

## Metadata of the chapter that will be visualized online

---

Chapter Title	Coastal squeeze	
Copyright Year	2015	
Copyright Holder	Springer Science+Business Media Dordrecht	
Corresponding Author	Family Name	<b>Esteves</b>
	Particle	
	Given Name	<b>Luciana S.</b>
	Suffix	
	Division/Department	Faculty of Science and Technology, Talbot Campus
	Organization/University	Bournemouth University
	Street	Fern Barrow
	City	Poole, Dorset
	Country	UK
	Phone	+44 (0) 1202 962446
	Email	lesteves@bournemouth.ac.uk

---

1

C

---

## 2 COASTAL SQUEEZE

---

3 Luciana S. Esteves  
4 Faculty of Science and Technology, Talbot Campus,  
5 Bournemouth University, Poole, Dorset, UK

### 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

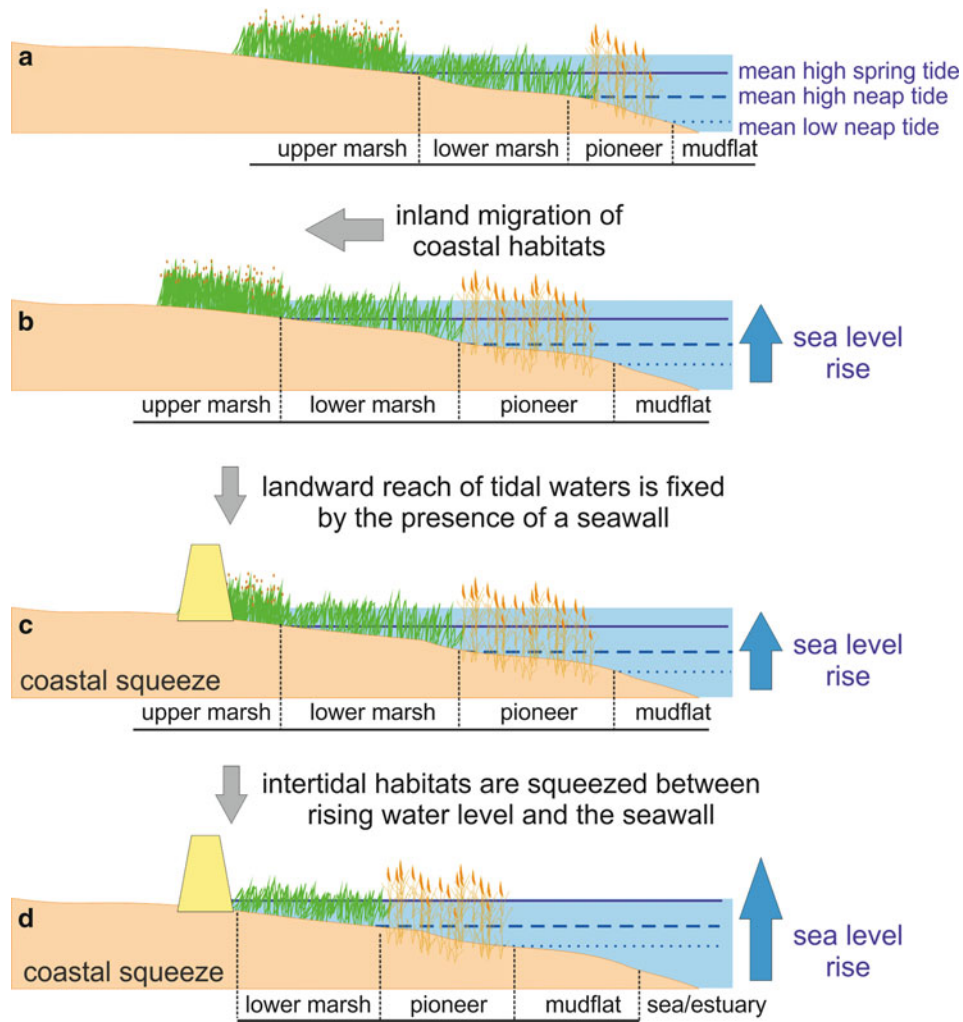
Coastal squeeze and land reclamation are often cited as 41  
the main causes for the loss of intertidal habitats (e.g., 42  
Doody, 2012). Coastal squeeze is not the only cause for 43  
the loss of intertidal habitats. Hughes and Paramor 44  
(2004) argue that coastal squeeze would lead first to the 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

### Bibliography 58

Dahl, T. E., and Stedman, S. M., 2013. *Status and Trends of Wet-* 59  
*lands in the Coastal Watersheds of the Conterminous United* 60  
*States 2004 to 2009*. U.S. Department of the Interior, Fish and 61  
Wildlife Service and National Oceanic and Atmospheric Admin- 62  
istration, National Marine Fisheries Service, 46 p. 63

- 64 Doody, J. P., 2012. Coastal squeeze and managed realignment in  
65 southeast England, does it tell us anything about the future?  
66 *Ocean & Coastal Management*, doi:10.1016/j.  
67 ocecoaman.2012.05.008.
- 68 French, F. W., 1997. *Coastal and Estuarine Management*. London:  
69 Routledge.
- 70 Hughes, R. G., and Paramor, O. A. L., 2004. On the loss of  
71 saltmarshes in south-east England and methods for their restora-  
72 tion. *Journal of Applied Ecology*, **41**, 440–448.
- Pennings, S. C., and Calloway, R. M., 1992. Salt marsh plant zonation: the relative importance of competition and physical factors. *Ecology*, **73**, 681–690. 73  
74  
75  
Pontee, N., 2013. Defining coastal squeeze: a discussion. *Ocean & Coastal Management*, **84**, 204–207. 76  
77

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.