

Barrier Islands Sands & Lands in Motion



Photo credit: Michael Carlowicz

No matter what a map may tell you, shorelines are constantly moving and changing. Currents, waves, winds, and people re-shape our coasts on scales of days, months, years, centuries, and millennia. If you go to your favorite beach regularly, you might not notice the subtle changes. However, satellites can see the movement in ways that we cannot see from the ground.

A good example of Earth's ever-changing shorelines is the **barrier island**. As the name suggests, these sandy islands create a barrier between the ocean and the mainland. They are **depositional landforms** created by the movement of ice, water, and wind over Earth's sand, soil, and rocks.

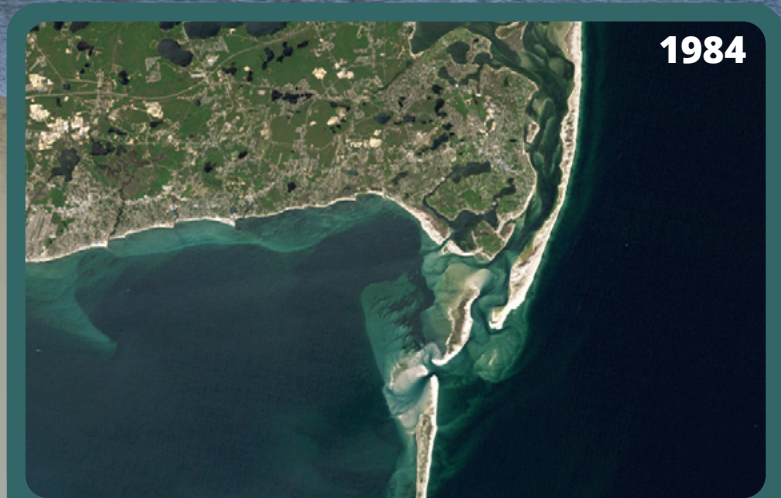
Vocabulary



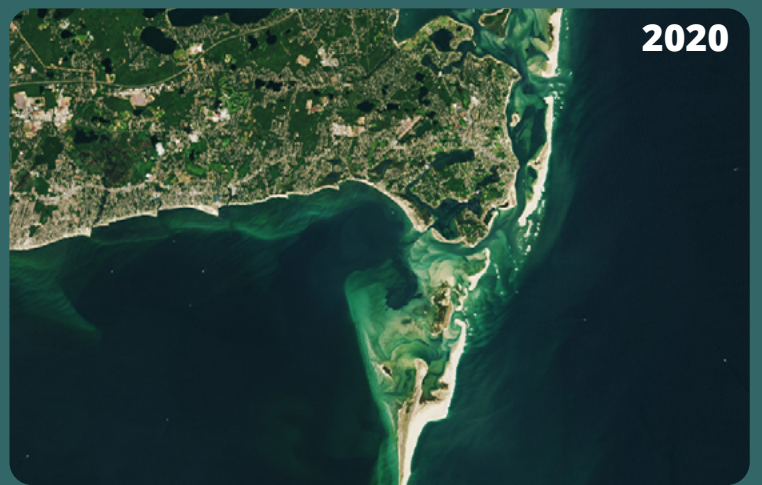
spits – Sandy landforms connected to the mainland but stretching out into the sea.

barrier island – A sandy island that usually lies parallel to the mainland shore.

depositional landform – What forms as a result of the movement and placement of sediments and rock from one place to another.



1984



2020

Where did part of the beach go!? Over the course of 35 years, the sandy **spits** and islands off of Chatham, Massachusetts, have experienced dramatic but natural changes. This barrier system has been growing, shrinking, and moving since the last Ice Age.

The Only Constant is Change

Weather events, gravity, and the tides all play a role in creating these coastal **landforms**. Barrier islands can grow from spits that are broken up. They can also form from sandbars that grow up above the water line over time.

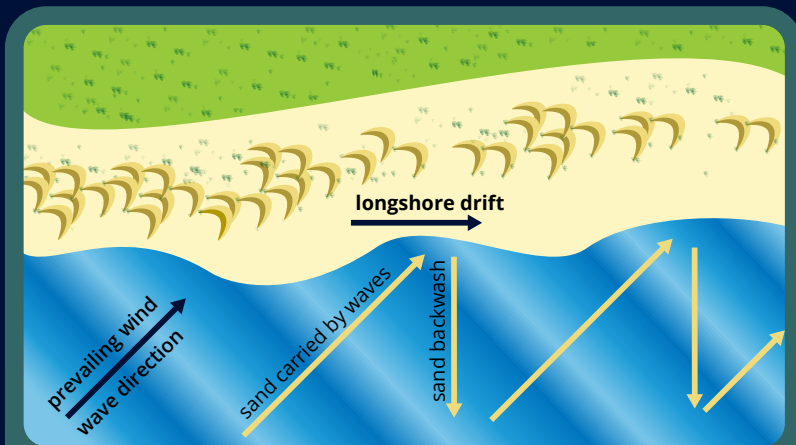
Shorelines also change when humans build near the coast. Jetties, seawalls, and other structures change the movement of ocean currents. This changes the flow of sand and where and how it gets deposited.



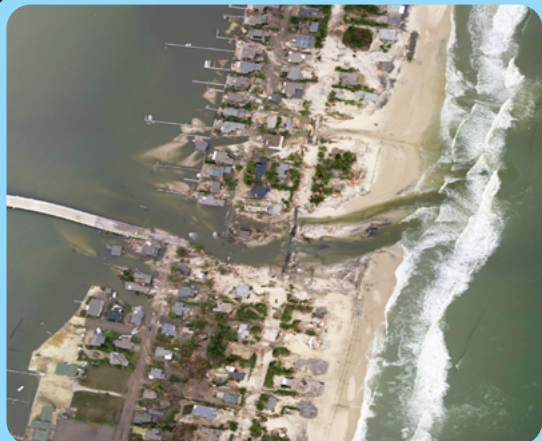
Along the 210-kilometer (130-mile) New Jersey shoreline, most of the beaches and barrier islands are retreating (getting smaller). But not in Wildwood. The beaches here are about the width of several football fields and are continuing to grow. The growth is due to the effects of longshore drift and human development such as a jetty.

Besides being formed by these forces, barrier islands can be re-shaped by them. For example, strong waves from **nor'easters** and hurricanes can cut through weaker parts of barrier islands.

Observing coasts from space better allows leaders to see how development can affect the people and animals who call these areas home.



Waves often approach the shore at an angle and then pull straight back from it. This sideways movement of water and sand allows sediments to be removed from one place and then deposited at another. This action is called longshore drift.



Entire blocks of houses were damaged or destroyed when Hurricane Sandy struck barrier islands in New Jersey in 2012. Photo credit: NOAA

Vocabulary

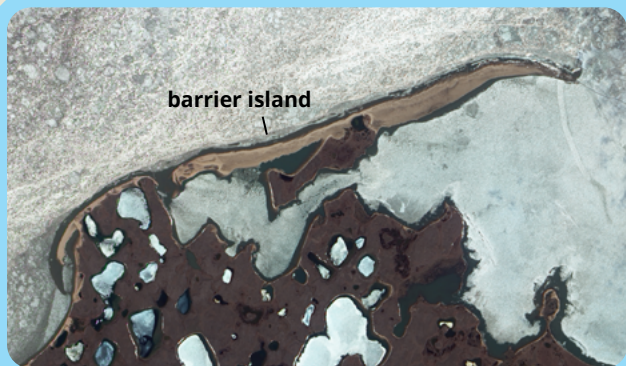


landform – A natural feature of Earth's surface, such as a mountain, valley, forest, or island.

nor'easter – A storm along the East Coast of North America that has strong winds blowing from the northeast.

All About Barrier Islands

Barrier islands make up nearly 10 percent of Earth's **continental** shorelines. They have been found along the edges of every continent except Antarctica. There are more than 2,100 known barrier islands in the world. Scientists and naturalists find new ones with improved satellite imagery.



Scientists were surprised to find that nearly 13 percent of the world's barrier islands are in the Arctic. Barrier islands in this region tend to be half as long as those in other places on Earth.



The world's longest continuous chain of barrier islands is in Brazil. There are 54 islands there. They extend more than 570 kilometers (350 miles) along the Atlantic coast.

Vocabulary



feral – A once domesticated animal that has returned to a wild state.

continental – Forming or belonging to a continent; as opposed to an island.

Home Sweet Home

Barrier islands protect the mainland from the full force of ocean waves and currents. They also promote growth of coastal features like bays, lagoons, and marshlands. These areas provide critical habitat and nurseries for fish, shellfish, and birds. Many creatures make their homes on barrier islands. Some of the most famous are the **feral** ponies that live on Assateague Island. The ponies have adapted to live with coastal storms, lots of mosquitoes, salty food, and limited fresh water. They are one of the few herds that still can be viewed in their natural habitat in the United States.

DIY Science

A Model Shoreline

Build your own model of the shoreline out of clay and sand. Then replicate what happens to shorelines and view both **erosion** and deposition taking place.

First Test:

1. With the clay, create a shoreline in the tray. (Use the brick under the clay to support it.) Let the clay harden for 24 hours.
2. Brush school glue all over the now dry clay and sprinkle it with sand. Let dry.
3. Using the paper cup, add additional sand on top of your shore to fill out your beach.



4. Carefully fill the tray with water so that it reaches the shore.
5. Set up your camera on time-lapse or slow motion.
6. Using the container lid, create waves in the water at an **oblique** angle.
7. View your video and then answer the questions.

Questions:

1. What happened?
2. Why did we create waves at an oblique angle?
3. Did any new depositional landforms get created or start to form?

Materials:

- Aluminum roasting tray
- A brick
- Modeling clay (air drying type)
- School glue
- Paint brush
- Dry play sand
- Paper cup
- Water
- A container lid
- A digital camera
- Popsicle sticks
- Black paint (optional)
- Glue gun
- Hot glue sticks



Vocabulary

oblique – A slanted angle that is neither parallel nor at a right angle.

erosion – A process where water, wind, ice, or gravity wear and displace surfaces.



Second Test:

1. Remove the water.
2. Using the hot glue gun, affix the popsicle sticks to the shore to replicate a man-made structure, like a jetty. (You can paint this black to help it stand out better against the sand.)
3. Repeat steps 3 - 7 from the first test.

Questions:

1. What happened?
2. Where did the most erosion take place?
3. Did any new depositional landforms get created or start to form?



1985



2019

Assateague Island is gaining land on its southern end.

Extension Activities:

- Try adding a few drops of food coloring into the water. This will improve your ability to see the wave movement on the shore.
- Get creative and decorate your model. Add little umbrellas, ponies, houses, or other shoreline features like a pier. Watch what happens to the sand around those structures when you make waves.
- You could base your model on an actual location. (Use both ground-based and satellite imagery to do this.)

spit

sand bar

barrier island

Answers:
Test 1: 1) The waves displaced sand (erosion/deposition), 2) In order to replicate longshore drift, 3) A spit or a sandbar began to form from the wave movement.
Test 2: 1) The jetty addition changed how the sand was displaced (erosion/deposition), 2) Near the jetty, 3) A spit or a sandbar began to form from the wave movement.