



# Determinants and Risk Factors for the Establishment of Deltas in Rivers and Marine Processes

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## DESCRIPTION

Deltas are wetlands that form as rivers empty their water and sediment into another body of water, such as an ocean, lake, or another river. Deltas are dynamic and variable systems that change over time due to various factors that influence their formation, growth, and decay.

One of the main factors that affect deltas is the amount and type of sediment available. Sediment is the solid material carried downstream by currents, and it determines the shape and size of a delta. Heavier, coarser material settles first near the river mouth, forming a distributary network of shallow channels that branch off from the main river. Smaller, finer sediment is carried farther downstream and deposited beyond the river mouth, forming a prodelta. The finest material, called silt or alluvium, is rich in nutrients and supports the growth of plants and microbes in the delta.

Another factor that influences deltas is the variation in volume of water discharged from the river. The water flow affects the velocity and transporting power of the river, which in turn affects the amount and distribution of sediment. When the water flow is high, more sediment is carried and deposited farther away from the river mouth, extending the delta seaward. When the water flow is low, less sediment is carried and deposited closer to the river mouth, causing erosion and retreat of the delta.

A third factor that shapes deltas is the aspect and geometry of the coast. The coast determines the direction and magnitude of waves, tides, and currents that interact with the river flow and sediment. These coastal processes can either enhance or hinder the growth of a delta. For example, strong waves can erode and

redistribute sediment along the coast, preventing a delta from forming or reducing its size. On the other hand, weak waves can allow sediment to accumulate and form a large delta.

A fourth factor that affects deltas is the change in coast level. The coast level can change due to tectonic movements, glacial cycles, or human activities. A rise in coast level can submerge parts of a delta or increase its slope, making it more prone to erosion. A fall in coast level can expose parts of a delta or decrease its slope, making it more stable and conducive to deposition.

A fifth factor that influences deltas is the impact of climate on the growth of vegetation and marine organisms. The climate determines the temperature, precipitation, and seasonality of a region, which affect the availability of water and nutrients for plants and animals. Vegetation and marine organisms can contribute to delta formation by trapping sediment, stabilizing banks, creating organic matter, and building reefs or mounds.

Deltas are complex and diverse ecosystems that provide many benefits for humans and nature. They support biodiversity, filter water quality, absorb floodwaters, store carbon, offer recreational opportunities, and provide resources such as food, fuel, and minerals. However, deltas are also vulnerable to natural hazards such as storms, floods, droughts, earthquakes, tsunamis, landslides, and sea level rise. Moreover, deltas are threatened by human activities such as damming rivers, diverting water flow, dredging channels, draining wetlands, clearing vegetation, polluting waterways, overfishing resources, and urbanizing land.

Therefore, it is important to understand how deltas form and change over time due to riverine and marine processes, and to protect and manage them sustainably for future generations.

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