



The Effects of Sea Level Rise and Sedimentation on Coastal Lagoon Formation and Dynamics

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DESCRIPTION

Coastal lagoons are shallow water bodies that are separated from the open sea by barriers such as barrier islands, spits, or reefs. They are dynamic environments that are influenced by various factors, such as sea level changes, sediment supply, wave and tidal energy, and climate variability. In this essay, I will discuss how sea level rise and sedimentation affect the formation and evolution of coastal lagoons.

Sea level rise is one of the main drivers of coastal lagoon formation and expansion. Sea level rise can result from global factors, such as thermal expansion of seawater and melting of ice sheets and glaciers, or local factors, such as land subsidence or uplift. Sea level rise can create new space for sediment accumulation, which is termed accommodation. If the rate of sediment supply exceeds the rate of accommodation creation, then the barrier will grow seaward and the lagoon will become shallower and narrower. If the rate of accommodation creation exceeds the rate of sediment supply, then the barrier will retreat landward and the lagoon will become deeper and wider.

Sea level rise can also affect the hydrodynamic regime of coastal lagoons. As sea level rises, the tidal range and wave height can increase, enhancing the exchange of water and sediment between the lagoon and the sea. This can lead to erosion or deposition of the barrier and the lagoon floor, depending on the balance between sediment transport capacity and availability. Sea level rise can also alter the salinity and nutrient levels of coastal lagoons, affecting their ecological functions and services.

Sedimentation is another important factor that influences coastal lagoon formation and dynamics. Sedimentation can

result from fluvial, marine, or aeolian sources. Fluvial sedimentation can occur when rivers discharge sediments into coastal lagoons, either directly or indirectly through deltas or estuaries. Fluvial sedimentation can contribute to the infilling of coastal lagoons, especially during periods of high river discharge or low sea level. Fluvial sedimentation can also affect the salinity and nutrient levels of coastal lagoons, depending on the quality and quantity of river inputs.

Marine sedimentation can occur when waves and currents transport sediments from the open sea or alongshore into coastal lagoons. Marine sedimentation can contribute to the formation and maintenance of barriers that separate coastal lagoons from the sea. Marine sedimentation can also affect the morphology and stability of barriers, depending on the direction and magnitude of wave and current forces.

Aeolian sedimentation can occur when wind blows sand from beaches or dunes onto barriers or into coastal lagoons. Aeolian sedimentation can contribute to the growth and elevation of barriers, enhancing their resistance to sea level rise and storm surges. Aeolian sedimentation can also affect the vegetation cover and biodiversity of barriers, depending on the frequency and intensity of wind events.

In conclusion, sea level rise and sedimentation are two interrelated factors that play a key role in shaping coastal lagoons. They can have positive or negative impacts on coastal lagoons, depending on their rates and interactions with other factors. Understanding how sea level rise and sedimentation affect coastal lagoon formation and evolution is essential for managing these valuable ecosystems in a changing climate.

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