

Culled fruit trees sunk into the Wadden Sea boost local diversity and abundance of marine life

August 25 2023



One of the tree-reefs after five months in the Wadden Sea. Credit: Jon Dickson

Reefs, whether natural or man-made, are hotspots of marine biodiversity. But especially in soft-bottomed seas, reefs have become scarce because many hard substrates have been removed due to overfishing of shellfish, dredging, trawling, and deep-sea mining. How can we restore this lost biodiversity, as encouraged by the UN Decade on Ecosystem Restoration (2021–2030) and the EU Biodiversity Strategy?

Now, researchers have shown that culled [fruit trees](#) sunk into the sea are a cheap and effective way to recreate reefs and boost the local diversity and abundance of marine life. The study, published in *Frontiers in Marine Science*, was conducted in the Wadden Sea, a UNESCO World Heritage Site and the largest tidal flats system in the world.

"Here we show that native marine biodiversity can be restored in a highly degraded ecosystem like the Dutch Wadden Sea by using trees as reefs," said Jon Dickson, the study's lead author and a Ph.D. candidate at the Royal Netherlands Institute for Sea Research.

"Before humans domesticated the landscape with agriculture, logging, and river controls, trees fell into rivers in large numbers and were washed out to sea. We know that such sunken wood has been present in marine ecosystems since the Jurassic, providing a home, shelter, and food for [marine animals](#)."



Overgrown tree-reef hoisted onto a ship. Credit: Jon Dickson

Culled pear trees

In April 2022, Dickson and a team of researchers constructed 32 pyramid-like structures from 192 felled pear trees past their economic lifespan, and transported these by ship to open waters between the Dutch barrier islands Texel and Vlieland. There, the 'tree-reefs' were rooted in concrete feet and sunk to the soft sea bottom at four different locations, approximately three to four meters deep.

Four months later, they were briefly raised onto a ship, to allow the researchers to count the number of different species of sessile organisms on them, for example shellfish, algae, or polyps. They were replaced on the sea bottom and allowed to accumulate more biodiversity for a further two months.

Then, three fish traps were lowered around each reef block, as well as nearby control sites and retrieved 24 hours later. All fish and crustaceans in the traps were counted and measured, with their species identified, before being released unharmed.



Overgrown tree-reef being examined on board after five months in the Wadden Sea. Credit: Jon Dickson

'Profusion' of marine animals

"Within six months, the tree-reefs were covered in a profusion of sessile animals and algae, and home to more fish than surrounding control areas," said Dickson.

In total, the researchers found 15 species of sessile organisms: predominantly barnacles and hydroid polyps, while bryozoa, sea grapes, sea lettuce, and sea stars were also found. Each of these taxa tended to

specialize in a different range of heights measured from the sea bottom.

Within tree-reef sites, six species of fish (such as whiting-pout, common goby, and European eel) and four of crustaceans were caught, compared to only two species of fish and five of crustaceans within control sites, approximately 200 meters away. The abundance was likewise greater within the tree-reef sites: for example, 5.1 times more individuals of the dominant species five-bearded rockling were caught there than in control sites.

Rapid colonization

"Current findings highlight that initial colonization of natural tree-reefs is rapid and suggest that recovery of communities associated with woody substrates may be possible by active restoration," concluded the authors.

"Since we have done our experiment only in one sea, we don't yet know how tree-reefs would perform off the coast of other continents. Also, how long will they function as reefs as they biodegrade? What species will live in, on, and around them in the longer term? These are questions we need to answer," said Dickson.

More information: Who lives in a pear tree under the sea? A first look at Tree Reefs as a complex natural biodegradable structure to enhance biodiversity in marine systems. *Frontiers in Marine Science*. [DOI: 10.3389/fmars.2023.1213790](https://doi.org/10.3389/fmars.2023.1213790)

Provided by Frontiers

Citation: Culled fruit trees sunk into the Wadden Sea boost local diversity and abundance of marine life (2023, August 25) retrieved 28 April 2024 from

<https://phys.org/news/2023-08-culled-fruit-trees-sunk-wadden.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.