

Where Does the Gutter Go?



Grade 4

‘Ōhi‘a Project / Exploring the Islands

Lesson at a Glance

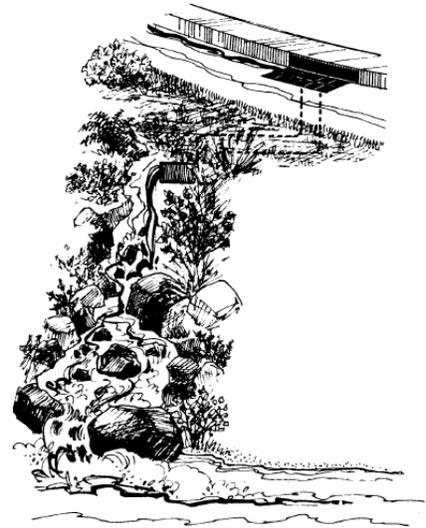
Students create an educational display illustrating both positive and negative actions regarding household pollutants in streams and coastal areas.

Key Concepts

- Individual actions can have a far-reaching effect on the quality of ground and surface water in Hawai‘i.
- Protecting our streams is beneficial to people, plants and animals.

Essential Questions

- How can we make a difference for our environment?
- How do our activities on land affect our streams and ocean?



Hawai‘i Content Performance Standards, III

There are no identified standards for this grade and course.

Objectives

Students:

- describe the importance of conserving our resources;
- list positive and negative land and water uses;

DOE/MGF *Exploring the Islands* Telecast: “We Can Make a Difference”

Students participate in a “Futures Game” that focuses on their ideas for a healthy island environment. They explore how actions in the neighborhood can affect neighborhoods miles away and they learn about ways to make a difference for the environment.

Time

two to three class periods



Subject Areas

science, social studies

Materials

student activity cards (provided)

drawing paper

colored pens or markers

“Flowing to the Sea” video (contact MGF for a copy)



Teacher Background

Pollutants are generally classified into two broad categories; one comes from an identifiable source, such as a particular factory or farm, the other is from sources that are difficult to trace. The Environmental Protection Agency and other groups have made great strides toward regulating and minimizing pollution from identifiable sources.

Pollution from overall sources, such as herbicides and pesticides from lawns, paint, oil, gasoline, anti-freeze, and cleaning solvents from homes is more difficult to trace. Some of it is litter, such as garbage, plastic bags, Styrofoam cups, bottles, cans, animal wastes, and old appliances. Much of this pollution is left on lawns, driveways or roadsides to wash down the street and into the gutter. Once in the gutter, this household debris washes through a storm drain and is deposited into a stream. Some of the pollutants, particularly biodegradable garbage, will decay. If too much material decays at once, it can consume all the oxygen in the water and kill stream life. Some of the smaller particulates may percolate beyond the streambed and contaminate the groundwater below. After a heavy rain, most materials will be carried out to sea, and much will wash up on our beaches.

Beaches in Hawai‘i have been posted warning signs periodically due to pollution from streams, treated and untreated sewage, beach-goers and boaters.

People can be warned to stay out of the water, but coastal plants and animals don't have that option. Plastics are especially dangerous to wildlife. Many marine animals, such as the endangered green sea turtle, mistake bits of plastic for edible jellyfish or seaweed. Oil spills from ships kill sea birds and other marine life. Seals and other marine animals sometimes become trapped in plastic, especially plastic soda can rings, and starve or choke to death. To make matters worse, many plastics take a long time to break down. Soda can rings, for example, will stay in the environment for about 450 years! Fortunately degradable plastics are currently being developed and used in place of plastics that persist in the environment.

In Hawai‘i, pollution from general sources is believed to be the primary cause of environmental pollution, contributing up to ten times as much pollution to streams and beaches as all our factories and industries combined. Unfortunately, it is virtually impossible for officials to identify or regulate the source of all these pollutants. As the population grows and population density increases, this pollution will become an increasingly serious problem for people and wildlife. The burden of recognizing the environmental consequences of one's actions and making the effort to control pollution rests with each individual.

Technology is used to help clean up pollution. For instance, in phytoremediation, plants such as *‘ākulikuli* and koa haole can be used to clean water by breaking down contaminants such as pesticides. Carbon filters are used at water treatment plants to remove contaminants such as pesticides in drinking water. The carbon in the filters attracts contaminants the way magnets attract metal filings.

Teaching Suggestions

1. Ask students to imagine they are washing a car. They use soap and ammonia to clean tar from the tires and oil from the hood. The plastic bag their sponges were in is picked up by the wind and carried away. Where do the tar, oil, soap, ammonia, wax and plastic end up? (Down the street, into the gutter, into a stream and out to the sea.) Explain that in Hawai'i, sewage is the only waste product that is treated before going out to sea.
2. Record the path of the soapy water from the above scenario in sequence on the board. Discuss potential effects on wildlife and ways that the impact on the stream and ocean environment could be reduced. (For example, the tar and the oil could be scraped or wiped off the car and thrown in the garbage. The plastic bag could be disposed in the same way. A biodegradable soap could also be used.)
3. Show the video, "Flowing to the Sea" (optional). Divide the class into small groups. Ask each group to come up with a list of things that might go down a storm drain in their neighborhood. Groups should list at least two organisms that would be affected by things going down the drain.
4. Write a list of items on the board and initiate a class discussion. Have the students go back to their list and explain alternative ways that the pollutants could be taken care of.
5. Watch the *Exploring the Islands* telecast, "We Can Make a Difference."
6. Divide the class into small groups and distribute an activity card to each group. Ask students to illustrate and describe possible results from each situation.
7. Ask each group to present its pictures and describe the chain of events to the class.
8. Discuss what could have been done to prevent the pollution in each of the three situations.
 - Take the oil to a recycling center (listed in the phone directory).
 - Discard plastic and all forms of litter in trash cans.
 - Discard paint chips by wrapping them in newspaper and placing the waste in trash bins.
9. Have students write a reflective journal on the following:
 - the importance of conserving our resources;
 - a list of positive and negative land and water uses;
 - a list of five potential pollutants found at home;
 - a written explanation of all the ways that one of these pollutants could be harmful to the stream and coastal ecosystem, if it passed into a storm drain; and
 - an outline of an action plan to prevent this potential pollutant from reaching a storm drain.

**During the *Exploring the Islands* Telecast
“We Can Make a Difference”**

Mystery Minute Question

When something goes down a storm drain, name three places it could end up.

MindPower Minute Questions

What contributes up to ten times more pollution in our streams than all of our factories and industries combined?

During the “Futures Game” students watch short video segments that illustrate impacts on the environment and answer the questions:

- What were the environmental impacts in the forest? (Segment 1)
- What were the environmental impacts from stream pollution? (Segment 2)
- What were the environmental impacts on the coast? (Segment 3)
- What were the environmental impacts in the ocean? (Segment 4)

Round 2 of the “Futures Game” asks the following question:

- What are your solutions?

Student Activity

Students play the “Futures Game” (see *MindPower Minute Questions* above).

Mahalo to ...

Mānoa Elementary School for assisting with *Exploring the Islands*.

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Extended Activities

- Take a field trip to a nearby stream or beach. Students should wear shoes and use rubber gloves. Ask them to record and collect all the garbage they find within a specified area and look for evidence of other pollutants (such as dead fish or foam in the water). Summarize the results and publish them in a letter to the editor of a local newspaper, urging readers to help fight pollution by disposing wastes more carefully.
- Have students conduct research about various kinds of pollutants (plastics, metals, chemicals, and biodegradables). Information gathered should include pollution sources, persistence in the environment, and possible ways to reduce the pollution. One-page data sheets and illustrations can be displayed on a school bulletin board or mural.
- Have students write a letter to the editor of a newspaper:
 1. explaining how common household items can become pollutants in our water system, if it is allowed to flow down the storm drain.
 2. educating the community of the need to manage and use water wisely.
- Ask students to draw a mural illustrating the importance of individual actions. Stress our responsibility to pick up litter, even when it isn't ours. Post the mural with other information about water pollution in a central place at school.



A Miniature Oil Spill

You have just helped your parents to change the oil in the car. You need to get rid of the old oil and don't know where to put it. You pour it down the gutter in the street. Then you go join your friends playing near the stream at the end of the street. It begins to rain.

- 1) Draw a series of picture to show where the oil will go.
- 2) Write a sentence under each picture to describe the effect the oil might have on people and wildlife.
- 3) What could you have done to prevent this pollution?



Plastic and Picnics

You and your friends are having a picnic in your backyard. Some plastic potato chip bags are picked up by the wind and blown to the gutter in the street. It begins to rain.

- 1) Draw a series of pictures to show where the plastic bags could end up.
- 2) Write a sentence under each picture to describe the effect the plastic might have on people and wildlife.
- 3) What could you have done to prevent this pollution?



Paints and Pollution

You are helping your family scrape old paint off the side of your house. You clean up the driveway by washing away the fallen paint chips with a hose. It begins to rain.

- 1) Draw a series of pictures to show where the paint chips could end up.
- 2) Write a sentence under each picture to describe the effect the paint chip might have on people and wildlife.
- 3) What could you have done to prevent this pollution?

