

Biomes: Coastlines & Seas

Grade Level: 6-8

Subject: Earth Science

Duration: Three class periods

Objectives

Students will

- learn about types of marine coasts and their locations in the United States and its territories;
- discover the difference between primary and secondary marine coasts and their formations; and
- identify life forms that inhabit different marine coastal regions.

Materials

- Computers with Internet access (optional but very helpful)
- Reference books on the coastlines of the U.S. and its territories (Puerto Rico, Virgin Islands, Guam, American Samoa).
- Maps: Two or more of the U.S. and its territories, including latitude and longitude lines; separate maps of Guam, Puerto Rico, and American Samoa.

Procedures

1. To prepare, gather reference materials about marine biology, oceanography, and ecology. Make atlases available that contain political and physical descriptions of the U.S. and its territories with marine coasts. Mount one map on a bulletin board or wall. Leave at least two feet of space around the map.
2. As a class, review the characteristics of marine coasts, which are classified as primary and secondary coasts.
 - Primary coasts owe their character and appearance to land erosion, deposition of sediments, and other processes that occur on land; they are formed by earthquakes, volcanoes, and rapid sea level changes. A delta is a primary coast, created by sand deposited at the mouth of a river.
 - Secondary coasts are created by wave erosion, water chemistry, coral-building marine animals, and other processes occurring at sea. A reef is a secondary coast, which may be a ridge of rock, sand, or coral.
3. Have students identify on the map the states and territories that have a marine coast. List these on the board. Brainstorm with students the different kinds of coasts, including those with lots of sand, cliffs, rocky coasts, and so on. Write students' ideas on the board.
4. In this activity the coasts of the U.S. and its territories fall into three broad geographic categories: the Pacific, Gulf of Mexico, and Atlantic. Review the characteristics of each category.
 - The Pacific coastline commonly experiences earthquakes and volcanic eruptions. Its landforms show evidence of an actively changing region characterized by high-energy, or powerful, waves.
 - The Gulf of Mexico coastline includes the Louisiana-Texas coast. It is dominated by the Mississippi River, which deposits sediment into the Gulf of Mexico. Central America physically shields it from massive erosion and high-energy waves.
 - The Atlantic coastline has subsided, or sunk, about two miles (three kilometers) over the last 15 million years. Continental erosion has produced sediment up to 10 miles (16 kilometers) thick in some places. High-energy waves develop during storms and when hurricanes strike.

5. Divide students into small groups. Assign each group one of the following 10 coastal regions: California, Washington, Alaska, Hawaii, Texas, Florida, Maine, Louisiana, New Jersey, and Puerto Rico.
6. Distribute the Coastal Analysis Profile activity below. Each student will analyze a coastal region. Allow students time to conduct research and complete their profiles.

Coastal Analysis Profile

- On a separate sheet of paper, answer each of the questions.
 - Record the name of your state or territory.
 - Write one or two sentences describing its location.
 - Name the marine body of water along its coast.
 - Classify the coastline as primary or secondary. Use pictures from your research to describe its characteristics. If it has primary and secondary coastlines, describe them.
 - List at least 10 animals and plants living along the coastline. Summarize them in one paragraph.
 - Describe natural hazards (earthquakes, tsunamis, hurricanes, storms) that could affect the coastline.
 - Discuss one or two ways humans threaten this coastal environment. List your ideas for solutions.
7. Students will work in groups to create a visual presentation that summarizes their research. Restrict presentations to five minutes. Have students illustrate their presentations with pictures from their research materials. Encourage the class to take notes during presentations and be prepared to ask questions.

The following Web sites will be helpful:

Monterey Bay Aquarium
<http://www.mbayaq.org>

National Oceanic and Atmospheric Administration (NOAA)
<http://www.noaa.gov>

Ocean Planet, Smithsonian
http://seawifs.gsfc.nasa.gov/ocean_planet.html

OceanLink
<http://oceanlink.island.net>

Physical Oceanography from Space
<http://podaac.jpl.nasa.gov/kids>

Coastal mitigation projects
<http://www.coastalamerica.gov>

8. Have students post visual presentations next to the appropriate coastline on the mounted map.

Evaluation

Use the following three-point rubric to evaluate students' work during this lesson.

- **Three points:** Students completed all sections of the profile and actively participated in a well-researched and organized presentation to the class.
- **Two points:** Students completed all sections of the profile; made an effort to participate in group presentation; did not organize presentation as clearly as it could be.
- **One point:** Students did not complete all sections of the profile; made a below-average research effort and poor organization of the content of the group presentation.

Vocabulary

coast

Definition: The land or area next to the ocean; a seashore
Context: Ann's family spent summer vacations at the Atlantic coast.

delta

Definition: A deposit of sand and soil at the mouth of a river
Context: Several deltas in the world have risen above water level and can be inhabited by animals, plants, and even humans.

mangrove swamp

Definition: A region with various tropical evergreens that grow in masses along tidal shores, with roots that grow above ground in a densely interlaced thicket
Context: Plants and animals have abundant food and areas to breed in a richly productive mangrove swamp.

reef

Definition: A ridge of rock, sand, or coral rising toward the surface of marine waters
Context: Reefs grow in areas of abundant sunlight and warm water; many are very old and cover vast areas of the tropics.

Academic Standards

The National Academy of Sciences provides guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K–12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following national standard:

- Life Science: Populations and ecosystems

Credit

Discovery School staff (based on lesson plan by Robert Michael de Groot, science education consultant and curriculum designer)