

Episodic sediment mixing from the tidal flat to the mangrove forest: a disturbance gradient for seedling survival

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Abstract

Mangroves provide important ecosystem services but remain threatened worldwide. A mechanistic understanding of seedling survival in a highly dynamic environment is crucial for improved management and restoration of this rapidly disappearing habitat.

Mangroves grow on recently deposited sediments that consolidate and lead to an increase in surface elevation of a few mm per year. However, sedimentation rates show high seasonal and short term fluctuations including periods with negative sedimentation (i.e. re-suspension of deposited material) hence sheet erosion. The process of episodic erosion and accretion events is known as mixing and forms a physical disturbance agent for mangrove seedlings. In previous research we determined thresholds to mangrove seedling survival by experimentally applying accretion (burial) and erosion (excavation) events.

In this study we build upon earlier experimental work with bimonthly field measurements on sediment dynamics along transects in mangrove forests at the Andaman Coast of southern Thailand. We found that over the period of 10 months, sediment mixing (i.e. abiotic disturbance) was highest on the mudflat and the forest edge and decreased going landwards. This is in line with other ecosystems that develop along a succession gradient such as salt marshes, granitic outcrops or dunes.

Keywords

sediment dynamics, mudflat, succession, biogeomorphology