

Science for Environment Policy

'Building with Nature' increases resilience to climate change

New ecosystem-based solutions which provide flexible resilience to coastal flooding, rather than rigid defences, are needed in the face of global environmental change. A recent study examines a new coastal protection scheme in the Netherlands which reduces ecosystem damage whilst offering resilient defence against flooding. Using this case study, the researchers present a framework for evaluating climate change adaptation measures called 'Building with Nature'.

Rising sea levels and increased storms as a result of [climate change](#) are threatening coastal settlements across the globe. The risk of flooding in coastal areas has generally been met with 'hard' engineering approaches, such as dams or storm barriers. However, the wisdom of such approaches is being increasingly challenged; critics highlight that hard engineering solutions often disrupt natural [water](#) and sediment flows and do not adapt easily to changing conditions.

In this study, researchers examined a case study in Holland, a densely populated region of the Netherlands with around 8 million inhabitants living in areas of high flood risk, often below sea level. These settlements are protected from flooding by coastal dunes and beaches, which also provide other vital ecosystem services, such as filtering drinking water and providing habitats for wildlife.

Coastal protection strategies in the area have changed over time. Initially, hard engineering techniques, such as reinforcements and dams, were used. However, in 1990, policy shifted and adding volumes of sand to eroded coastal regions became the main form of defence. This 'soft' engineering approach has less impact on sediment flow, but the need to add more sand every year buries organisms on the seabed and destroys some habitats.

In 2011, a new pilot project, the Delfland Sand Engine, was completed. Under this strategy, much larger amounts of sand are added (20 million m³ rather than 1 million m³, as previously), extending 2 km along the coast. This large mound of sand is not maintained or added to, ensuring an undisturbed environment for wildlife and the natural redistribution of sand along the coast by tides and wind.

The researchers evaluated this coastal protection strategy using a conceptual framework called 'Building with Nature' that consists of three main elements: resilience of a system and its ability to withstand disturbance; social learning by taking into account different stakeholder views; and ecosystem services provided, such as coastal defence and drinking water filtration. This approach also explicitly includes humans as part of the natural system.

The researchers conclude that, although it is too early to present a final assessment, the Delfland Sand Engine represents an important shift in climate change adaptation. The site has a cycle of 20 years or more before the sand will be naturally depleted, suggesting it will be more resilient to slow, long-term changes. Input from many different stakeholders, not only coastal engineers, has been considered, enhancing public acceptance. Finally, allowing the system to develop naturally has meant that habitats for wildlife are undisturbed.



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www.springerlink.com/content/j7082p815n577622?MUD=MP

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