

Environmental Geology lecture outline - Shorelines and related environmental concerns.

A case history: Galveston, Texas, on Sept. 8th 1900 and now.

View of Galveston, with breakwaters, seawall and buildings built on raised platform.



Factoids on 1900 storm:

- 20 foot high storm surge covered island.
 - 4' increase in less than a minute in some locales.
 - 6000 fatalities.
 - 3000 homes demolished.
 - built up platform to reconstruct on.
- 'protected' by a seawall

View of Hotel Galvez from breakwater made of granite blocks. The thin beach and the seawall are also evident.

[What are general environmental concerns associated with shorelines?](#)

[What basic forces are involved in shaping shorelines?](#)

Myriad of shoreline types - will look at three general types.

- deltas.
- barrier island complexes.
- cliffs.

Deltas:

- three end member types: river, wave, tide dominated.
- the Mississippi delta, [lobe progradation -> lobe switching](#), and the Atchafalaya pirate.
- compaction, [subsidence](#), flooding, mass wasting, shifting channels and ecosystems
- flooding on the Bangla Desh delta: in last 30 years typhoons have caused over 300,000 fatalities.

Barrier Island complexes and shifting shorelines:

- examples: from Hilton Head to Padre Island.
- some components: shoreface, dune berm, washover fans, tidal channels, tidal deltas, offshore sand bars, lagoonal area.

- presently characterized by erosion. [Rates?](#)
 - [how does sand move?](#) This is key to many environmental problems.
 - [how can barrier island change with time?](#)
 - [how do you determine and what are rates of shoreline retreat and what are rates?](#)
 - the importance of hurricanes.
 - [what are possible causes of shoreline retreat?](#)
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Rocky shorelines:

- California and mass wasting triggered by slope profile steepening.
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[What are engineering responses to shifting shorelines?](#)

What is an alternate approach to shifting and flooded shorelines?

Some links to explore more:

[Extensive USGS study of El Niño Coastal Erosion along California.](#)

[State of Texas Coastal Erosion Planning and Response.](#)

[Study on risk analysis and management for coastal erosion and catastrophic storms.](#)

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