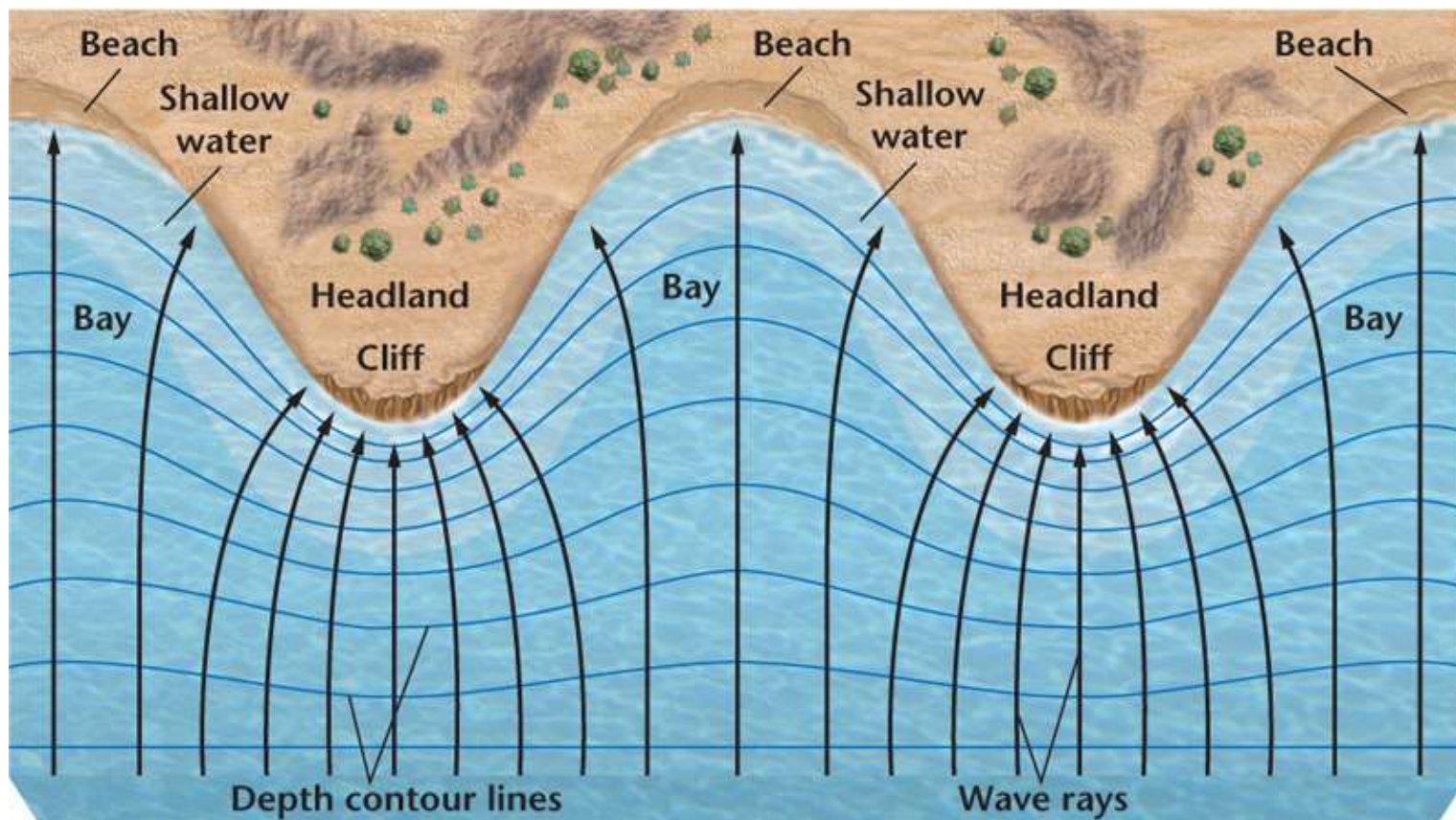


Ocean Shoreline Erosional Landforms



Beaches

- 🔊 A **beach** is a sloping band of sand, pebbles, gravel, or mud at the edge of the sea.
- Beaches are composed of loose sediments deposited and moved about by waves along the shoreline.
- The size of sediment particles depends on the energy of the waves striking the coast and on the source of the sediment.

Estuaries

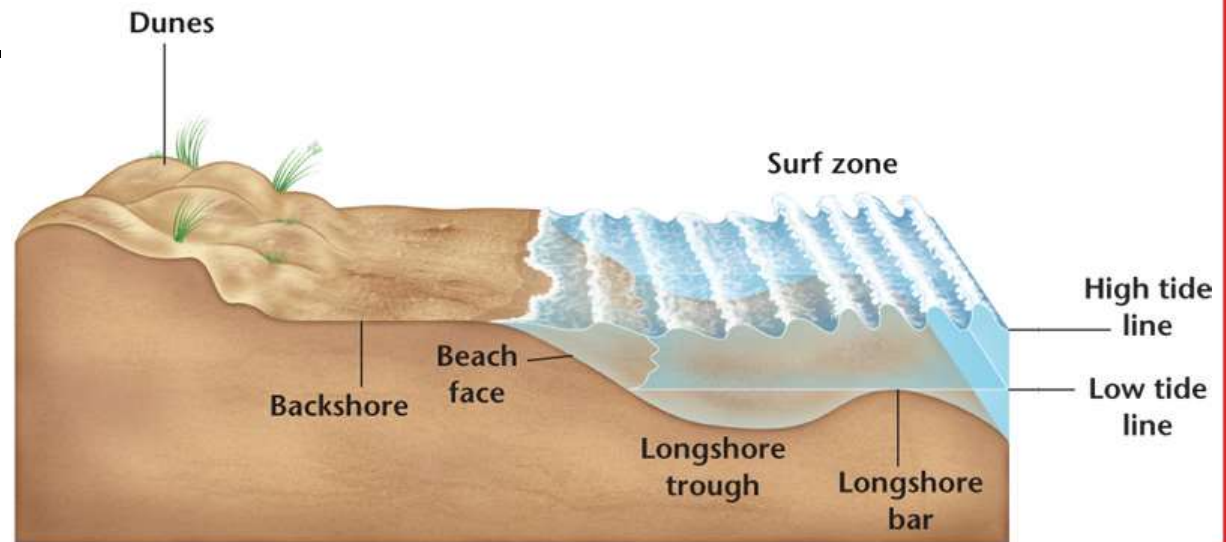
- 🔊 An **estuary** is the area where the lower end of a freshwater river or stream enters the ocean.
- The water in estuaries is brackish—a mixture of freshwater and salt water.
 - Estuaries are nutrient rich nurseries to the young of many different species.



Longshore Currents

- The longshore trough is the deeper water closer to shore than the longshore bar.

🔊 The longshore current is a current flowing parallel to the shore that is produced as water from incoming breakers spills over the longshore bar.



Longshore Currents

Movement of Sediments

- Longshore currents move large amounts of sediments along the shore.
- Fine-grained material such as sand is suspended in the turbulent, moving water, and larger particles are pushed along the bottom by the current.
- The transport of sediment is in the direction of the longshore current, generally to the south on the Atlantic and Pacific Coasts of the United States.

Longshore Currents

Rip Currents

- Wave action also produces rip currents, which flow out to sea through gaps in the longshore bar.
- These dangerous currents can reach speeds of several kilometers per hour.
- If you are ever caught in a *rip current*, you should not try to swim against it, but rather *swim parallel to the shore to get out of it*.

Longshore Currents

Rip Currents

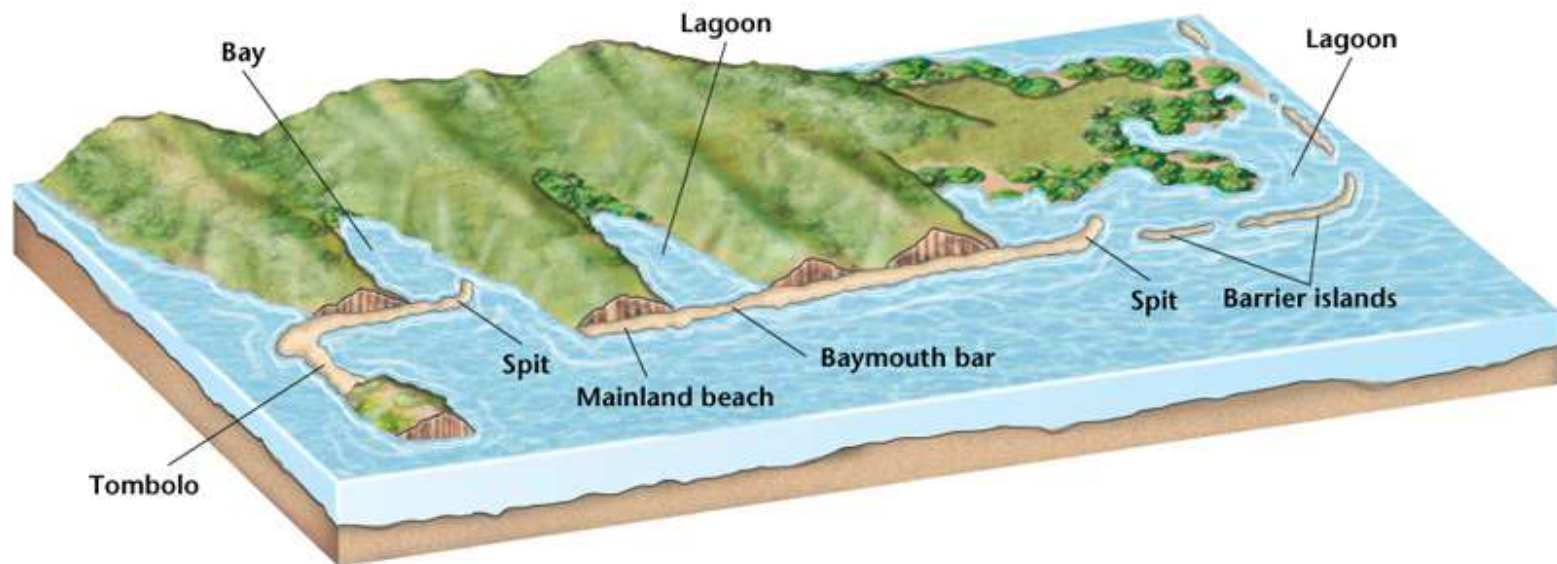


Depositional Features of Seashores

- Sediments moved and deposited by longshore currents build various characteristic coastal landforms.
 - A spit is a narrow bank of sand that projects into the water from a bend in the coastline.
 - A baymouth bar forms when a growing spit crosses a bay.
 - **Barrier islands** are long ridges of sand or other sediment, deposited or shaped by the longshore current, that are separated from the mainland.

Depositional Features of Seashores

- The shallow, protected bodies of water behind baymouth bars and barrier islands are called lagoons.
- A tombolo is a ridge of sand that forms between the mainland and an island, and connects the island to the mainland.



Depositional Features of Seashores

- All depositional coastal landforms, including large barrier islands, are unstable and temporary.
- Tides, currents, storm waves, and winds all play a role in building and changing coastal landforms that rise well above sea level.

Protective Structures

- In many coastal areas, protective structures are built in an attempt to prevent beach erosion and destruction of oceanfront properties.
- These artificial structures interfere with natural shoreline processes and can have unexpected negative effects.

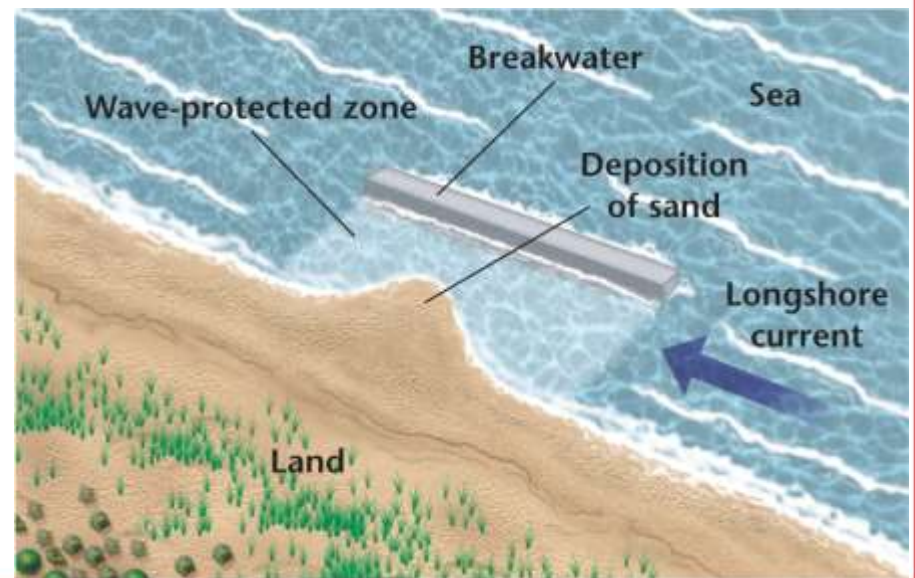
Protective Structures

- Seawalls are built to protect beachfront properties from powerful storm waves by reflecting the energy of such waves back towards the beach.
- Groins are wall-like structures built into the water perpendicular to the shoreline for the purpose of trapping beach sand.
- Jetties are walls of concrete built to protect a harbor entrance from drifting sand.



Protective Structures

- Breakwaters are built in the water parallel to straight shorelines to provide anchorages for small boats.
- The longshore current slows down behind the breakwater and is no longer able to move its load of sediment, which is then deposited behind the breakwater.
- If the accumulating sediment is left alone, it will eventually fill the anchorage.



Changes in Sea Level

- In the last 100 years, the global sea level has risen 10 to 15 cm and estimates suggest a continued rise in sea level of 1.5 to 3.9 mm/year.
- Many scientists contend that this continuing rise in sea level is the result of global warming.
- As Earth's surface temperature rises, seawater will warm and expand and water flow into the oceans from melting glaciers will increase.
- Scientists predict that global sea levels could rise another 30 cm in the next 70 years.

Changes in Sea Level

Effects of Sea Level Changes

- Although unlikely anytime soon, if Earth's remaining polar ice sheets melted completely, their meltwaters would raise sea level by 70 m.
- This rise would totally flood some countries, such as the Netherlands, along with some coastal cities in the United States, such as New York City, and low-lying states such as Florida and Louisiana.
- If Earth's temperature keeps rising, an unstable part of the Antarctic ice sheet eventually could melt and cause a rise in sea level of about 6 m.

Section Assessment

1. Match the following terms with their definitions.

B beach

D estuary

C longshore bar

A barrier island

A. a long ridge of sand or other sediment, deposited or shaped by the longshore current, that are separated from the mainland

B. a sloping band of sand, pebbles, gravel, or mud at the edge of the sea

C. a sand bar that develops parallel to the coast in many locations

D. the area where the lower end of a freshwater river or stream enters the ocean

Multiple Choice

1. Pamlico sound is an example of a(n) _____.

a. estuary

b. barrier island

c. longshore trough

d. spit

Numerous rivers flow into Pamlico Sound which is separated from the Atlantic Ocean by a string of *barrier islands*.



Multiple Choice

2. How much has global sea level risen over the past 100 years?

a. 0–5 cm

c. 50–75 cm

b. 10–15 cm

d. 1 m

Sea level continues to rise slowly; estimates suggest a rise in sea level of 1.5–3.9 mm per year. Scientists predict that global sea levels could rise another 30 cm in the next 70 years.



Multiple Choice

4. A rip current flows ____ the shore.
- a. parallel to
 - b. toward
 - c. away from

Rip currents flow out to sea through gaps in the longshore bar and usually dissipate just beyond the surf zone. They are a major danger to swimmers. If you are caught in a rip current, do not try to swim against it. Swim parallel to the shore to get out of it.

True or False

8. Identify whether the following statements are true or false.

true Large barrier islands are temporary and unstable.

false Groins are effective for stabilizing beach erosion.

true A kilogram of warm sea water has more volume than a kilogram of cold sea water.

false Manganese nodules grow at the rate of several millimeters per year.

true The longshore current runs parallel to the beach.

