

# Science for Environment Policy

## Salt marshes protect shorelines by reducing waves and erosion

**Conserving salt marshes helps protect our coasts**, according to research which shows that they stabilise shorelines and protect them from damage by incoming waves. Their benefits are particularly significant in light of the destruction caused by storms and flooding, which are likely to increase under climate change.

**Despite their protective benefits**, salt marshes are frequently destroyed and replaced by manmade coastal defences, such as sea walls. After Hurricane Katrina hit the US in 2005, it was suggested that conserving salt marshes could have helped reduce the widespread damage that occurred. In the face of increasing concerns about storms, flooding and sea level rise under [climate change](#), it has become important to fully understand the protective role of salt marshes.

In 2011, researchers carried out a review of studies on marshes and coastal protection, focusing their search on the shore-stabilising and wave and flood-reducing effects of marshes. By collating and collectively analysing the results of these studies, the authors found that marshes were consistently and significantly effective in reducing waves and erosion, and in stabilising and growing shorelines.

From 33 shore stabilisation studies that compared the effects of vegetated areas and unvegetated areas, the majority (58%) found that vegetated marshlands had positive effects. The degree of protection offered depended on the types, density and heights of plants present in marshland. Plants seemed to protect coastal areas by capturing sediment above ground and growing roots below ground to raise the level of the stable surface.

From 14 studies on wave impacts, the researchers identified several factors that were important, for example, marsh width, and vegetation density and height were key to reducing waves' impacts. In particular, four studies found that wider marshes had significant positive effects in protecting shorelines from waves. The results were drawn from a range of settings, covering Europe, North America and China, and small to moderate waves.

The researchers also identified 121 studies related to flood protection, but none of these provided quantitative data on the amount of floodwater stored in coastal marshes or the peak level of flood reduction. This gap in scientific understanding needs to be urgently addressed, as most of the deaths caused by hurricanes and storms are related to flooding. However, the studies did reveal a general trend for natural marshland to drain more quickly than altered marshland.

According to the researchers, their review provides support for comprehensive approaches to coastal protection and climate change adaptation that incorporate natural features, such as marshes. There are already ongoing projects in the Netherlands and UK to realign coastal defences to allow for areas of marshland. More computer modelling and field studies to quantify the risk reduction benefits of marshes will allow a better understanding of when and where salt marshes can be incorporated into coastal protection planning, the researchers say.



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[www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0027374](http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0027374)

**Contact:**

[mcshepard@tnc.org](mailto:mcshepard@tnc.org)

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