

“You are the Solution to Pointless Pollution” Education Kit K-12



*Interactive Lessons, Hands-on Activities, and
Information about Nonpoint Source Pollution...
The #1 Cause of Ocean Pollution*



Teach Students to Become the Solution to Pollution!



TO THE INSTRUCTOR

Each day, pollution enters our waterways from many sources. With every rainfall or snowmelt, pollutants, including litter from streets and parking lots, excess nutrients and chemicals from fertilizers, herbicides, pesticides, and insecticides, bacteria from pet waste, livestock, and faulty septic systems, wash into storm drains. Additionally, raw or partially treated sewage enters our waters from leaking sewer pipes and out-dated combined-sewer infrastructure. Nonpoint source, or “pointless” pollution, is the mix of pollutants, litter, and debris that enters our storm drains, empties directly into water bodies, and eventually reaches the ocean where it disrupts ecosystems and harms aquatic life.

Today, pointless pollution is the number one source of water pollution.

Fortunately, there is a solution. While people are the source of this pollution, we **are** the solution. For this reason, Clean Ocean Action seeks to raise awareness of pointless pollution as a campaign to improve and protect the ocean.

This Pointless Pollution Education Kit includes information, interactive lessons, and hands-on activities to incorporate in the classroom and community. Similar in structure, these lessons and activities include the same basic elements: grade level, reference to the New Jersey Core Curriculum Content Standards (NJ CCCS), goal(s), objective(s), materials list, activity description, activity evaluation(s), activity extension(s), and useful websites*. The Glossary of Terms on page 15 contains definitions for key words used throughout this kit.

This kit was designed to be informative, helpful, and enjoyable. Please share any thoughts or suggestions about our education materials by contacting our main office at:

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POINTLESS POLLUTION

Fact Sheet

What is Pointless Pollution?

Pointless pollution, also called non-point source pollution, originates from many different sources, instead of a single, identifiable point. Every rainfall or snowmelt washes this pollution into waterways, which all flow into the ocean. Pointless pollution, or nonpoint source pollution, is the #1 cause of water quality problems in the United States. Importantly, we all play a role in creating pointless pollution, and solving this problem.

How Do We Cause It?

Automobiles: Oil, gasoline, antifreeze, grease, and metal break linings leak from our cars and onto roadways and parking lots.

Litter: Disposable products and garbage that is not disposed of properly litters our communities and enters our waterways.

Homes and Businesses: Fertilizers, pesticides, insecticides, and grass clippings from our yards, and chemicals from our cleaning products and car washing detergents wash into storm drains and waterways. Leaking septic systems, combined sewer overflows, and pet waste all pollute waterways with bacteria and nutrients.

Farms: Improper disposal of animal waste and the use of fertilizers, ammonia, pesticides, and insecticides on agricultural land can pollute waterways.

Leachate: Old unlined landfills, leaky septic systems, and other highly concentrated areas of waste products contaminate local water supplies when rainwater flushes chemicals from them, forming a contaminated liquid sludge called leachate. Landfills are particularly troublesome sources of leachate because they contain industrial, automotive, and household hazardous wastes. Common components of landfill leachate are lead, mercury, cadmium, and other cancer-causing or harmful chemicals such as cyanide, toluene, and benzene.

Overdevelopment: Increasing paved and impervious surfaces in a community increases pointless pollution. Paved surfaces force rainwater, and the pointless pollution that it transports, to move quickly across an area, delivering the pollution directly to adjacent waters, thereby preventing natural infiltration into the ground. Additionally, sediment, (dirt and grit from construction sites or streets) can wash into water bodies and destroy aquatic habitats.

Where Does It Go?

Pointless pollution is washed by rainfalls and snowmelts either directly into the nearest water body, or into a storm drain, which empties into the nearest water body. Most of the time, this “stormwater” is not treated or cleaned before reaching our waterways. Once these pollutants make their way into storm drains, streams, brooks, creeks, rivers, and lakes, they can eventually make their way to the ocean.



CONTROLLING POINTLESS POLLUTION

Every Drop Counts

Pointless pollution is difficult to manage because it comes from many different sources. Here are some actions everyone can take to reduce or eliminate pointless pollution.

Reduce, Reuse, Recycle

-  Never litter!
-  Make sure your outdoor garbage and recycling receptacles are covered so wind and animals don't let garbage out.
-  Reduce your use of disposable items (such as plastics). Recycle everything you can. Reuse products instead of buying new ones.
-  Aggressively comply with the law, by ensuring that the recycling programs at your school, business, and home are correctly implemented and followed.
-  Always pick up after your pet!
-  Urge your community to pass and enforce ordinances prohibiting littering and requiring owners to clean up their pets' wastes.
-  Do not sweep dirt, leaves, and grass clippings onto the street and into storm drains.
-  Do not wash your car outdoors. If needed, use biodegradable products or go to a car wash that recycles wash water.
-  Encourage your municipality or county authority to implement regular street cleaning programs.
-  Organize and attend regular community cleanups.
-  Eliminate the use of fertilizer on your property. If you must use fertilizer, use organic fertilizers and follow the directions carefully.
-  Eliminate your use of synthetic chemicals in your yard and garden. Natural alternatives (also known as Integrated Pest Management - IPM!) are available, and are often more effective.
-  Participate in "household hazardous waste" collection days to properly dispose of electronics, cleaning chemicals, paints, oil, and other materials containing hazardous substances. Contact your local public works department for the schedule.
-  Take used motor oil, antifreeze, and transmission oil to service stations for recycling.
-  Reduce the amount of impervious surface on your property and create vegetated areas to absorb and filter rain-water.



JOURNAL ON CONSUMER ISSUES

Language Arts/Science/Social Studies: Grades 6-12

NJCCCS

3.2, 5.1, 5.10, 6.2

Goal: To make students aware of how their everyday activities contribute to pointless pollution.

Objective: Students will keep a detailed journal of their everyday activities (including use and disposal of consumer products) for one week to understand how each individual can contribute and be the solution to pointless pollution in his/her own small way.

Activity: Instruct students to describe, in journal form, all activities throughout their day that may contribute to pointless pollution. This should include transportation, energy use, garbage produced, recreation, and any other activities or habits that could contribute to pointless pollution. Instruct students to be specific; for instance, students should list everything they threw in the garbage. After one week, prompt them with questions such as:

What was the most common garbage item?

How many pieces of packaging were in your garbage? What types of materials were they?

How was your lunch packaged? What types of materials were the packaging? Was all the packaging necessary?

How many beverage bottles were in your recyclables? What types of materials were they?

Were the items recyclable? Which ones?*

Did you recycle or reuse anything during the week?

How long will your trash last? Review the chart on page 13 to discuss the long-term implications of trash.

Did you clean up after your pets?

Did you help wash the family car? What kind of soap did you use? Was it biodegradable?

Did you notice any oil or grease marks in your garage or on the driveway?

Did you drop or leave any litter on the ground?

Did you throw anything in a storm drain?

How did you travel to school?

What did you use that required electricity?

Evaluation: Students should make a plan describing changes in behavior that they will make over the next week to reduce their contribution to pointless pollution. At the end of the week, students should write an essay about how they followed their plan, what impact their changes may have had on pointless pollution, and what laws could be made and enforced (on a local, state, or federal level) that could potentially help the problem.

Extension: Students organize and conduct a local cleanup (see page 14) and compare their journal observations with the common items found during the cleanup.

* Students should visit <http://www.dnr.ohio.gov/recycling/plastics/> for an excellent tutorial on plastics and recycling.



DO YOU KNOW WHAT YOU'RE SWIMMING IN?

Marine Water Quality

Healthy water is necessary to sustain all life on earth. Water is used for drinking, bathing, swimming, boating, irrigating crops, and countless other uses. Water quality is a term used to describe the physical, chemical, and biological properties of water. Based on these properties, government agencies establish standards to determine water's suitability for different purposes. For example, water with properties that make it safe enough to swim in, may not have properties that make it clean enough to collect and eat shellfish from. Water quality cannot be determined by looking, tasting, or smelling. In order to determine if water quality is good for a specific purpose, tests and surveys must be done.

Water can be tested to determine temperature, salinity, and levels of elements, nutrients, chemicals, and bacteria including oxygen, nitrogen, phosphorus, and *eterecoccus*. Runoff from storms and sewage that enter waterways can carry fertilizers, pesticides, bacteria, and chemicals into waterways that cause poor water quality, harm aquatic life, and make humans sick. In waterways with clean water, aquatic life thrives and people are able to swim without getting ill. Nationally, 35% of the coastal waters and estuaries are impaired and 44% are threatened for aquatic life use or human use¹.

Marine Debris

Marine debris is trash that enters our waterways and eventually flows into our oceans. Marine debris is a problem along shorelines and in coastal waters, rivers, estuaries, and oceans throughout the world. Almost 80% of the debris can be traced to land-based sources such as litter that is carried into storm drains by rainwater and snowmelt². Marine debris is tossed, blown, or washed into a water body or storm drain, and eventually makes its way to the ocean.

Debris injures and kills marine wildlife through ingestion and entanglement. Studies have found plastic marine debris affects a minimum of 267 animal species worldwide, including 86% of all sea turtle species, 44% of all sea bird species, and 43% of marine mammal species². Ingestion occurs when birds, fish, and mammals mistake plastic debris for food. Some birds even feed it to their young. With plastic items filling their stomachs or lodging in their throats, animals can die of starvation or suffocation. Sea turtles often mistake plastic bags for jellyfish, one of their favorite foods. Gray whales have been found dead with plastic bags and sheeting in their stomachs³. Entanglement occurs when marine animals become trapped or tangled in debris, including fishing lines and nets, balloons, and six-pack beverage holder rings. Through entanglement, animals lose the ability to move, escape predators, or catch prey. As many as 30,000 northern fur seals per year get caught in abandoned fishing nets and either drown or suffocate. The bottom line: marine debris will stop being a problem when people stop pointless pollution.

For more information on water quality and marine debris, contact these organizations:

Healthy Water, Healthy People
1001 West Oak St.,
Suite 210,
Bozeman, MT 59717-0575
(866)337-5486
www.healthywater.org

Water Environment Federation
601 Wythe St.
Alexandria, VA 22314-1994
(800)666-0206
www.wef.org

National Oceanic and Atmospheric Administration
Marine Debris Program
<http://marinedebris.noaa.gov/welcome/html>

Ocean Conservancy
National Marine Debris Monitoring Program
1300 19th Street NW
8th Floor
Washington, DC 20036
(800)519-1541
www.oceanconservancy.org

US Environmental Protection Agency
Marine Debris Abatement
1200 Pennsylvania Avenue, NW
Mail Code 4504T
Washington, DC 20460
www.epa.gov/owow/oceans/debris

1. US Environmental Protection Agency, National Coastal Condition Report II Fact Sheet, <http://www.epa.gov/owow/oceans/nccr/2005/nccr2-factsheet.pdf>.
2. US Environmental Protection Agency, Marine Debris Abatement, <http://www.epa.gov/owow/oceans/debris>.
3. California Coastal Commission, <http://www.coastal.ca.gov/publiced/marinedebris.html>.



WHAT IS A WATERSHED?

How Pollution Gets from the Hills to the Ocean

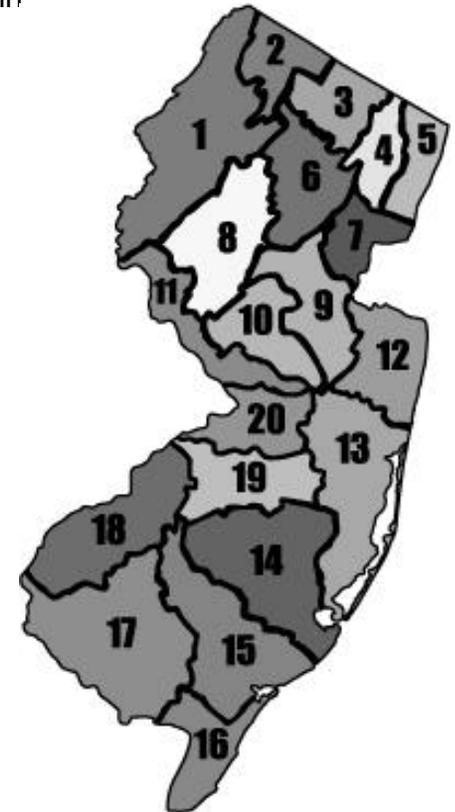
A watershed is an area of land where all the rain that falls and snow that melts run into a common water body, such as a marsh, a stream, a river, or a lake. Every land surface is part of a watershed. The defining characteristic of a watershed is elevation. Naturally, the precipitation flows to the lowest point due to gravity and wind. The lowest point can be a body of water (including the ocean), or a storm drain

Watersheds vary in shape and size, and can cross town, county, state, and national boundaries. They can be hilly and mountainous, or flat and low¹.

When precipitation flows over land surfaces to the nearest water body, it usually collects pointless pollution. In watersheds, rain, snowmelt, wind, and gravity all help pointless pollutants travel into a water body. For example, if a piece of litter is dropped on the top of a mountain, rain water could wash the litter into a stream which could eventually flow to the ocean. Similarly, a cigarette filter thrown out a car window will most likely be washed or blown into a storm drain, and then directed into the nearest water body.

Aquifers are part of a watershed. Instead of flowing into streams or water bodies, some precipitation is absorbed into the ground and becomes part of an underground reservoir, or aquifer. As water is absorbed into the ground, it is filtered. As a result, the water in an aquifer is typically much cleaner than surface water (e.g., a lake). Also, aquifers help to recharge lakes and streams. In the United States, 89% of drinking water comes from aquifers². When marshes and wetlands are destroyed and replaced by parking lots and highways, less water reaches the aquifer, and pollutants are no longer filtered, but are washed directly into the ecosystem. In addition, oil and road salt from paved roads may trickle down with rain and snowmelt and pollute an aquifer³.

To locate any watershed in the United States, use the Environmental Protection Agency's EnviroMapper for Water, an interactive mapping utility. The EnviroMapper can be accessed at: www.epa.gov/waters/enviromapper



New Jersey has 20 different watershed areas. This map depicts the areas by numbers and boundaries⁴.

1. United States Environmental Protection Agency, "What is a Watershed?", <http://www.epa.gov/owow/watershed/whatis.html>.
2. United States Environmental Protection Agency, Safe Drinking Water Act, www.epa.gov/safewater/sdwa/30th/factsheets/uic.html.
3. Gulf of Maine Aquarium, Aquifers, www.gma.org/katahdin/aquifer.html.
4. New Jersey Department of Environmental Protection, Division of Watershed Management, <http://www.state.nj.us/dep/watershedmgt/>.



YOUR WONDROUS WATERSHED

Visual Arts/Language Arts/Science/Technological Literacy
Grades 3-12

NJCCCS

1.2, 3.3, 5.1,
5.4, 5.7, 5.10, 8.1

Goal: To demonstrate to students how pollution moves through a watershed into waterways.

Objective: Students will learn how pollution affects our waterways by creating their own model of a watershed.

Materials List:

- Large tupperware container or deep aluminum tray
- 2lbs of modeling clay
- 3lbs of sand
- 2lbs of aquarium gravel (to represent aquifer)
- Sheet of waterproof paper (wax paper, plastic film)
- 1/4 cup of cocoa mix
- Green scouring pad (cut into thin rectangular strips; represents trees)
- Tooth picks
- Glue
- Wood Blocks (small and various sizes; represents buildings)
- 1 spray bottle of water

ACTIVITY: Students may want to work in cooperative groups of four for this activity. Fill 2 inches of the container with gravel. Slope the gravel slightly, so one end is about a ½ inch deep and the other end is about 3 inches deep. Mix the clay and the sand to a gritty consistency, with slightly more clay than sand (do not use all at once; save some clay and sand for later in the exercise). Without disturbing the slope, add 2 inches of this mixture to the container. To represent the main river, carve a channel in the middle of the clay/sand layer, about ½ inch deep and about 1 inch wide. Near the top of the slope, split the channel into two or three separate channels to represent tributaries. Build little hills between the tributaries with extra clay/sand mixture. Attach trees to watershed by inserting toothpicks to the upright strips of your scouring pad. Place blocks of wood on the model in several places to represent buildings. Along the main river, flatten out a small area. Cut out a piece of wax paper to cover this area, and stick this on the sand/clay mixture. Explain to students that this wax paper represents the surface of a parking lot. Add water to your container. The water should fill all of the gravel and should just reach up to the lowest extent of the clay/sand mixture. Explain to students that the aquifer captures and transports water that seeps down through the soil. Sprinkle rain over the flattened soil area and the parking lot with the spray bottle. Ask the students to observe how the rain seeps through the soil, but runs off the parking lot to the river. Sprinkle some cocoa over the sides of one of the hills. Tell the students that the cocoa represents pollution. Spray rain over the polluted area. Ask the students to note how the pollution travels through the watershed, contaminating all downstream areas.

EVALUATION: Initiate a roundtable discussion with students about how litter and other pollutants travel throughout the watershed, how to reduce or eliminate impacts on local waters, and how to educate people within the community about pollution in their watershed.

EXTENSIONS: Students should read the tutorial on Making Water Quality Connections¹. Students can record observations of their town and how physical characteristics might impact water quality. Additionally, students can observe a local water body over a period of time for observable signs of pollution.

1. Making Water Quality Connections (from page 6 to end), http://www.green.org/files.cgi/212_Making_Water_Quality_Connections.pdf.



STORM DRAINS, SEWERS, COMBINED SEWERS, AND SEPTIC SYSTEMS: WHAT'S THE DIFFERENCE?

Storm Drains

Storm drains are the metal grates on roads and in parking lots and fields that are connected to drains that collect rainwater and snowmelt (“stormwater”), leaves, silt, and litter (*see picture to left*). Unfortunately, people pour motor oil and throw litter, pet waste, and other debris into storm drains, thinking they are “sewers” and that the contents will go to the wastewater treatment plant. Instead, contents in a storm drain often empty directly into the nearest water body.

Sanitary Sewers

Sanitary sewers transport wastewater (anything that goes down the toilet, sink, shower, washing machine, and dishwasher) to a wastewater treatment plant. A wastewater treatment plant removes solid waste and treats the water so that it meets legal requirements and can be discharged into a water body or be reused for a specific purpose.

Combined Sewers

In the United States, some urbanized areas have older infrastructure (e.g., pipelines) for gathering and carrying both raw sewage and stormwater. These systems, called Combined Sewer Overflows (CSOs), combine and treat the contents from storm drains and sanitary sewers. However, CSOs are additional sources of water pollution at times of wet weather. When an abundance of water overwhelms the treatment system, such as during a rainstorm or a snowmelt, the combined stormwater from storm drains and sewage from homes, schools, and businesses is diverted around the treatment plant and discharged “raw” into the nearest waterway. Hence, with many rainfall events in areas with CSOs, raw sewage is discharged into our waters, posing a considerable threat to the health of humans and marine life, and to the viability of our waters for harvesting fish and shellfish¹. Bacteria-polluted waters can cause significant human illnesses.

The combined stormwater and sewage is diverted around the treatment plant and discharged “raw” into the nearest waterway.

Septic Systems

In areas where houses are far apart and connecting to a sanitary sewer line would be too expensive, septic systems are installed. Septic systems are individual wastewater treatment areas. All the wastewater from a house goes through pipes into a holding tank buried in a yard. In the tank, bacteria breaks down the waste product, so that after the waste product leaches through the “fields” or parts of the system, the resulting water will contain few nutrients and minimal harmful bacteria. If septic systems are not installed or maintained properly, raw sewage can leach into the surrounding watershed.

1. New York/New Jersey Harbor Estuary Program, www.seagrant.sunysb.edu/hep/pdf/hep_cso.pdf.



INTRODUCTION TO YOUR SECRET UNDERGROUND SYSTEM

Visual Arts/Language Arts/Geography/Technology Literacy
Grades K-8 (teacher-led), 9-12 (student-led)

NJCCCS

1.2, 3.3, 6.1, 6.2, 6.6, 8.1

Goal: To learn where and how your community's storm drain system operates.

Objective: Students will identify the locations of storm drains near their school or home, as well as potential sources of pointless pollution that may affect the waterbody into which the storm drains empty.

Materials List:

- Obtain a map of school grounds or town (i.e., use street map, topographic map, telephone book map, watershed map, Google Earth map¹, or USEPA's EnviroMapper for water². The EnviroMapper (EM) for Water is a web-based, interactive mapping application that allows you to create a map, displaying various types of surface water information for your area of interest. (For a tutorial on using EnviroMapper, please visit www.cleanoceanaction.org and click on "Education Programs" and "Resources for Educators").
- Locate a storm drain on/near school property.

Activity: Have students mark the approximate location of the nearest storm drain on their map. Using their map, instruct students to locate the nearest waterbody. Using the map and physical characteristics of the area, brainstorm on the various sources of pollution that may wash into this storm drain.

Evaluation: Students should expand their knowledge of EnviroMapper by producing a more detailed map of the town surrounding the chosen storm drain. Using EnviroMapper, instruct students to produce a map of impaired waters in their town. (These waters will be highlighted in red on the map.) If impaired waters do not exist in the immediate area of interest, have students produce a map for a larger expanse until a nearby impaired body of water is located. Use the *Identify* tool to identify the waterbody. A Feature identifier, such as the two letter state abbreviation, followed by a number should appear in the map window. You can click on the Impaired Water ID to learn more about the impairment. Students should perform further research on this impaired waterbody by looking at the demography and topography of the area, and other pertinent information, such as farming and industry. Students should produce a report on the causal relationship between the possible sources of environmental pollution and water quality.

Extensions: Much of the water in rivers comes directly from surface (or stormwater) runoff, which is precipitation that travels over a land surface into the nearest waterbody. Instruct students to research the factors that affect surface runoff in their area of interest and the effects of surface runoff into the nearest stream/river. For background information, the United States Geological Survey provides a good tutorial on the water cycle³, and information for mapping soil types is available. Students should produce a report on their findings.

1. Google Earth, <http://earth.google.com/>.

2. USEPA's EnviroMapper for Water, <http://www.epa.gov/enviro/html/em/>.

3. USGS - water cycle, <http://ga.water.usgs.gov/edu/watercycle>.

4. Information on soil types, <http://websoilsurvey.nrcs.usda.gov/app/>.



COMMUNITY STORM DRAIN AWARENESS

*Visual Arts, Language Arts, Social Studies
Grades 3 and Up*

NJCCCS

1.2, 3.3, 3.5, 6.1, 6.2

Goal: To determine local awareness about the connection between storm drains and pointless pollution.

Objective: Students will conduct a survey of their friends, family, and neighbors to find out how many people in their community are aware of the role and function of storm drains and how they relate to pollution of local waters. Based on the survey results, students will design educational materials about storm drains and pointless pollution to distribute to their neighbors.

Activity: Instruct students to survey five friends, family members, or neighbors to find out what they know about storm drains and pointless pollution. Students should ask:

1. Do you know what a storm drain is? If yes, do you know the location of the one nearest your house?
2. Do you know what happens to the materials that go into the storm drain? Where do they go?
3. Have you ever discarded an item or dumped anything in a storm drain? Have you seen anyone else do this?
4. If you change the motor oil in your vehicles yourself, where do you dispose it?
5. Do you regularly clean sidewalks, driveways, and lawn areas of litter?
6. How do you think litter on the street and in storm drains affects the environment?
7. What can you do to prevent litter from entering our waterways, including the ocean?

Evaluation: After students collect the answers to their surveys, initiate a classroom discussion about their findings. Were there common misconceptions about storm drains? Did many people find neighbors who used storm drains to dispose of things? Based on classroom discussion, students should brainstorm ideas for an educational brochure (or other item) to be designed and distributed to members of their community. Create and distribute posters and fact sheets based on ideas provided by students.

Extensions: Students remind people about the connection between storm drains and pollution of our waterways by marking storm drains with an anti-pollution message. Clean Ocean Action has a storm drain stencil kit available for purchase that includes a stencil with the words "No Dumping-Drains to Waterway," a fish-shaped stencil, instruction cards, and 50 educational door hangers to be distributed in the area of the stenciling project. For more information on storm drain stenciling, or to order a Storm Drain Stenciling Kit, contact Clean Ocean Action or visit www.CleanOceanAction.org (click on "Education Programs" and "Storm Drain Stenciling.")

OIL POLLUTION

Oil And Water Don't Mix



Hydrocarbons, organic compounds that compose fossil fuels, oils, plastics, paraffin, waxes, and solvents, contaminate water quality. Every eight months, 10.9 million gallons of hydrocarbons, wash into our coastal waters from pointless pollution sources¹. This amount is equal to the amount of oil spilled by the Exxon Valdez in Alaska in 1989.

Hydrocarbons can be deadly in the marine environment. When large oil spills occur, marine animals die from becoming smothered or trapped in the oil, or ingesting it. When birds become oil-covered, they lose their ability to regulate their body temperature and often freeze to death. Smaller amounts of hydrocarbons in the marine environment can be toxic to aquatic life and humans, and have a devastating impact on the food chain. Hydrocarbons also pollute our drinking water supplies and soil. For instance, one gallon of used motor oil can pollute one million gallons of fresh water - a year's supply of drinking water for 50 people or create an oil slick on surface water up to eight acres in size².

What are the Sources?

People working on their cars at home often do not realize the implications of dumping used motor oil in nearby storm drains. In addition, oil that leaks from vehicles, lawn mowers, leaf and snow blowers, and other motorized machinery washes off streets, parking lots, and lawns into storm drains and consequently our local waters.

Once oil enters the marine environment, it can be deadly. It has chronic and toxic health effects on marine life, birds, and humans. Humans are impacted when oil pollutes drinking water supplies and soil. Marine animals die from becoming smothered or trapped in the oil, or ingesting it. When birds become oil-covered, they lose their ability to regulate their body temperature, and often freeze to death. Even small amounts of oil can harm aquatic life.

Solutions:

It is illegal to dispose used motor oil in a sink or toilet, storm drain, septic system, or waterway. If you change the motor oil in your car, motorcycle, boat, or lawnmower yourself, take it to a collection center for recycling. If you take your car to a service station, you can be fairly certain they recycle the used oil, but if you're not sure, ask. Motor oil can be recycled and used to generate heat and electricity, or made into lubricating oils³. Additionally, make sure your cars, motorcycles, boats, and lawnmowers are in good working order and that they do not leak oil.

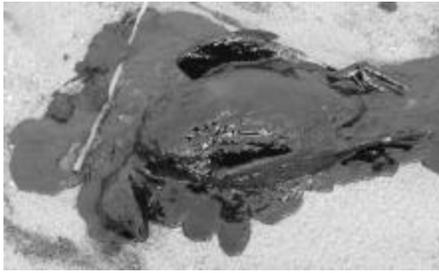
How To Recycle Your Oil:

Put all used motor oil in a clean leak-proof container with a screw-on top. Do not mix any other automotive chemicals with the oil. Take the oil to a service station or other facility that sells oil (all businesses that sell oil are required to recycle it), or to your local oil recycling drop-off location. Contact your municipal or county recycling coordinator to find out if they accept used motor oil, or visit www.earth911.org to search for recycling facilities using your zip code.

1. United States Environmental Protection Agency, www.epa.gov.

2. Earth 911, <http://www.earth911.org/master.asp?s=lib&a=oil/default.asp>.

3. American Petroleum Institute, www.reycleoil.org.



OIL: A DEADLY BIRD BATH

Language Arts/Science: Grades 4-8

NJCCCS

3.3, 5.1, 5.5, 5.6, 5.10

Goal: To understand how oil in waterways affects the environment

Objective: Students will learn how oil affects seabirds' ability to survive.

Materials List:

- natural feathers (3 per group)
- plastic gloves (1 pair per group)
- magnifying glasses (1 per student or group)
- rags for cleanup
- 12 oz jar filled with water (1 per group)
- 12 oz jar filled with water/dish soap mixture (1 per group)
- jar (12 oz) filled with a cooking oil/water mixture (1 per group)
- magic marker

Activity:

(1) Organize the class into groups of three or four students. Hand out the feathers and magnifying glasses and have the students examine the feathers. The groups should discuss and record the answers to the following questions:

- (a)** How are feathers used by a seabird (have them think beyond flying)?
- (b)** How do you think oil affects a bird's feathers?
- (c)** Is it possible to clean oil off a bird's feather?

(2) Hand out the materials for the experiment. Each group should drop a feather into the *jar with water* and record what happens to the feather. Then, students should take the feather out of the jar, shake it off, and let it dry. Using the marker, students should label this feather "water" and set it aside. Student should label the other feathers "water/oil/soap" and "water/oil." Next, have a student in each group put on gloves and drop the last two feathers into the *jar with the oil/water* mixture. Instruct students to observe and record what happens to the feathers. Next, have the students with the gloves shake the excess water off the feathers and record what happens. Next, students will only put the feather labeled "water/oil/soap" into the *jar with the water/dish soap* mixture, try to clean it off, and then dip it in the *jar with water* to wash off the excess soap. Examine all three feathers with the magnifying glass and discuss and record the differences.

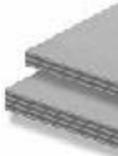
(3) Explain to the students that feathers keep birds alive. Feathers provide insulation, buoyancy, waterproofing, and give birds the ability to fly. Explain to the students that the feather labeled "water" represents a feather from a bird that has not been exposed to oil; the "water/oil" feather represents a bird that swam in water polluted with oil; and the "water/oil/soap" feather represents a bird that swam in oil, but has been cleaned.

Evaluation: Engage the students in a discussion within and between their groups with the following: **(1)** Explain the differences you observed while looking at the feathers with the magnifying glass. **(2)** How would a bird be affected if it swam in water polluted with oil? How would it affect a bird's ability to fly? Keep warm? Float? Be waterproof? **(3)** Do you think putting soap on a bird covered in oil helps the bird? Is it possible to wash all the birds affected by an oil spill? **(4)** You cleaned one feather; how long do you think it takes to clean an entire bird? **(5)** What are some things you can do to stop or prevent oil spills?

Extensions: Discuss with the students ways that oil gets into waterways. Instruct groups of students to create convincing Public Service Announcements (PSA)s explaining how oil gets into water bodies, how it affects seabirds, and what the public can do to help solve the problem. The PSA can either be acted out and videotaped at home, or acted out live during class.

TRASH THAT LASTS

How long does it take for debris to breakdown in the marine environment?

Paper products		2-6 weeks	Nylon Fabric		30-40 years
Wool sock		1-5 years	Leather		50 years
Plywood		1-3 years	Aluminum can		80-200 years
Cigarette filter		1-5 years	Disposable diaper		450 years*
Plastic bag		10-20 years*	Plastic bottle		450 years*
Tin can		50 years	Fishing line		600 years*
Foam plastic cup			Glass		undetermined

*Plastic's photo-degrade into smaller, toxic petro-polymers which continue to cause ecological harm.

INVESTIGATING MARINE DEBRIS

NJCCCS

3.4, 5.1, 5.2, 5.4, 5.10

Language Arts/Science: Grades 4 and Up



Goal: To understand how different characteristics of marine debris affect marine wildlife.

Objective: Students will make observations about commonly found items of marine debris, as well as learn about the habits of marine mammals. Then students will make and discuss hypotheses about how different types of marine debris affect marine animals.

Materials: Commonly found marine debris items (e.g. deflated latex balloons with ribbon, plastic pellets - can use white jellybeans or marbles, plastic caps and lids, cigarette filters, plastic straws, beverage bottles, plastic wrappers, etc), materials to perform experiments (e.g. bucket of water, fan)

Activity: Instruct students to perform experiments, make observations, and record their answers to the following questions for each of the commonly found pieces of marine debris (see materials list).

1. What is the item made out of?
2. Would the item float or sink?
3. Could the debris get blown around or carried by rainwater runoff easily?
4. What would the item look like in the marine environment or ocean?

Then, read or have students read the following descriptions of the marine animal habits found below:

Gulls and other birds: Forage for food among the seaweed, shells, critters, and other objects that wash up with the tide. Often eat things that have already been caught by someone or something else. Love eating fish eggs, which are round and clear.

Seals: Very curious and playful. Often use their noses and flippers to poke, explore, and play with unusual objects.

Fish: Avoid predators by swimming into holes and tight spaces. Larger fish often swim towards large groups of fish and eat smaller fish.

Turtles: Eats very small fish and jellyfish. Jellyfish are see-through and float on or near the surface of the water. They usually swim together in schools.

Horseshoe Crabs: Crawl around on bay bottoms and feed on small creatures. They use their gizzards and legs to crush hard food before it reaches their stomachs.

Whales: Use their mouths as strainers and eat the tiny fish and particles in the water.

Evaluation: Students should apply what they have learned about the debris and the marine life by making hypotheses about how each item might end up in the ocean and how it could affect marine animals. Have students decide if animals could be affected by entanglement and/or ingestion (see page 4). They can write essays or make graphic representations about what they expect to happen. Brainstorm ideas about how people can prevent debris from entering the marine environment and harming marine animals.

Extensions: Students can perform their own beach cleanup to investigate the most common types of marine debris. Students can also do their own research to understand the habits and feeding behaviors of additional marine animals or find examples of how marine debris has affected marine animals to confirm their hypotheses



GIVE YOUR COMMUNITY A CLEAN SWEEP!

Language Arts/Math/Science: Grades 6-12

NJCCCS

3.2, 4.4, 5.3, 5.10

Goal: To learn and understand the prevalence and type of litter in local communities and how it affects our waterways.

Objective: Students will collect and sort litter from a nearby area to learn the type and quantity of litter in waterways and to consider the impacts.

Materials List:

- pencils
- gloves
- bags for collecting litter (preferably paper bags with/without handles)
- calculator (optional)
- data card with columns: plastic, paper, polystyrene (foam plastic), glass, rubber, metal, cloth, and wood (or request Clean Ocean Action's datacard)

Activity: **(1)** Explain to students the sources of and danger from litter in our waterways (or see lessons and activities earlier in this education kit). Inform students of the major sources of litter and its properties (i.e., is it biodegradable?), as well as any laws and ordinances in place regarding litter management. **(2)** Assign students to various areas of the school grounds. Groups of two or more students pick up and record the debris found on the street and near storm drains on their datacards. Students tally their datacards and combine their results with those from the entire class for a grand total; **(3)** Using the grand totals, students create an informative display of charts, tables, lists, and samples of litter from their cleanup to be exhibited in the classroom, library, or main office area to be viewed by peers; and **(4)** Discuss ways in which collected litter could harm marine life and wildlife (see also *lesson on entanglement and ingestion*).

Evaluation: By using the "Trash That Lasts" chart (see *page 13*), students should estimate how long each item they found will take to break-down or "biodegrade." Students should write an essay or a letter to the mayor or the local newspaper about the type, location, and amount of litter, as well as how long it will take for items collected during the cleanup to biodegrade in the environment. Students should urge the mayor to help stop pointless pollution in the community through ordinances and litter law enforcement.

Extensions: **(1)** Students may graph (e.g., line or bar graph) the results of their cleanup to determine the most frequently found items. Results may also be compared with national and international cleanup efforts. The Ocean Conservancy's International Coastal Cleanup reports are available at www.coastalcleanup.org, and Clean Ocean Action's Beach Sweeps reports for New Jersey are available at www.cleanoceanaction.org; **(2)** The teacher and class may organize a larger cleanup* of a local stream, river, lake or beach and involve groups and citizens in the community.

* For step-by-step instructions on organizing a cleanup, visit www.cleanoceanaction.org, and click on "Beach Sweeps."

GLOSSARY OF TERMS

AQUIFER: An underground bed or layer of earth, gravel, or porous stone that holds water.

BIODEGRADABLE: Decomposes naturally into organic matter.

-CIDE: This suffix means “killer”. Example: pesticide.

COMBINED SEWERS: An older system of pipes that carries both stormwater and wastewater to a treatment facility. During heavy rains, the pipes divert the stormwater and wastewater directly into a nearby body of water.

HOUSEHOLD HAZARDOUS WASTE: Products and materials used in a household that contain dangerous ingredients and chemicals and must be disposed separately from the regular waste.

HYDROCARBONS: Organic compounds consisting entirely of hydrogen and carbon. Hydrocarbons compose the major fossil fuels (coal, petroleum, and natural gas) and plastics, paraffin, waxes, solvents, and oils.

IMPAIRED: Water that does not meet the standards for its designated use.

INFILTRATION: To pass into or through a substance.

INFRASTRUCTURE: The system of public works of a country, state, or region, such as underground sewer and water pipes.

INTEGRATED PEST MANAGEMENT (IPM): an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices; uses information on the life cycles of pests and their interaction with the environment; methods used to management pests with the least possible hazard to people, property, and the environment; applicable to farms, home, schools, garden, and workplace.

LEACHATE: A chemical solution created by water passing through another substance and taking on its qualities.

NONPOINT SOURCE POLLUTION: Pollution that contains contaminants originating from not one source, but from many different and independent sources and no defined point of entry (i.e., rainwater, snowmelt); may also be called pointless pollution.

NONRENEWABLE RESOURCE: A natural resource that may only be used until it is gone. Example: petroleum that is refined into oil and burned for energy may not be used again – once it’s used up, it is gone.

NUTRIENT: Substances found in the environment that plants and animals need to survive; in high concentrations they can be considered a type of pollution.

ORDINANCE: A law or regulation set forth from a government authority.

POINTLESS POLLUTION: Pollution that contains contaminants originating from not one source, but from many different and independent sources with no defined point of entry (i.e., rainwater, snowmelt); may also be called nonpoint source pollution.

PRECIPITATION: Water such as rain, snow, sleet or hail that falls to earth’s surface.

RECYCLABLE: Material that can be reprocessed for reuse; also, the ability to be recycled.

RECYCLE: To pass through a series of changes or treatments in order to regain material for reuse.

RENEWABLE RESOURCE: A natural resource that may be reused. Example: the sun may be used as a source of energy in perpetuity.

SEPTIC SYSTEM: A method of sewage disposal that utilizes an on-site treatment system that is built underground.

SEWAGE: Liquid or solid waste (e.g., from toilets, sinks, bathtubs, washing machines, and dishwashers) that is carried in drains and pipes usually to a treatment plant.

SEWER: A system of pipes used to carry wastewater or sewage to a treatment facility.

STORM DRAIN: A method of channeling stormwater off streets to stormwater pipes underground.

STORMWATER: Water, including rain or snowmelt, that runs off streets, parking lots, lawns, farms, and other surfaces and washes into storm drains and nearby waterways, often containing nonpoint source pollutants.

SURFACE RUNOFF: Precipitation runoff which travels over the soil surface into the nearest stream channel.

WATER QUALITY: The chemical, biological, and physical characteristics of water.

WATERSHED: The area that drains to a common waterway, such as a stream, lake, estuary, wetland, or, ultimately, the ocean.

FOR MORE INFORMATION

Organizations and sources that provide information to stop pointless pollution:

Cacapon Institute

PO Box 68
High View, WV 26808
(304) 856-1385
ci@cacaponinstitute.org
www.cacaponinstitute.org/high.htm

Earth 911

7301 E. Helm, Building D
Scottsdale, AZ 85260
1-877-EARTH911
www.earth911.org

H₂O Conserve

215 Lexington Ave, Ste. 1001
New York, NY 10016
(212) 726-9161
info@h2oconserve.org
h2oconserve.org

National Oceanic and Atmospheric Administration

Communication & Education Division
NOAA's National Ocean Service
SSMC4, Room 13317
1305 East-West Hwy
Silver Spring, MD 20918
Phone: (301) 713-3060
nos.info@noaa.gov

www.oceanservice.noaa.gov/education/kits/pollution/welcome.html

New Jersey Department of Environmental Protection

401 E. State St.
PO Box 418
Trenton, NJ 08625
(609) 777-3373
www.nj.gov/dep/watershedmgt/outreach_education

Ocean Planet: Smithsonian

(301) 286-9428
gene@seawifs.gsfc.nasa.gov
http://seawifs.gsfc.nasa.gov/ocean_planet.html

Project Wet

1001 West Oak, Suite 210
Bozeman, MT 59715
(866) 337-5486
info@projectwet.org
www.projectwet.org

U.S. Environmental Protection Agency

NPS Control Branch
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
(202) 566-1155
www.epa.gov/owow/nps

Surfrider Foundation USA

P.O. Box 6010
San Clemente, CA 92674-6010
(949) 492-8170
www.surfrider.org

Visit www.CleanOceanAction.org for additional educational programs, materials, and activities related to pointless pollution.

10 TIPS FOR REDUCING YOUR IMPACT

Clean Ocean Action developed a series of “tip cards” designed to educate distinct groups of people. These cards teach people how to minimize their contribution to the problem of pointless pollution. Aimed at specific user groups (e.g., kids, drivers, boaters, homeowners, to name a few), the cards are excellent educational tools to broadcast the pointless pollution message and urge people to change their behavior to improve the environment. The cards are available for municipalities to reproduce and distribute in town mailings, print in the community newspaper, or posted on community bulletin boards. To order copies of the cards, please complete and return this form to **Clean Ocean Action, PO Box 505, Sandy Hook, NJ 07732.**

Please indicate by check mark the tips you would like to receive:

- | | | | |
|---|---------------------------------------|--|---|
| <input type="checkbox"/> Anglers | <input type="checkbox"/> Beach | <input type="checkbox"/> Boaters | <input type="checkbox"/> No Butts About It: Use Your Ashtray |
| <input type="checkbox"/> Cleaning | <input type="checkbox"/> Daily Living | <input type="checkbox"/> Drivers | <input type="checkbox"/> If You See It...Report It |
| <input type="checkbox"/> Kids | <input type="checkbox"/> Kitchen | <input type="checkbox"/> Lawn & Garden | <input type="checkbox"/> Personal Watercraft Operators (i.e., jet skis) |
| <input type="checkbox"/> Shore Visitors | | | |

In addition, I would like to receive information about COA:

- | | | | |
|--|--|--|---|
| <input type="checkbox"/> Beach Sweeps | <input type="checkbox"/> Storm Drain Stenciling | <input type="checkbox"/> Educational Materials | <input type="checkbox"/> Monthly Newsletter |
| <input type="checkbox"/> Presentations | <input type="checkbox"/> Volunteer Opportunities | <input type="checkbox"/> Educational Programs | <input type="checkbox"/> Special Events/Fundraisers |

Name: _____

Address: _____

Phone: _____

E-mail: _____



The 10 Tips Card Series is also available at www.CleanOceanAction.org by following the links for “Education Programs” and “10 Tips.”

“OUR HABITAT IS DOWN THE DRAIN”

COA Education Programs & Materials

Clean Ocean Action (COA) offers several interactive programs and informative materials to schools and groups in New Jersey to educate students of all ages about ocean pollution. Many of COA's activities and resources provide students with ways to become the solution to ocean pollution. To order materials and to schedule programs, contact COA's main office at (732) 872-0111, and ask for the Pollution Prevention Coordinator.



ABOUT CLEAN OCEAN ACTION

“Our goal is to improve the degraded water quality of the waters off the New Jersey/New York coast.” - Mission Statement

Clean Ocean Action identifies the sources of pollution and mounts an attack on each source by using research, education, and citizen action to convince our officials to enact and enforce measures which will clean up and protect our ocean. COA is the only fully-time regional coalition that works exclusively and effectively for a clean ocean.

Organized in 1984, COA is a broad-based coalition of over 150 active boating, business, community conservation, diving, environmental, fishing, religious, service, student, surfing, and women's groups, and hundreds of businesses, and thousands of citizens concerned with water pollution in the New York Bight (the area of water from Cape May, New Jersey to Montauk Point, New York).

Clean Ocean Action
18 Hartshorne Drive
Sandy Hook, NJ 07732
732-872-0111
www.CleanOceanAction.org

