Marine Debris in Hawaii

Summary
Students will be introduced to a variety of human and natural threats to coral reefs, focusing on how man-made marine debris affects coral reef ecosystems. Students will learn about marine debris via two strategies: reading an article and watching a Power Point presentation.

Objectives
• Students will identify natural and human threats to coral reefs.
• Students will identify impacts of marine debris on Hawaiian coral reef ecosystems.
• Students will describe why and how marine debris occurs and how we can decrease the amount of marine debris.

Materials
“Marine Debris in Hawaii” brochure from NOAA
“How long does it take for marine debris to decompose?”
“Healthy Reef vs. Unhealthy Reef” picture
A sheet of paper for their journal entry (1 per student)

Making Connections
Students have now learned about and discovered a variety of physical and biological components of a coral reef. In the following lessons, students will explore the things, including themselves, that threaten the safety of coral reef ecosystems.

Teacher Prep for Activity
Photocopy the “Healthy vs. Unhealthy Reef” picture, “Marine Debris in Hawaii” brochure, and “How long does it take for marine debris to decompose” for each student.

Background
See background in brochures attached.
Procedure
1. Make a list on the board titled: “What destroys a coral reef?” Ask for some examples of things they think might destroy a coral reef. Write them on the list.
2. Then, ask the students to help you categorize the list into the subheadings: Humans? Vs. Natural?
3. Pass out and read as a class, the NOAA brochure on marine debris in Hawaii.
   *If time permits, briefly discuss some of the information on the other brochures provided.*
4. Next, brainstorm research questions that beach researchers might want to ask about a degraded (marine-debris laden) shoreline. Example questions you could look for are:
   a. What are the five most common types of marine debris items we will find?
   b. Will cigarette butts be the most typical item found?
   c. How does marine debris affect coral reef organisms?
5. Now, have the students write a journal entry on their reactions to these questions:
   *What do students think about plastic in the ocean?*
   *Where does plastic go?*
   *Does it go away?*
   *What types of animals are the most affected by marine debris?*
   *How do we use plastic in our daily lives?*
   *How can we reduce plastic waste in the ocean?*
   *Note: if time permits, ask for volunteers to share their entries to give them practice on oral communication skills.*
6. Distribute the “Healthy Reef vs. Unhealthy Reef” picture and have students draw and color their pictures.
7. To end, get the students up and active by introducing and asking for volunteers to perform the following “Impact Dramas”:

   1. Polyp being stepped on or crushed
      - Opened, healthy polyp immediately closing (“Ouch” sound effect)

   2. Polyp dying
      - (“cough, cough, greasy” sound effect)- symbolize being covered with oil.
      - (“hot, hot, hot” sound effect) symbolize sea temperature rise from global warming.
      - (“coughing, gasping; I can’t feel the sun; Nooo” sound effect) symbolize being smothered by sediment/algae or marine debris

   **Homework:** Challenge students to keep track of all of the disposable plastic items (including packaging on products) they use during one full day. Have them list each item and make notes of what they do with these items when they are finished using it. Ask students to share how they disposed of their plastics, including ways that they reduced (used alternative products), reused, or recycled the next day.
   *Note: Before giving the assignment, play Jack Johnson’s song “Reduce, Reuse, Recycle” the build up some excitement for the task you are asking them to do.*
Assessments
Completed category list
Marine debris drawings
Homework assignment

Resources
Marinedebris.noaa.gov
Hawai‘i Wildlife Fund website – www.wildhawaii.org
Partnership for Reform through Investigative Science and Math

Alien Species Transport

Vessel L Score and Habitat Disturber

How YOU Can Help

GET INVOLVED! Participate in local cleanups in your area.

REMEMBER that our land and sea are connected.

REDUCE the amount of waste you produce.

REUSE items when you can! Choose reusable items over disposable ones.

RECYCLE as much as possible! Bottles, cans, cell phones, ink cartridges, and many other items can be recycled!

March 2005
Printed on recycled paper with vegetable ink.


For more information 
marinedebris.noaa.gov

Marine Debris in Hawaii 6.1
Partnership for Reform through Investigative Science and Math

Background

The state of Hawaii is an archipelago of islands, atolls, banks, and shoals extending over 1,500 miles in the Pacific Ocean. Hawaii is home to endangered Hawaiian monk seals, sea turtles, dolphins, whales, many species of seabirds, and an abundance of coral reefs. Throughout Hawaii, marine debris continues to present a hazard to marine life and habitat, as well as safe navigation.

Sources of Marine Debris

DIRECT from ocean-based sources such as ships and fishing vessels.

INDIRECT from land-based sources when washed out to sea via streams and storm drains.

Movement of Marine Debris

The North Pacific, California, North Equatorial, and Kuroshio currents along with atmospheric winds generate the North Pacific Subtropical Gyre (shown above). Located in the center of this subtropical gyre, marine debris accumulates in Hawaii (Timmerman et al., 2005).

Degradation Timeline

Paper towel 2-4 weeks

Milk carton 3 months

Plywood 1-3 years

Cigarette filter 1-5 years

Plastic bag 10-20 years

Plastic cup 50 years

Rubber shoe sole 50-80 years

Aluminum can 80-200 years

Plastic soda bottle 450 years

Disposable diaper 450 years

Monofilament fishing line 600 years

Glass bottle 1 million years

From TRASH to ELECTRICITY

Removing and Recycling Marine Debris in Hawaii

100 tons of derelict net creates enough electricity to power 43 homes for a year!

The debris is then hauled on board an awaiting boat.

As much as possible, the derelict net is sorted and identified.

The debris is brought to Honolulu Harbor where it is off-loaded.

The debris is then sent to Schnitzer Steel Hawaii Corporation's facility.

Partnerships

The National Oceanic and Atmospheric Administration (NOAA) works with other federal agencies, state and county departments, not-for-profit organizations, industry partners, private businesses, and community groups to ensure the success of all marine debris removal efforts.

Marine Debris in Hawaii 6.1
How long does it take for marine debris to decompose?

Time it takes for garbage to degrade in the environment

Source: U.S. National Park Service; Mote Marine Lab, Sarasota, FL.

<table>
<thead>
<tr>
<th>Item</th>
<th>Decomposition Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass bottles</td>
<td>1 million years</td>
</tr>
<tr>
<td>Monofilament fishing line</td>
<td>600 years</td>
</tr>
<tr>
<td>Plastic beverage bottles</td>
<td>450 years</td>
</tr>
<tr>
<td>Disposable diapers</td>
<td>450 years</td>
</tr>
<tr>
<td>Aluminium can</td>
<td>80 - 200 years</td>
</tr>
<tr>
<td>Foamed plastic buoy</td>
<td>80 years</td>
</tr>
<tr>
<td>Rubber boot sole</td>
<td>50 - 80 years</td>
</tr>
<tr>
<td>Foamed plastic cup</td>
<td>50 years</td>
</tr>
<tr>
<td>Tin can</td>
<td>50 years</td>
</tr>
<tr>
<td>Leather</td>
<td>50 years</td>
</tr>
<tr>
<td>Nylon fabric</td>
<td>30 - 40 years</td>
</tr>
<tr>
<td>Plastic film canister</td>
<td>20 - 30 years</td>
</tr>
<tr>
<td>Plastic bag</td>
<td>10 - 20 years</td>
</tr>
<tr>
<td>Cigarette filter</td>
<td>1 - 5 years</td>
</tr>
<tr>
<td>Wool sock</td>
<td>1 - 5 years</td>
</tr>
<tr>
<td>Plywood</td>
<td>1 - 3 years</td>
</tr>
<tr>
<td>Waxed milk carton</td>
<td>3 months</td>
</tr>
<tr>
<td>Apple core</td>
<td>2 months</td>
</tr>
<tr>
<td>Newspaper</td>
<td>6 weeks</td>
</tr>
<tr>
<td>Orange or banana peel</td>
<td>2 - 5 weeks</td>
</tr>
<tr>
<td>Paper towel</td>
<td>2 - 4 weeks</td>
</tr>
</tbody>
</table>

What does marine debris look like?

A few commonly seen debris items in Hawai’i:

<table>
<thead>
<tr>
<th>Plastic tubes</th>
<th>Plastic buoys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic with liquid chemicals inside.</td>
<td>Come in a variety of</td>
</tr>
<tr>
<td>Similar to the type sold at Hallowen</td>
<td>sizes from basketballs to baseballs.</td>
</tr>
<tr>
<td>Lightstick</td>
<td>Cigarette lighter</td>
</tr>
<tr>
<td>Plastic tubes</td>
<td>Found in a wide variety of</td>
</tr>
<tr>
<td>~6-8 inches long and 1/2 inch in diameter. Most common color is black.</td>
<td>colors. May still contain flammable liquid, so be careful.</td>
</tr>
<tr>
<td>Plastic bottles</td>
<td>Plastic bottles</td>
</tr>
<tr>
<td>A variety of bottle types are found from beverage bottles to detergent and oil containers.</td>
<td></td>
</tr>
</tbody>
</table>
Activities that Produce Debris:

**Source:** *A Pocket Guide to Marine Debris* by The Ocean Conservancy and U.S. Environmental Protection Agency

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoreline and Recreational Activities</td>
<td>Debris produced on or near shoreline areas from beach goers, picnickers, sports and games, festivals as well as litter carried from inland from streets and storm drains.</td>
</tr>
<tr>
<td>Ocean/Waterway Activities</td>
<td>Debris produced from recreational or commercial fishing or boating.</td>
</tr>
<tr>
<td>Smoking</td>
<td>Debris associated with the improper disposal of smoking materials.</td>
</tr>
<tr>
<td>Dumping Activities</td>
<td>Debris associated with the discarding (legal or illegal) of construction or building materials and supplies, cars and car parts, and household appliances.</td>
</tr>
<tr>
<td>Medical/Personal Hygiene</td>
<td>Debris that may be improperly disposed of through sewers, toilets and storm drains, or left by beach goers. Those items may indicate the presence of other unseen pollution such as disease-causing bacteria.</td>
</tr>
</tbody>
</table>

Sources of marine Debris in Hawaii

**Source:** 2005 International Coastal Cleanup: Summary Report Hawaii, The Ocean Conservancy

- Shoreline and Recreational: 9.8%
- Smoking Related: 2.4%
- Ocean/Waterway: 50.1%
- Dumping: 37.1%
- Medical/Personal Hygiene: 0.6%
Healthy Reef vs. an Unhealthy Reef

Name________________

Directions: Draw a picture of a HEALTHY coral reef in the top box. Draw a picture of reef impacted by human and natural threats in the bottom box that is UNHEALTHY.

HEALTHY

UNHEALTHY