



# Coastal Erosion: Factors that Influence Erosion Rates and its Control Methods

Yan Xu\*

Department of Marine Geography, Kyoto University, Kyoto, Japan

## DESCRIPTION

Coastal erosion is the temporary or permanent loss of land owing to the action of waves, currents, tides, wind-driven water, waterborne ice, or other effects of storms. It can also be the long-term removal of soil and rocks along the shoreline. Over a time scale of tides, seasons, and other transient cyclic events, one may measure and explain the shoreline's retreat inland. Among other natural or artificial forces, hydraulic action, abrasion, impact, and corrosion by wind and water can all contribute to coastal erosion.

Where the coastline has rock layers or fracture zones with varied resistance to erosion, coastal erosion on non-rocky coasts causes rock formations in certain locations. Landforms like tunnels, bridges, columns, and pillars are frequently created when softer parts erode considerably faster than harder ones do. The shoreline usually levels off with time. Rock formations are lost as a result of the erosion of sediment from the harder portions into the softer areas. Furthermore, erosion frequently occurs in places with strong winds, evanescent sand, and soft rocks. An effect known as "sandblasting" is produced by the blowing of several sharp sand grains. Rocks are smoothed, polished, and eroded as a result of this process. Rock surfaces are ground and worn away by the mechanical action of water, which is the definition of erosion.

### Factors affecting erosion rates

Rock strength, the existence of fissures, fractures, and layers of non-cohesive materials like silt and fine sand, as well as the erodibility of sea-facing rocks, are all influenced by these factors. In addition to offering some degree of protection to the surrounding land, beaches disperse wave energy on the coastline. Once it has reached a stable state, the foreshore should enlarge and become more efficient at dispersing wave energy, resulting in fewer and weaker waves breaking beyond it. A stable beach is ensured by the presence of up drift material that enters the beachfront from beneath the cliff.

The nearby hydrographic, or seafloor shape, regulates the amount of wave energy that reaches the coast and can have a significant impact on the rate of cliff erosion. Due to the storm

waves breaking and losing energy before reaching the shore, shoals and bars provide protection from wave erosion. Given the fluidity of the seafloor, shifting shoals and bars may shift the site of the locus of beach or cliff erosion along the shore.

### Control techniques

Compared to soft-erosion control methods, hard-erosion control methods offer a more long-lasting solution. Semi-permanent infrastructure includes seawalls and groynes. These buildings must be renovated or rebuilt since they are not resistant to normal wear and tear. A seawall's expected lifespan is 50-100 years, while a groyne's expected lifespan is 30-40 years. These buildings are seen to be a permanent solution to erosion because of their relative longevity. Seawalls can also severely damage the beach's natural nature and deny the public access to it. The natural nature of the beach is also significantly altered by groynes.

Groynes aren't thought of as a solution to beach nourishment, but some suggest they could shorten the time between beach replenishment projects. Seawalls are also criticized for their high cost, challenging upkeep, and potential to sometimes worsen beach erosion if constructed incorrectly. As we learn more about hard erosion controls, it is evident that these structural fixes exacerbate rather than resolve the issue at hand.

Temporary methods of reducing the impacts of erosion are referred to as soft erosion strategies. These remedies, including Sandbag and beach nourishment, are not meant to be long-term or permanent. The construction of an artificial dune in front of a building or as a way to protect a building foundation is possible using a different technique called beach scraping or beach bulldozing. Beach replenishment initiatives are among the most often used soft erosion management strategies.

These operations entail dredging sand and transporting it to the beaches in order to replenish the sand that has been lost to erosion. In some circumstances, such as those involving sand sinks or frequent, severe storms, beach nourishment is not an appropriate erosion management measure. In high energy situations like open coasts, dynamic revetment—which uses loose cobble to simulate the function of a natural storm beach—might be an alternative to conventional soft-erosion control methods.

**Correspondence to:** Yan Xu, Department of Marine Geography, Kyoto University, Kyoto, Japan, E-mail: yan00@gmail.com

**Received:** 01-Nov-2022, Manuscript No. JCZM-22-18786; **Editor assigned:** 03-Nov-2022, Pre QC No. JCZM-22-18786 (PQ); **Reviewed:** 21-Nov-2022, QC No. JCZM-22-18786; **Revised:** 30-Nov-2022, Manuscript No. JCZM-22-18786 (R); **Published:** 07-Dec-2022, DOI: 10.35248/2473-3350.22.25.533

**Citation:** Xu Y (2022) Coastal Erosion: Factors that Influence Erosion Rates and its Control Methods. J Coast Zone Manag. 25:533.

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