

## Geomorphology and habitat dynamics

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### Introduction

Since the early work of Lugo and Snedaker (1974), geomorphology has been used to organise our understanding of the interactions between coastal wetlands and their habitats. Mangroves and saltmarshes respond to hydrological and geomorphic conditions in consistent ways (Thom *et al.* 1967; Woodroffe 1983), such that the relationships between hydrological and geomorphic change can be used as a template to predict changing distributions of mangrove and saltmarsh.

With the exception of Tasmania, where mangroves are absent, saltmarshes in Australia are restricted to the upper intertidal environment, generally between the elevation of the mean high tide, and the mean spring tide. The distribution of these environments within an estuary or embayment is controlled by patterns of riverine and marine sedimentation, shaped by the major hydrological drivers of river discharge and tidal propagation. The position of intertidal flats within an estuary will also exert profound influences on water salinity, and provide a major control over the suite of saltmarsh species present.

The interplay of hydrology and geomorphology in estuaries has been systematised in the work of several Australian authors (Roy 1984; Woodroffe *et al.* 1989). These models allow predictions of the changing distributions of mangroves and saltmarsh within estuaries as they infill. The accumulation of fine silt in intertidal environments leads eventually to the conversion of wetland to supratidal floodplain, and the channelisation of the estuary. Marine transgression exerts an opposing influence, exposing upper intertidal and supratidal environments to increased tidal inundation. The study of the interactions between mangrove and saltmarshes in estuaries therefore provides insights not only into the influence of geomorphic change, but the possible impacts of changes in eustatic sea level.

After a brief review of the geomorphic settings within which saltmarshes are found in Australian estuaries, this chapter considers interactions between mangroves and saltmarshes over a range of timescales, from recent decades to the past several thousand years. These insights, combined with measurements of rates of sedimentation and subsidence in contemporary saltmarshes, makes possible predictions about how the distribution of saltmarsh may change with the onset of accelerated sea level rise.