

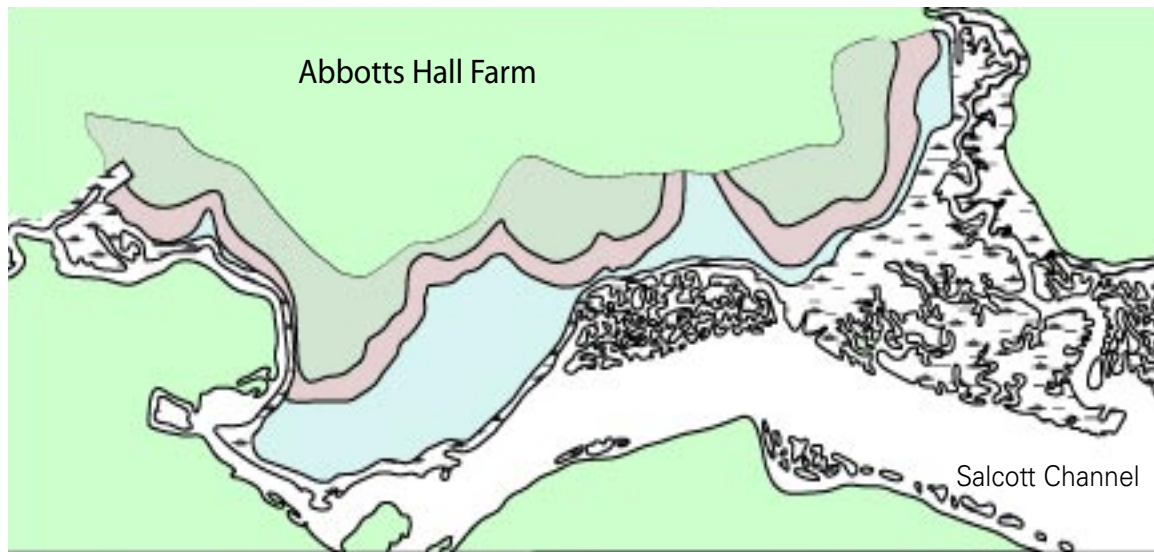
Abbotts Hall Farm

Coastal Squeeze

Fact Sheet 5
Spring 2004



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When the sea level rises saltmarsh is eroded at the seaward edge because saltmarsh plants cannot survive under deep sea water. On a natural coastline new salt marsh is formed on slightly higher land as the conditions become suitable there. Sea walls prevent this formation of new saltmarsh on higher land. The erosion of the saltmarsh in front of the sea defences is called coastal squeeze.

Intertidal habitats

Intertidal areas such as saltmarsh and mudflats are made up of plant and animal communities able to tolerate periodic inundation by salt water. Different groups of plant and animal species are present at different levels according to the conditions created by the frequency, depth and duration of the inundation. Meandering creek systems, which allow the tidal waters to drain in and out, protect the marsh from the scouring effects of moving water and remove the energy from both tides and waves.

If the sea level rises, as it has since the last ice age, intertidal areas will naturally migrate landwards, maintaining the same position relative to the high and low tide marks in which the plants and animals thrive.

However, if there is a fixed barrier, such as a sea wall, this landwards migration cannot take place. This means that the plants in existing areas of saltmarsh will die back but no areas of replacement habitat become available further inland because of the sea wall. The saltmarsh is squeezed out between the sea on one side and the sea wall on the other and is eventually eroded and disappears. Coastal squeeze is occurring in many of the estuaries in the south east of England.

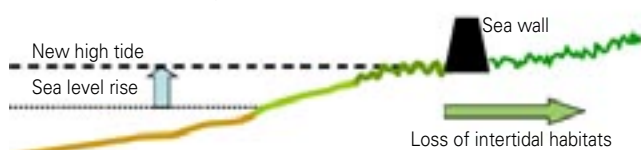
1. Intertidal zones



2. Rising sea levels cause landwards migration of the intertidal zones



3. Sea wall prevents migration and causes coastal squeeze



Coastal Squeeze at Abbotts Hall

The erosion of saltmarsh and coastal squeeze are evident at many places on the Blackwater Estuary. At Abbotts Hall Farm there were 3.8km of sea walls along the north bank of the Salcott Channel with saltmarsh on the seaward side, which is subject to coastal squeeze. The coastal realignment project has breached the sea wall so that new saltmarsh can form further inland. Short sections of sea wall have been built at the ends of the site to protect neighbouring properties, but elsewhere along the frontage at Abbotts Hall there is no sea defence and the sea rises to its natural level. The slope of the land now supports a range of intertidal habitats.

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DEFRA support the
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Sea level rise

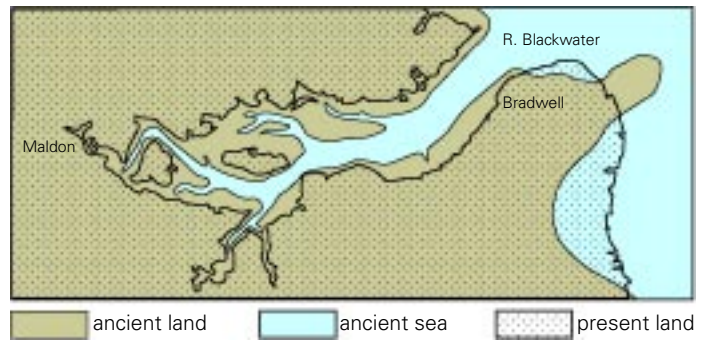
The combined effects of global warming and post-glacial rebound have caused sea levels to rise by about 300mm per century for the last 10,000 years. In the next century this rate is expected to double because of human-induced climate change. Sea level rise is currently 4-6mm per year in South East England..

After the last ice age, which ended between 10,000 and 15,000 years ago, land in the north of England and Scotland that had been pressed down under the weight of the ice sheet started to rise again and the land in the south and east started to sink. This is called postglacial rebound. The rise in relative sea levels that results, called the isostatic adjustment, is about 2 mm per year in the south east of England.

Global warming has been taking place since the last Ice Age ended 10,000 years ago and has caused sea levels to rise. In Neolithic times the high water mark is thought to have been about where the low water mark is now. Human-induced climate change is mainly caused by the release of green-house gases such as methane and carbon dioxide, which help to warm the atmosphere. There are three main effects.

- water in the oceans expands as it gets warmer, causing sea levels to rise
- ice at the poles melts more quickly, adding water to the volume of the oceans
- the weather becomes stormier and wave action increases, increasing erosion

Global warming is estimated to be causing sea levels to rise at about 4 mm per year.



Changes in the coastline of the River Blackwater in the last 5000 years
Source: Murphy and Brown



Eroding saltmarsh



Natural saltmarsh in flower

Sea walls

The Essex coastline contains over 400 miles of sea wall, which is one and a half times the entire Dutch coastline. The majority of sea defences in Essex were built to enclose saltings that were drained to provide improved grazing, rather than to protect existing dry land from flooding. The sea walls protect the drained land from inundation by the sea at high tides or storm surges. Much of this land has subsequently been converted to arable land. In Essex 100,000 acres (40,000 hectares) of saltings were claimed, including 13,000 acres (5,500 hectares) on the Blackwater.

The sea walls were not originally built to withstand the full power of the sea. In estuaries such as the Blackwater they were protected on the seaward side by large areas of saltmarsh. Saltmarsh provides protection because it absorbs the energy of the sea and greatly reduces the impact on the land or sea walls inland: the creeks and salt marsh plants reduce both tidal energy and wave energy. Most sea walls were built as earth banks, sometimes with wooden structures beneath, which were effective as flood barriers but could not withstand direct pounding by the sea.

When saltmarsh becomes eroded tidal and wave energies increase and the sea wall must be reinforced or rebuilt if it is to withstand the effects of the sea. This is hugely expensive and, where agricultural land is being protected, is of doubtful economic value to the taxpayer even without counting the environmental cost of coastal squeeze.

On some parts of the coast it is necessary to build larger and stronger sea defences to protect people's lives and property. In other parts of the coast it is more appropriate to remove coastal defences to allow the estuary to function as a more natural ecosystem, to relieve coastal squeeze and allow new saltmarshes to grow and replace those that have been lost.

Further Information

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