Coastal Facies Models*

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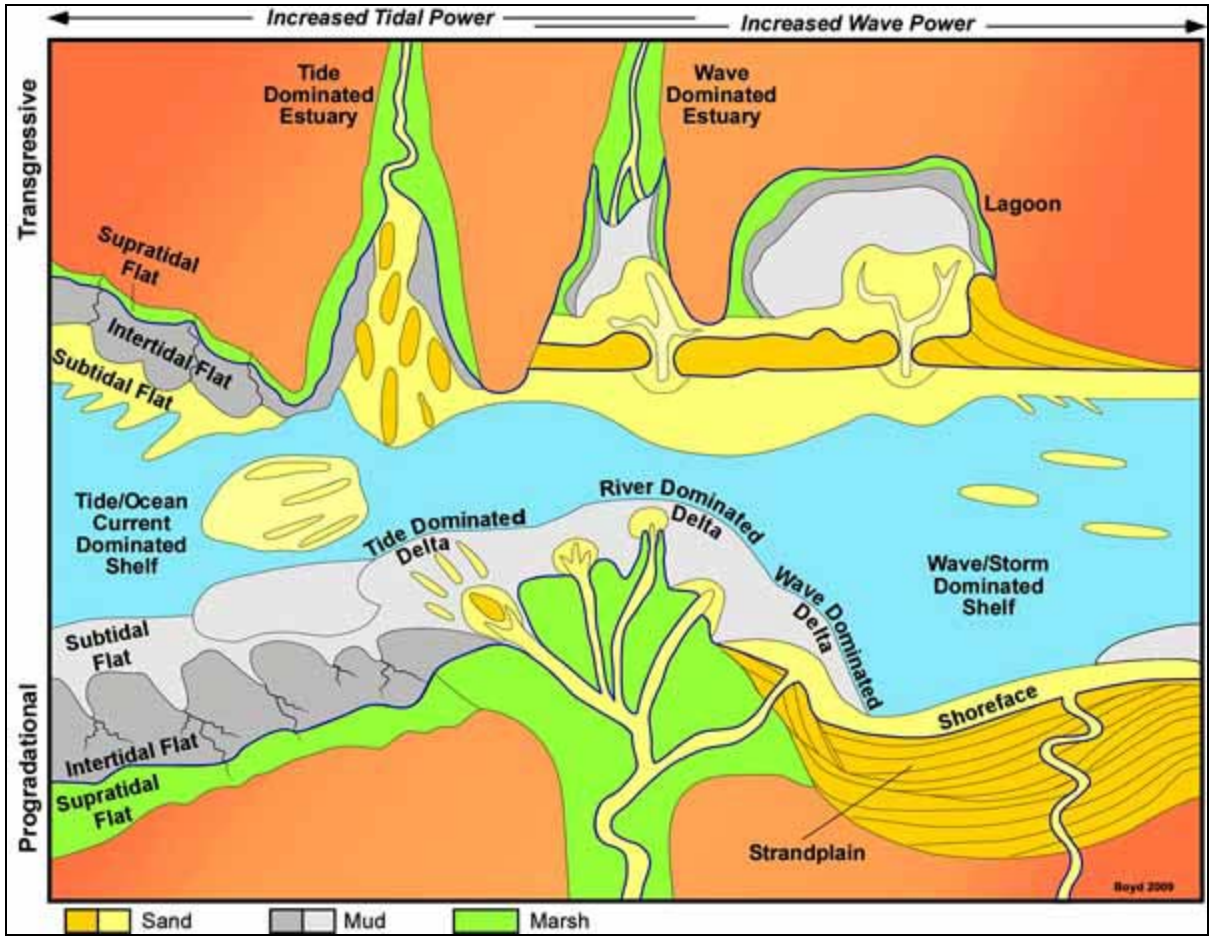
Coasts occur on the critical interface between land and sea. Coastal sedimentation can be categorized as occurring mainly under either transgressive or regressive conditions, based on the balance between sediment flux and relative sea level change. Further subdivision results from the dominant marine processes operating at the shoreline, mainly either waves or tides, and the influence of river systems. Transgression produces eroding linear coastlines, barrier-lagoon shorelines occupying embayments with little fluvial input, and estuaries at the mouths of river valleys and deltas. Shelf shoals and ridges consisting of reworked shoreline deposits lie seaward of transgressing coastlines.

Landward of transgressing coastlines, major clastic deposition is typically constrained to river valleys. On regressing coasts, sediment is supplied by rivers to deltas that range from tide to wave and river dominated forms. Sediment is also supplied from deltas, offshore areas and eroding updrift coasts to deposits in strandplains and shorefaces in wave dominated regions, and tidal flats where tidal processes prevail. Transgressive coastlines record a lower rate of sediment input compared to their rate of relative sea level rise. The resulting stratigraphy is composed of more seaward facies overlying more landward facies and details are determined by the presence of incised valleys, the accumulation of estuarine and coastal barrier sediments and the trajectories of the major wave and tidal ravinement surfaces. Styles of modern and ancient stratigraphy range from low accommodation and low trajectories in which only the lowest incised valley and estuarine deposits are preserved, to complex transgressions with higher accommodation and higher trajectories and stacked transgressive/regressive parasequences. Regressive coastal sedimentation results in more landward facies overlying more seaward facies. It has been extensively documented in strandplain/shorefaces, river dominated deltas, and to a lesser extent in wave dominated deltas but is only at an early stage in tide dominated deltas. Here extensive shore normal sediment transport, high mud contents and low gradients result in facies and facies models that contrast with their river and wave dominated counterparts. By combining the principles of sediment flux and relative sea level change together with the major controlling processes of rivers, waves and tides, a suite of facies models can be constructed that synthesizes the major depositional features of each coastal environment.


Increased Tidal Power
Increased Wave Power
Transgressive
Progradational
Tide Dominated Estuary
Wave Dominated Estuary
Lagoon
Supratidal Flat
Intertidal Flat
Subtidal Flat
Tide/Ocean Current Dominated Shelf
Tide Dominated Delta
River Dominated Delta
Wave Dominated Delta
Wave/Storm Dominated Shelf
Subtidal Flat
Intertidal Flat
Supratidal Flat
Shoreface
Strandplain
Boyd 2009
Sand
Mud
Marsh