

COASTLINES & OCEANS

Q: Why do we care?

A: About 53% of the world population lives within 120 miles of a coastline. Therefore, a lot of people are affected when things among coastlines change.

I. COASTS

- Remember- still on continental crust
- Several forces acting on these environments
- Coastal processes
 - o **Tides**- twice daily rise & drop of sea level
 - o **Tidal flats**- stretch of land covered in high tide & exposed in low tide
 - o High tide- sides facing towards & away from moon
 - o Low tide- the in-between sides
 - o **Spring Tide**- occur twice a month (full & new moons); really high high tides
 - o **Neap Tide**- occur twice a month (1st & 3rd quarter moons); really low low tides
 - o Tide height
 - Hawaii has a tidal range of 1-2 feet
 - Bay of Fundy has a tidal range of ~40 feet
 - Areas w/ open coastline = small tidal range; sheltered/closed off areas = large tidal range
 - o Waves: size increases w/ wind speed, duration, & distance
 - o **Wavelength**- distance of 1 point on a wave to the same point on another wave
 - o Waves get higher, slower, & closer together coming toward shore
 - o **Wave refraction**- waves turn to become more parallel to the shore as it gets into more shallow water
 - o **Longshore current**- a current running across the shore
 - o **Longshore drift**- sediment being picked up & deposited along the shore

- o Key: delicate balance of processes
- o The coast is very dynamic & very complicated
- Shoreline Features
 - o Depend on: tectonics, rock type, sea level fluctuations, tidal & storm size & strength
- Types of Coastlines
 - o **Emergent coastlines**- one where processes are constantly uplifting the area
 - Lots of cliffs, very small & narrow beach area
 - **Stacks**- tops of larger features that are mostly still submerged
 - **Terraces**- uphill then flattens out over & over; flat areas are terraces; where ancient beaches were before they were uplifted
 - o **Submergent coastlines**- area is subsiding or water level is rising; beaches are flooding
 - Often dominated by lots of sediment deposited
 - Long, wide beaches & coastal plains
 - **Spit**- type of sediment deposit where sediments are building out into the water but still attached to main land
 - **Barrier islands**- offshore sediment deposits; problem building things on these islands

II. COASTAL EROSION

- Can occur along emergent & submergent coasts
- Hazard because we build things so close to the coast
- Barriers
 - o Protect the shore in one of two ways: stop sand movement or reduce wave energy
 - o Several types of barriers are used
- Barrier Types
 - o **Seawalls**- built up parallel to coast; block waves from hitting most of the coastline; very expensive to build & maintain; fear that they'll poorly effect tourism

- o **Groins**- jut out into water perpendicular to coastline; keep sediment from drifting along coast by interrupting longshore drift; very expensive to build & maintain; while protecting one part of coastline, another part is getting eroded away quicker than usual so you have to build a series of groins
- Non-Barrier Approach
 - o **Beach (Re)Nourishment**- buy sediment & place it back on the beach
 - Case Study: Miami vs. NJ
 - Miami successfully renourished its beach, NJ tried but failed
 - Some wildlife issues
 - Ex: sea turtles can't dig well through the very compacted sediments

III. OCEANS

- **Continental margin**- everything off the coast
- Types of margins
 - o **Active**- plate boundary present at coastline (ex: West Coast of US)
 - o **Passive**- plate boundary absent (ex: East Coast of US)
- Continental shelf features
 - o Depend on type of continental margin
 - o Passive- thick sediment layers
 - o Active- shelf shorter, thickness varies, layers distorted, volcanic material present
 - o Economically important: best fishing areas; a lot of oil & methane deposits
- Continental shelf sediments
 - o **Terrigenous**- sediment coming from land; make muddy, cloudy water
 - o **Carbonates**- sediment formed from shells, etc.; make clean, clear water
 - o Don't find the two types together