
Image: Wakapuaka, Nelson © TNC NZ

Coastal Wetland Blue Carbon Programme

Data collection – overview of findings

The programme's goal is to assess the potential for funding coastal wetland restoration in Aotearoa New Zealand through blue carbon credits. This involves gathering data on carbon storage and emissions, alongside financial modelling to evaluate the economic feasibility of blue carbon project development.

In addition, the project explored the potential for applying coastal resilience credits by modelling how restored coastal wetlands help protect low-lying areas from storm surges and coastal flooding in two sites.

This work is part of The Nature Conservancy's global Blue Carbon Programme, which aims to support the development of voluntary carbon and climate resilience markets from the restoration of these coastal habitats. Potential revenue from carbon credits could encourage local communities and landowners to undertake restoration in the event that traditional land use becomes unsustainable long-term.

About The Nature Conservancy

The Nature Conservancy (TNC) is a global environmental non-governmental organisation (eNGO) dedicated to addressing the climate and biodiversity crises to ensure a future where both people and nature thrive.

Since 2018, TNC in Aotearoa New Zealand (TNC NZ) has worked collaboratively to achieve change at scale on freshwater, marine and land. We work with local communities/private landholders, local and central government, Iwi and hapū, private industry and other environmental NGOs.

The project

Data has been collected at seven New Zealand saltmarsh sites, both healthy and modified (Northland, Kaipara, Waikato, Bay of Plenty, Nelson and Tasman), to help build the evidence base about the viability of bringing blue carbon credits to market. The results of this project will also contribute to ongoing policy research and development. Data


Image: Wakapuaka, Nelson © TNC NZ

collection started in mid-2023 and finished in late 2024. This document summarises what we found.

Data was collected by the Cawthron Institute, the Bioeconomy Science Institute, Pattle Delamore Partners Ltd, Earth Sciences New Zealand and TNC. The modelling and analysis were carried out by Earth Sciences New Zealand, Tidal Research and TNC. The coastal resilience case studies were prepared by Earth Sciences New Zealand, Pattle Delamore Partners Ltd and TNC.

What we found

The report examines whether the sites were currently storing or emitting more net greenhouse gases on an annual cycle, based on our twelve months of data collection. We explored the potential of generating blue carbon credits via blue carbon habitats (saltmarsh and mangrove) restoration. Two sites were also analysed to examine whether they would be suitable for coastal resilience credits.

Site observations

Based on preliminary greenhouse gas measurements and soil carbon data collected over a one-year period, the majority of sites are currently emitting more greenhouse gases than they are capturing, at least on an annual cycle.

If original blue carbon habitats such as coastal salt marsh were to be restored by reintroducing tides onto the land, more carbon would accumulate and be stored long-term through the interaction of salt water, soil and plant matter.

Nationally, saltmarshes and mangroves are estimated to sequester an average of 4 and 5 tonnes of carbon dioxide equivalent per hectare per year, respectively. By comparison, native forests sequester an average of 7 tonnes per hectare per year.

Based on conservative restoration assumptions incorporating an 80% planting success rate across the area (best practice), if all sites were restored—giving a total area of 270 hectares—the projects would be expected to sequester up to 853 tonnes of carbon dioxide equivalent annually total. Over a 25-year project period, the maximum total abatement potential is 20,000 tonnes of carbon dioxide equivalent, roughly the same as taking 4,370 passenger vehicles off the road for an entire year.


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Carbon credit potential

We conducted an economic analysis on the carbon sequestration results using a peer-reviewed tool developed by TNC (the Blue Carbon Cost Tool). Using this tool, we found that all sites in the study have the potential to generate carbon credits, but the extent to which those credits would cover the costs of restoration depends on the price carbon can be sold at, the scale of the project and the complexity of restoration.

At present, the costs to set up a project on the voluntary carbon market would outweigh the potential revenue, due to the low price of blue carbon credits on the international market and the high costs of restoration.

Project costs would vary greatly depending on the complexity of restoration required, ranging from approximately $20,000 (NZD)1 per hectare in a low-cost restoration scenario to over $350,000 per hectare when including full capital and operational expenditures.

For a project to break even, at the scale of the sites tested, the carbon price would need to be anything from $300 (for sites >20 ha) to over $10,000 per tonne (for sites <10 ha). Current carbon prices on international markets are as low as $50. This highlights the critical importance of minimising project costs, particularly those associated with carbon standard compliance and physical restoration works.

However, the financial risk could be reduced by raising up-front costs through alternative financial strategies including endowment funds, government climate grants and co-funding partnerships with mana whenua.

In summary, restoration of blue carbon habitats would provide a diversity of benefits for biodiversity, climate change mitigation and adaptation. However, blue carbon credits would not produce enough revenue to fully fund restoration and maintenance at present, but this could be feasible in the future; for example, if markets for nature-based resilience and biodiversity develop, and as local governments begin to implement nature-based coastal adaptation measures.

[1] All amounts have been converted from USD, the currency in which the Blue Carbon Cost Tool operates.


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Coastal resilience credit potential

Restoring the two sites surveyed would certainly improve coastal resilience if integrated within the current coastal defence design. The study's results show that coastal wetlands located in front of stopbanks reduce the likelihood of overtopping during storm surge events. Given the ongoing rise in sea levels, the site requires work to maintain its current land use, and at some point, alternative land uses may become more practical.

However, the study concluded that the international resilience credit methodology tested was less suitable for New Zealand's coastline. This is because the methodology was designed for coastal sites with different characteristics, particularly those lacking current coastal defence measures. In New Zealand, wetlands have been drained and land artificially protected by stopbanks to be used for agriculture and urban development; which is why the international methodology does not work in this context.

To advance the use of coastal resilience credits in New Zealand, a bespoke methodology would need to be developed that integrates coastal wetland restoration alongside coastal defence redesign/upgrades. Given the urgent need for coastal adaptation and managed retreat to protect our communities and livelihoods, this provides an opportunity to reimagine how low-lying coastal landscapes are managed in New Zealand.

Other benefits

Restoring natural coastal saltmarsh and mangrove habitats has good potential to provide a wide range of benefits to the community and the environment. Wetland ecosystems filter water, protect communities, homes, and livelihoods from coastal erosion and storms, as well as provide vital homes and food sources for endemic invertebrate, plant and bird species.

Wetlands can also provide communities with a natural buffer against sea-level rise, as soil layers accumulate on top of each other over time, gradually raising the land. By protecting and restoring these ecosystems, we help limit and adapt to climate change at place, as well as combat the crisis of biodiversity loss.

Conclusion

This research has helped us identify some of the next steps required to advance coastal wetland restoration and the potential for blue carbon and coastal resilience credits in New Zealand. TNC NZ will continue to work with local communities, Iwi and hapū, and


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central and local governments to investigate how to make restoration more feasible for landowners.

TNC NZ is also scoping a pilot restoration project to further advance our understanding in practice and are exploring fundraising and other financial tools to fund the initial costs.

For more information

For more information on The Nature Conservancy Aotearoa New Zealand's coastal wetlands work, see https://www.nature.org/en-us/about-us/where-we-work/asia-pacific/new-zealand/stories-in-new-zealand/blue-carbon/

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