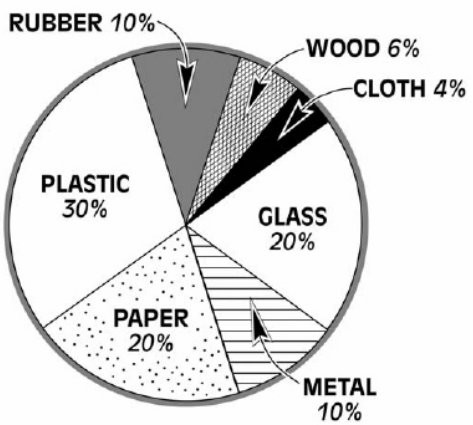
   0.24 x 100 = 24

   24% of the debris collected were recyclable items!

4. Discuss the results. Are there more recyclable items than trash? What could be some reasons for this? (there are many possible answers for the question)

Survey #2

1. In the classroom, consolidate the data onto two datasheets, one for the upper shoreline and one for the water line.
2. Photocopy the datasheets and give them out to the students. Have the students get in their original groups and give each group a data sheet. Groups should have the datasheet for the area they cleaned (upper shoreline or waterline).
3. Now the students will graph the data on the data sheets, but first they need to organize the data. How they will organize the data depends on the question(s) they want to answer. They can keep it organized by material if they want to know what is the most abundant type of material. If they want to know how the debris may have reached the beach, then they could classify the data by possible source of debris (beachgoers, boater, storm drains, etc). For this task, you may chose to have the students transfer the data to Datasheet B or have them come up with their own sources. The Datasheet B will help them organize the data by sources of debris. Each group can choose to answer a different question and therefore organize the data differently.
4. Now have the students create a pie chart or bar graph of their data.



Example pie chart.

5. The students will present their findings by showing their graph and discussing: What was the question they wanted to answer? What results did they obtain from their analysis? Was their hypothesis correct?

6. Discuss with the students their results on: Where is most of the debris coming from? Was debris more abundant on the upper shoreline or the waterline? Why could this be? Why is it important to know the specific location and data the data was collected? What can this tell us about the sources of debris? Which items can be dangerous to wildlife? Which items can be dangerous to humans? How can marine debris affect humans?

Assessment

1. Give three examples of where the trash you collected may have originally come from.

2. What impact might this trash have had on the animals and the environment?

3. List four ways humans can prevent the trash from reaching the beach.

Credit

Data sheets from the "Waves, Wetlands, and Watersheds: California Coastal Commission Science Activity Guide."

Sources of Marine Debris

Student Handout

Where Does Marine Debris Come From?

Marine debris comes from many different sources. Any trash that is improperly disposed of, as well as any materials that are improperly transported or stored, have the potential to become marine debris.

Main sources of marine debris:

- **Beachgoers** – Many beachgoers leave behind materials that can become marine debris, such as food packaging and beverage containers, cigarette butts, and toys like shovels, sand pails, and Frisbees. This trash can be blown into the ocean, picked up by waves, or washed into the water when it rains.
- **Improper disposal of trash on land** – Trash can be blown or washed directly into the oceans if it is littered or disposed of carelessly. Even if trash that is generated hundreds of miles inland can become marine debris if it is blown or washed into rivers or streams and carried to sea.
- **Storm drains and combined sewer overflow** – Storm water runoff (the water that flows along streets or along the ground as a result of a storm) can carry street litter into sewer pipes, which carry this water and debris to a nearby river or stream, or even directly to the ocean. Combined sewer pipes cause problems when heavy rainstorms cause too much water to enter the sewer system. When this happens, the amount of water in the sewer pipes exceeds the sewage treatment plant's handling capacity.
- **Ships and other vessels** – Although it is illegal in the United States to put any type of plastic trash into the navigable waters of the U.S. sometimes trash is thrown overboard on purpose.
- **Industrial facilities** – can contribute to the marine debris problem when waste items generated by industrial processes (i.e. production scraps, flawed products, and packaging material) when disposed of improperly.
- **Waste disposal activities** – can cause a problem when trash is lost during collection or transportation, or when trash blows or is washed away from disposal facilities.
- **Offshore oil and gas platforms** – Because offshore oil and gas platforms are surrounded by water, any items that are lost from these structures can become marine debris.

The Ocean Conservancy conducts an annual, international beach cleanup. Here's a top ten list of the most commonly found debris items over 25 years of beach cleanups.

Data originally published by Ocean Conservancy, "Tracking Trash, 25 Years of Action for the Ocean, 2011 Report.

Top Ten Items Over 25 Years

RANK	DEBRIS ITEM	NUMBER OF DEBRIS ITEMS	PERCENTAGE OF TOTAL DEBRIS ITEMS
1	CIGARETTES/CIGARETTE FILTERS	52,907,756	32%
2	FOOD WRAPPERS/CONTAINERS	14,766,533	9%
3	CAPS, LIDS	13,585,425	8%
4	CUPS, PLATES, FORKS, KNIVES, SPOONS	10,112,038	6%
5	BEVERAGE BOTTLES (PLASTIC)	9,549,156	6%
6	BAGS (PLASTIC)	7,825,319	5%
7	BEVERAGE BOTTLES (GLASS)	7,062,199	4%
8	BEVERAGE CANS	6,753,260	4%
9	STRAWS/STIRRERS	6,263,453	4%
10	ROPE	3,251,948	2%
	TOP TEN TOTAL DEBRIS ITEMS	**132,077,087**	**80%**
	TOTAL DEBRIS ITEMS WORLDWIDE	**166,144,420**	**100%**

SOURCE: OCEAN CONSERVANCY/INTERNATIONAL COASTAL CLEANUP

Name: _____ **Date:** _____

Beach Cleanup Data Sheet

Option A, Page 1

- ✔ Count items in groups of five and record the total. For example: 𝍸 𝍸 || = 12
- ✔ Do not write the words "lots" or "many." Please count each item.
- ✔ Please leave natural items such as driftwood and seaweed on the beach.
- ✔ Avoid stepping on dune grass and plants. They hold the sand and prevent erosion.
- ✔ Work with a few people–have one person record the numbers while others collect and bag the trash.

PLASTIC

	# of items (𝍸 |||)	Total # of items
Bags:		
food bags/wrappers		
other bags		
Bottles:		
beverage bottles		
motor oil/lube bottles		
other plastic bottles		
Caps, lids		
Cigarette filters		
Cigarette lighters		
Cigar tips		

	# of items (𝍸 |||)	Total # of items
Cups, utensils, plates, straws		
Diapers		
Fast food containers		
Fishing line, nets, lures, floats		
Foam peanuts		
Six-pack holders		
Syringes		
Tampon applicators		
Toys		
Other plastic		

GLASS

Beverage bottles	
Other bottles/jars	
Other glass	

METAL

Bottle caps, pull tabs	
Beverage cans	
Other cans	
Nails	
Other metal	

RUBBER

Balloons	
Condoms	
Tires	
Other rubber	

PAPER

Bags	
Cardboard	
Cartons	
Cups/plates	
Newspapers/magazines	
Other paper	

WOOD

Lumber pieces	
Pallets	
Other wood	

CLOTH

Clothing	
Other cloth	

Adapted from The Ocean Conservancy's International Coastal Cleanup Data Card (in use 1986-2000)

Student Handout

Name: _____ **Date:** _____

Beach Cleanup Data Sheet

Option B, Page 1

ITEMS COLLECTED

The Ocean Conservancy
www.oceanconservancy.org

Human-made debris, trash and litter...

- Harms the environment & wildlife
- Causes communities to lose money
- Threatens human health & safety
- Looks bad!

Think about where all this debris comes from and how **we** can prevent it!

Please pick up all debris found on the beach. Record information on only the items listed below.

Keep a count of your items using tick marks and enter the item total in the box. **Example:** [8] **Beverage Cans** 𝍸 III

SHORELINE AND RECREATIONAL ACTIVITIES

(Debris from beach-goers, sports/games, festivals, litter from streets/storm drains, etc.)

- [ ] Bags
- [ ] Balloons
- [ ] Beverage Bottles (plastic) 2 liters or less
- [ ] Beverage Bottles (glass)
- [ ] Beverage Cans
- [ ] Caps, Lids
- [ ] Clothing, Shoes
- [ ] Cups, Plates, Forks, Knives, Spoons
- [ ] Food Wrappers/Containers
- [ ] Pull Tabs
- [ ] 6-Pack Holders
- [ ] Shotgun Shells/Wadding
- [ ] Straws, Stirrers
- [ ] Toys

OCEAN/WATERWAY ACTIVITIES

(Debris from recreational/commercial fishing and boat/vessel operations)

- [ ] Bait Containers/Packaging
- [ ] Bleach/Cleaner Bottles
- [ ] Buoys/Floats
- [ ] Crab/Lobster/Fish Traps
- [ ] Crates
- [ ] Fishing Line
- [ ] Fishing Lures/Light Sticks
- [ ] Fishing Nets
- [ ] Light Bulbs/Tubes
- [ ] Oil/Lube Bottles
- [ ] Pallets
- [ ] Plastic Sheeting/Tarps
- [ ] Rope
- [ ] Strapping Bands

SMOKING-RELATED ACTIVITIES

- [ ] Cigarettes/Cigarette Filters
- [ ] Cigarette Lighters
- [ ] Cigar Tips
- [ ] Tobacco Packaging/Wrappers

DUMPING ACTIVITIES

- [ ] Appliances (refrigerators, washers, etc.)
- [ ] Batteries
- [ ] Building Materials
- [ ] Cars/Car Parts
- [ ] 55-Gal. Drums
- [ ] Tires

MEDICAL/PERSONAL HYGIENE

- [ ] Condoms
- [ ] Diapers
- [ ] Syringes
- [ ] Tampons/Tampon Applicators

DEBRIS ITEMS OF LOCAL CONCERN

(Identify and count 3 other items found that concern you)

- [ ]
- [ ]
- [ ]

Name: _____ **Date:** _____

Beach Cleanup Data Sheet

Page 2, Options A and B

Beach Section (circle one): Water line Upper shore

Name(s)_____

School_____

Teacher_____

Age_____ Today's Date_____

Shoreline cleaned _____

City/Location _____

Number of people working on this data card _____

Number of trash bags filled_____ Number of recycling bags filled_____

SAFETY TIPS

1. Do not go near any large metal drums.
2. Do not pick up any sharp objects (inform your teacher where the sharp object is located.
3. Notify an adult if you find a syringe.
4. Wear gloves.
5. Stay out of dunes and any protected areas.
6. Watch out for wildlife and do not approach any animals you encounter.
7. Don't lift anything too heavy.
8. If you begin to feel very hot, dizzy or tired, drink some water and notify an adult.
9. If you are walking near the surf, never turn your back to the ocean.

What is the most peculiar item you collected?_____

Comments: _____

_____

_____

NOTES