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COASTAL SQUEEZE

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Definition

Coastal squeeze refers to the loss of intertidal habitats due to rising sea levels along coastlines fixed by hard engineering structures. The term coastal squeeze should not be used to refer to losses due to natural processes (Pontee, 2013).

Natural coasts can dynamically adjust to changing meteorological and climatic conditions. In natural systems, rising sea levels usually result in a landward movement of habitats (Figure 1a, b). Salt marshes, for example, depending on a number of interacting physical and biotic variables, can migrate inland and accrete vertically, naturally adjusting to sea-level rise. The natural landward migration of habitats is prevented in coastlines "fixed" by hard coastal engineering, leading to coastal squeeze (French, 1997).

The type of intertidal wetland that may be established at any particular location is influenced (among other variables) by their position within the tidal range (Figure 1a). The vertical zonation of marshes reflects the tolerance of species to inundation (Pennings and Calloway, 1992), i.e.~~,~~ more tolerant species are found at lower elevations. Coastal defences fix the upper boundary of intertidal habitats (Figure 1c, d); therefore, a rise in sea level will gradually increase the frequency and duration of inundation and ultimately result in loss of intertidal area (as lower areas become permanently submerged). Depending on the range of elevations in relation to the water levels, increased exposure to inundation may lead to a shift in the types of marsh communities and/or the loss of habitats. Mudflats may occupy areas formerly dominated by pioneer marshes (Figure 1d); these might shift to higher ground or will disappear if suitable conditions are not available. The same process applies to other types of marshes.

Coastal squeeze and land reclamation are often cited as the main causes for the loss of intertidal habitats (e.g.~~,~~ Doody, 2012). Coastal squeeze is not the only cause for the loss of intertidal habitats. Hughes and Paramor (2004) argue that coastal squeeze would lead first to the loss of upper marshes, while the loss of pioneer marshes is most commonly observed. The authors suggest that increases in the abundance of the polychaete *Nereis* might be the cause of widespread loss of pioneer marshes in southeast England. The impact of storms along the coast of the Gulf of Mexico has been identified as one of the main reasons for the increased rate of wetland loss in the United States in the period 2004-2009 when compared with the previous five years (Dahl and Stedman, 2013). The loss of salt marshes is particularly concerning as they provide natural coastal protection and other valuable ecosystems services.

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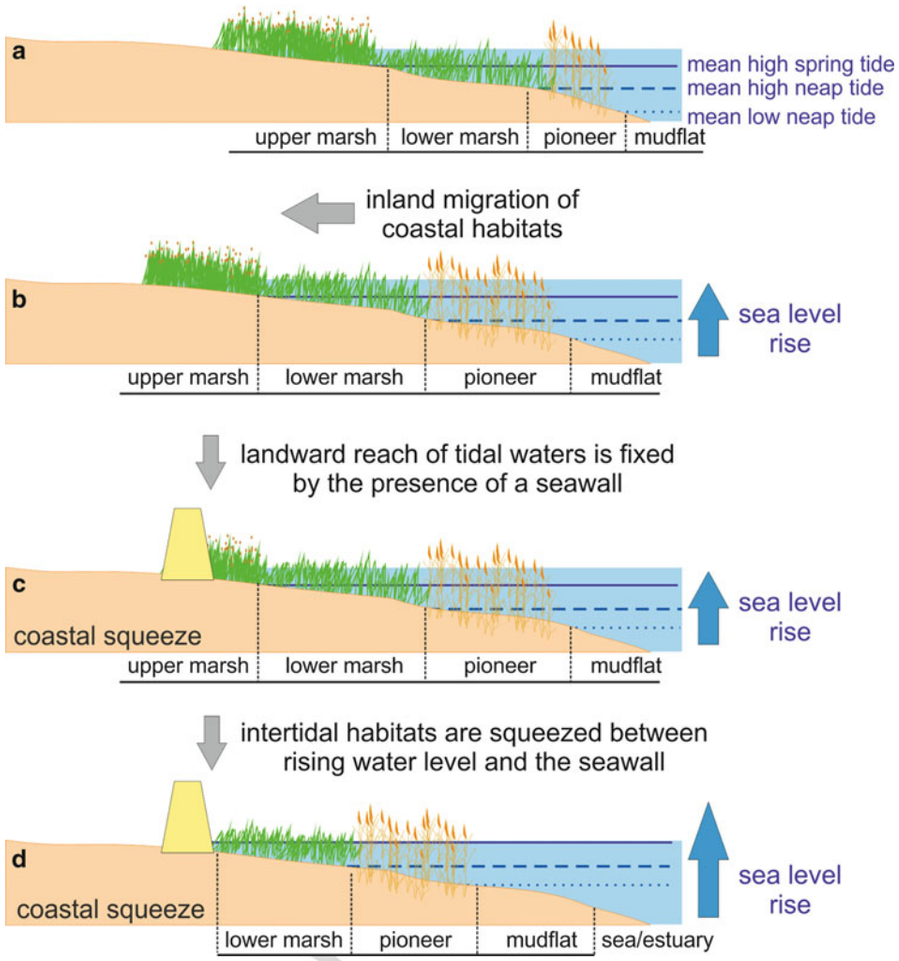

Coastal squeeze, Figure 1 The elevation in relation to the tidal range is one of the key factors determining the type of intertidal habitat that may develop in a particular location (**a**). Natural habitats tend to migrate inland as a response to rising sea levels (**b**). As a result of this migration the intertidal area may expand or reduce depending, for example, on the coastal topography. Hard engineering structures will invariably fix the landward limit of intertidal areas (**c**), which will be reduced in extent as sea levels rise and more land becomes permanently inundated (**d**). The loss of coastal habitats due to rising sea levels in front of artificially fixed shorelines is known as coastal squeeze.