



FEATURE ARTICLE

# Seagrass roots strongly reduce cliff erosion rates in sandy sediments

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**ABSTRACT:** Vegetated coastal ecosystems such as saltmarshes, mangroves and seagrass beds are increasingly promoted as sustainable storm and flood defence solutions by reducing wave energy. Yet, there is still intense debate on the ability of root mats to mitigate erosion, with some studies arguing that the direct contribution of roots in preventing sediment erosion is minor, while others consider them of major importance. Here, we hypothesized that the contrasting findings on the role of seagrass root mats in preventing erosion may stem from differences in sediment type. To test this idea, we investigated how root mats of seagrass that thrives in both sandy and muddy sediments mitigate wave-induced cliff erosion using *Zostera marina* in manipulative flume experiments. Results demonstrate that roots are very effective in reducing cliff erosion rates in sandy sediments. Cliff erosion rates were reduced up to 70% in sandy sediment with high seagrass root biomass. In contrast, cliff erosion rates in cohesive muddy sediments were low and unaffected by seagrass roots. This highlights the important role of seagrass roots in erosion mitigation, which has been overlooked compared to the role of canopies, which has received more attention. We suggest that management strategies should be developed to enhance the stabilization of sandy sediment, such as (1) using species with high belowground biomass, (2) using fast-growing pio-



Cliff erosion in a seagrass meadow

Photo: Eduardo Infantes

neer species and (3) applying temporary stabilising measures.

**KEY WORDS:** Coastal erosion · Seagrass ecology · *Zostera marina* · Roots · Plant biomass · Wave exposure · Sediment dynamics · Coastal management · Restoration

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