

# LECTURE 2: ESTUARIES - PHYSICAL CHARACTERISTICS

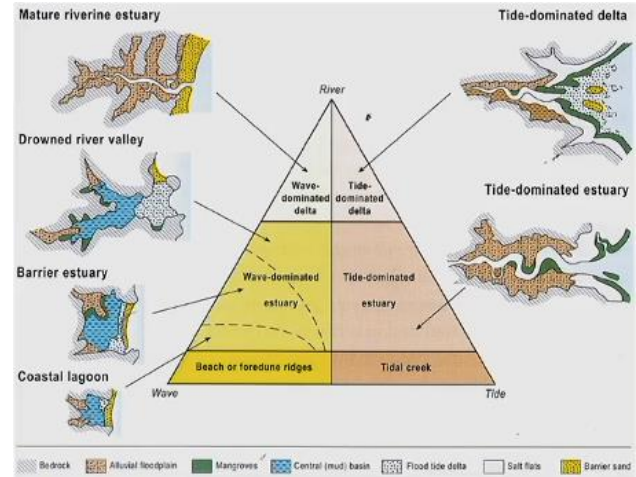
**Estuary:** body of water partially surrounded by land, where fresh water from a river mixes with ocean water

**Delta:** area of sediment deposition as a river flows to the ocean

## CLASSIFICATION OF ESTUARIES

### Degree of Mixing

- **Highly stratified (salt wedge):**
  - Deep estuary, high river flow, fluvial sediments
  - Distinct layer of fresh water overtop the saltwater
- **Moderately stratified (partially mixed) – majority of estuaries**
  - Shallow, tides overcome fluvial flow – less influence of river
  - Stronger flood at depth, stronger ebb at surface
- **Non-stratified (well mixed, vertically homogenous)**
  - Tides fully overcome flow, shallow and wide
  - Lateral differentiation of salinity
- **Negatively stratified:** arid areas, high evaporation



### Hydrodynamics

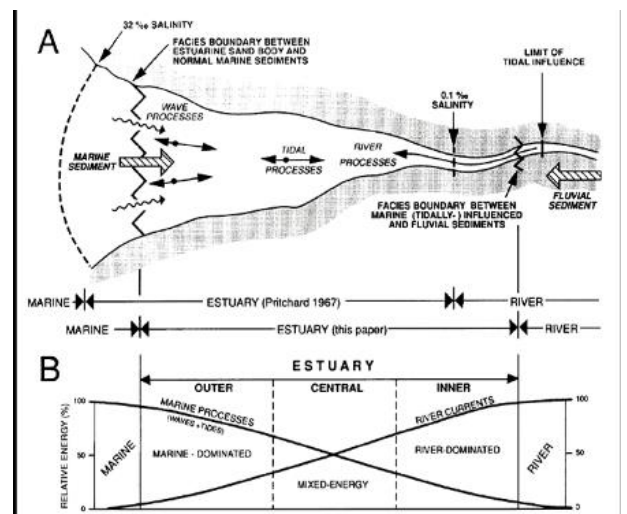
- Relative influence of rivers, tides and waves – most not usually dominated, rather a mix of them all
- Australia: usually wave-dominated (south coast) or tide dominated (northern coasts)

### Geologic Origin

- Types: drowned river mouth, fjords, bar-built, tectonic

## ESTUARINE PROCESSES

- **Sediment:** important for biota
  - Estuaries are sinks of sediments carried downstream or in from ocean
  - Evolutionary trend: estuaries to infill with sediment
- **Sediment transport:** patterns of movement of sediment around estuaries



### Movement of Water

<b>Waves</b>	<ul style="list-style-type: none"> <li>• Storm-generated</li> <li>• Swell: mature wind waves of one wavelength that form orderly undulations of the ocean surface</li> <li>• Features: barriers, wash overs (coarse sands), tidal delta (flood tide)</li> </ul>
<b>Tides</b>	<ul style="list-style-type: none"> <li>• Driven by moon, sun &amp; rotation of Earth – relative positions effect tide height</li> <li>• Changes in bulge of water on surface of Earth</li> <li>• Creates tidal bores: wave generated by tide being pushed up a river</li> <li>• Energy in middle of estuary due to tidal current</li> <li>• Features: mudflats, sandbars, meandering, salt marsh, sand flats</li> </ul>
<b>River</b>	<ul style="list-style-type: none"> <li>• Discharge is the volume of water which passes through a given cross-section of the river channel per unit of time</li> </ul>