



Activity #2

Protecting Coral Reefs

● ● ● In Advance *Student Assignment*

- Assign the Student Page “Keeping an Eye on Coral Reefs” (pp. 22-25) as homework. This homework assignment includes Internet research on coral reef problems and protection.

● ● ● Class Period One *Protecting Coral Reefs*

Materials & Setup

For each student

- Student Page “Keeping an Eye on Coral Reefs” (pp. 24-27)

Instructions

- 1) Lead a class discussion that focuses on the ideas students generated through their Internet research. The discussion should cover:
 - How monitoring is being used to document the health of coral reefs,
 - What is being done in other parts of the world to protect coral reefs from specific threats,
 - What is being done on Maui and in other parts of Hawai‘i to protect coral reefs,
 - What students think should be done to protect Maui coral reefs,
 - What students could do to help protect Maui coral reefs,
 - How people’s actions on land and in the water affect coral reefs, and
 - What other information students might need to make informed decisions about Maui coral reef protection.

Journal Ideas

- Have you ever been snorkeling, swimming, or diving near coral reefs? If so, what was it like? If not, what do you think it would be like?
- Why are Maui coral reefs important to you?
- How do you think you and your family affect Maui coral reefs in your daily lives? (This question could be used before and after the unit to see if student views change based on what they learn.)
- What are the most important things one person can do to help protect Maui coral reefs?
- In *Kumulipo*, the Hawaiian creation chant, the coral polyp is considered to be the first living organism created and the origin of all life. How do you think ancient Hawaiians treated coral reefs based on this belief? What would be the same and what would be different today if people acted in this way?

Assessment Tools

- Two-page Internet research report
- Participation in class discussion
- Journal entries



Keeping an Eye on Coral Reefs

Coral reefs are found throughout the tropical oceans of the world. Coral reef ecosystems are among the most diverse in the world. According to the National Ocean Service, coral reefs are the second most productive biological system in the world after tropical rain forests. That means that, acre for acre, they produce the second greatest amount of “biomass,” measured as the weight of all living organisms.

Threats to Coral Reefs

In many parts of the world, coral reefs are severely degraded and threatened by human activities. Scientific monitoring of coral reefs has helped to establish that globally, the most damage to reefs is caused by:

Marine Pollution

Much of the pollution in the ocean started out on land. Construction in coastal areas as well as development, logging, or mining along streams that run to the sea can cause soil to erode and get washed into the ocean. In this process of “sedimentation,” dirt, silt, and sand can cloud the water or settle directly on reefs, reducing available light and smothering the polyps, making it difficult for coral to thrive. Fertilizers and sewage also make their way into the ocean from land. The nitrogen and phosphorus in this runoff are nutrients that encourage rapid algae growth. Algae overgrowth can choke coral polyps by cutting off their supply of light and oxygen.

And as coastal areas become more built-up and urbanized, there is more paved-over area and less open area to absorb rains. This water may run off into the ocean, carrying with it pollutants such as oil and grease, metals such as mercury and lead, chemicals, and pesticide residues from lawns and landscaping. Trash dumped into or near the water can also kill coral reef animals, getting lodged in animals’ stomachs or strangling them.

Fuel leaks from boats, dumping of wastewater holding tanks and bilges, and occasional large oil spills can also damage local coral reefs and interfere with coral reproduction.

Unsound Fishing Practices

People catching fish can harm the reef environment in many ways. In some parts of the world, fishermen desperate to catch fish use explosives, which kill all of the marine life in the surrounding area (making it easier to collect) and reduce nearby coral to rubble. In other places, people use cyanide, chlorine bleach, and other poisons to stun and capture valuable reef fish for the aquarium fish market and for sale in live fish restaurants and markets. The poisons affect not only the fish but also coral “polyps” (the flower-shaped, mature stage of corals) and other marine life in the area.

Overfishing is another concern. In areas where fishing pressure is high, fishermen may change their methods to catch smaller, younger fish that would once have been allowed to get older and reproduce more often. Or they may target new species of fish when the traditional ones become rare.

When people take too many fish from a reef, it can upset the balance of the natural community. For example, overfishing of fish species that eat algae that naturally grows on corals can allow the algae to grow so much that they smother the corals.



Collecting Coral for Trade

Corals are popular as decorations, jewelry, and medicinal supplements. In some parts of the world, they are also collected for use as construction material. Alive, they are sold for use in salt-water aquariums. Taking live corals damages reef communities, especially when collection is concentrated in one area.

Direct Physical Damage

Divers, snorkelers, and recreational boaters can damage reefs by touching them, walking on them, or dropping anchor. Reefs are sometimes dredged or dynamited to make way for coastal construction or to improve access to a harbor. Large seagoing vessels sometimes run aground, damaging large sections of reef.

There are also natural causes of damage to coral reefs, including hurricanes and typhoons, which can break up reefs with powerful waves, and cause heavy rains which increase runoff and sedimentation. Another common threat to corals is the crown-of-thorns starfish (*Acanthaster planci*). It is a large starfish that feeds on corals, and in some parts of the Pacific, large booms in crown-of-thorns populations have caused serious effects on coral reefs. *Acanthaster planci* breakouts have been linked to regions of increased development and “eutrophication” or low oxygen conditions caused by algae overgrowth.

Hawaiian Coral Reefs

Around the world, there is growing concern over reef health. The International Coral Reef Initiative is a new international effort that aims to reverse the trends that have damaged about ten percent of the world’s coral reefs beyond recovery. The initiative, which began in 1994, now includes more than 90 member countries.

In Hawai‘i there is also concern about the health of our coral reefs. An initial assessment and the results of coral reef monitoring suggest that Hawaiian coral reefs are generally in better shape than reefs in many other parts of the world. Still, people are putting pressure on Hawaiian coral reefs, and the extent of our impact is not always known. One long-term study of coral reefs along the Maui coastline found that, between 1994 and 1998, coral cover declined at the northern sites, which are heavily used by people. In contrast, the more lightly used southern sites remained relatively stable.

In a series of meetings held during 1997 and 1998, scientists and resource managers identified four major problems facing Hawaiian coral reefs:

- Over-fishing,
- Sedimentation,
- Eutrophication, and
- Algal outbreaks.

Developing better research methods, tracking changes in coral reef systems, studying the effects of human-caused impacts such as those listed above, and basing management decisions on that information are all reasons that growing effort is being put toward assessing and monitoring the health of Hawaiian coral reefs.

The Hawai‘i Coral Reef Assessment and Monitoring Program (CRAMP) was begun in 1998 to help make the most of the effort that is being put into studying and monitoring coral reefs. CRAMP is developing and applying standard scientific techniques that will allow the results of many different studies of Hawaiian coral reefs to be compared.



Some monitoring programs rely on volunteer effort. Reef Check, for example, is a worldwide program for gathering basic information about coral reefs. Reef Check volunteers receive training that prepares them to do underwater surveys looking at fish, invertebrates, and coral cover. Reef Check has created special Hawai‘i data sheets because of the unique species that are found here.

Another volunteer monitoring program is conducted by the Reef Environmental Education Foundation (REEF). Through REEF, divers and snorkelers can participate in fish surveys as part of their regular diving activities. REEF has produced a waterproof color identification card for Hawaiian fishes and a special REEF survey form for Hawai‘i. (Websites listed on the following pages provide more information about these volunteer opportunities.)

Protecting Coral Reefs — Internet Research

People around the world are concerned about the health of coral reefs and what people can do to protect these important natural systems. We can learn a lot from what is happening in other parts of the world as we work to protect our coral reefs around Maui and the other Hawaiian Islands.

Your Assignment

- 1) Select one of the threats to coral reefs listed on the preceding pages.
- 2) Formulate a question about this threat to guide your Internet research and write it in the space below. Your question may have to do with how this threat is affecting specific coral reefs around the world, actions that people and organizations are taking to protect coral reefs from this threat, government policies designed to minimize this threat, how monitoring is being used to document this threat or the effect of protective actions, or another topic of your choosing.
- 3) Use the Internet to research your question and write a two-page report based on your research. As a reference, provide the URLs where you got the information on which your report is based.



Website Ideas

Hawai‘i Coral Reef Assessment and Monitoring Program at <cramp.wcc.hawaii.edu>.

Reef Environmental Education Foundation at <www.reef.org>.

Reef Check at <www.reefcheck.org>.

Coral Reef Alliance at <www.coralreefalliance.org>.

Coral Reef Ecology website at <www.uvi.edu/coral.reefer>.

U.S. Environmental Protection Agency, Office of Water, “Coral Reefs and Your Coastal Watershed” at <www.epa.gov/owow/oceans/factsheets/fact4.html>.

Key Word Ideas

- Coral reef
- Coral reef ecology
- Coral bleaching
- Coral diseases
- Coral reef threats
- Coral reef monitoring
- Marine protected areas
- Mooring balls