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Chapter Title	Coastal squeeze	
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2 COASTAL SQUEEZE

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6 Definition

7 *Coastal squeeze* refers to the loss of intertidal habitats due
8 to rising sea levels along coastlines fixed by hard engi-
9 neering structures. The term coastal squeeze should not
10 be used to refer to losses due to natural processes (Pontee,
11 2013).

12 Natural coasts can dynamically adjust to changing
13 meteorological and climatic conditions. In natural sys-
14 tems, rising sea levels usually result in a landward move-
15 ment of habitats (Figure 1a, b). Salt marshes, for
16 example, depending on a number of interacting physical
17 and biotic variables, can migrate inland and accrete verti-
18 cally, naturally adjusting to sea-level rise. The natural
19 landward migration of habitats is prevented in coastlines
20 “fixed” by hard coastal engineering, leading to coastal
21 squeeze (French, 1997).

22 The type of intertidal wetland that may be established at
23 any particular location is influenced (among other vari-
24 ables) by their position within the tidal range (Figure
25 1a). The vertical zonation of marshes reflects the tolerance
26 of species to inundation (Pennings and Calloway, 1992),
27 i.e., more tolerant species are found at lower elevations.
28 Coastal defences fix the upper boundary of intertidal hab-
29 itats (Figure 1c, d); therefore, a rise in sea level will grad-
30 ually increase the frequency and duration of inundation
31 and ultimately result in loss of intertidal area (as lower

areas become permanently submerged). Depending on 32
the range of elevations in relation to the water levels, 33
increased exposure to inundation may lead to a shift in 34
the types of marsh communities and/or the loss of habitats. 35
Mudflats may occupy areas formerly dominated by pio- 36
neer marshes (Figure 1d); these might shift to higher 37
ground or will disappear if suitable conditions are not 38
available. The same process applies to other types of 39
marshes. 40

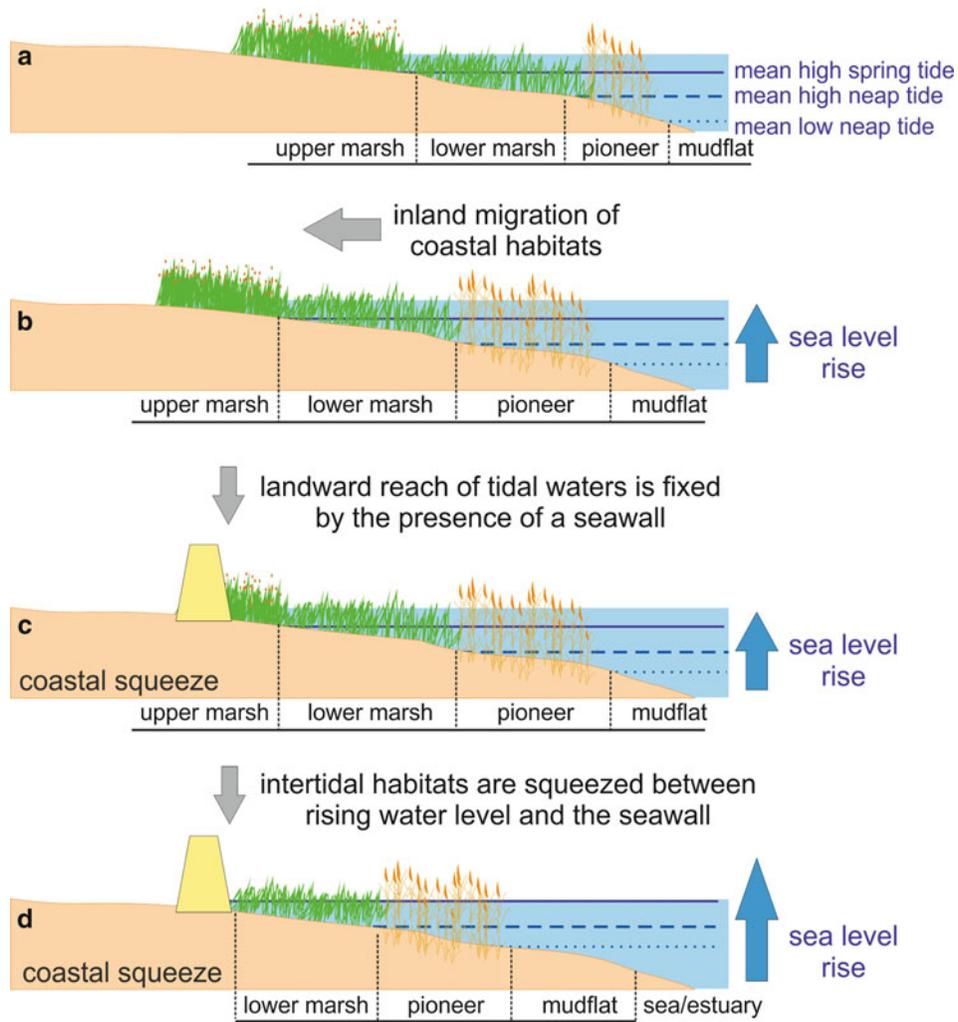
Coastal squeeze and land reclamation are often cited as 41
the main causes for the loss of intertidal habitats (e.g., 42
Doody, 2012). Coastal squeeze is not the only cause for 43
the loss of intertidal habitats. Hughes and Paramor 44
(2004) argue that coastal squeeze would lead first to the 45
loss of upper marshes, while the loss of pioneer marshes 46
is most commonly observed. The authors suggest that 47
increases in the abundance of the polychaete *Nereis* might 48
be the cause of widespread loss of pioneer marshes in 49
southeast England. The impact of storms along the coast 50
of the Gulf of Mexico has been identified as one of the 51
main reasons for the increased rate of wetland loss in the 52
United States in the period 2004-2009 when compared 53
with the previous five years (Dahl and Stedman, 2013). 54
The loss of salt marshes is particularly concerning as they 55
provide natural coastal protection and other valuable eco- 56
systems services. 57

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Uncorrected Proof



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.