Project 1.2: Spatially-explicit cumulative effect tools

Project Leader: Carolyn Lundquist

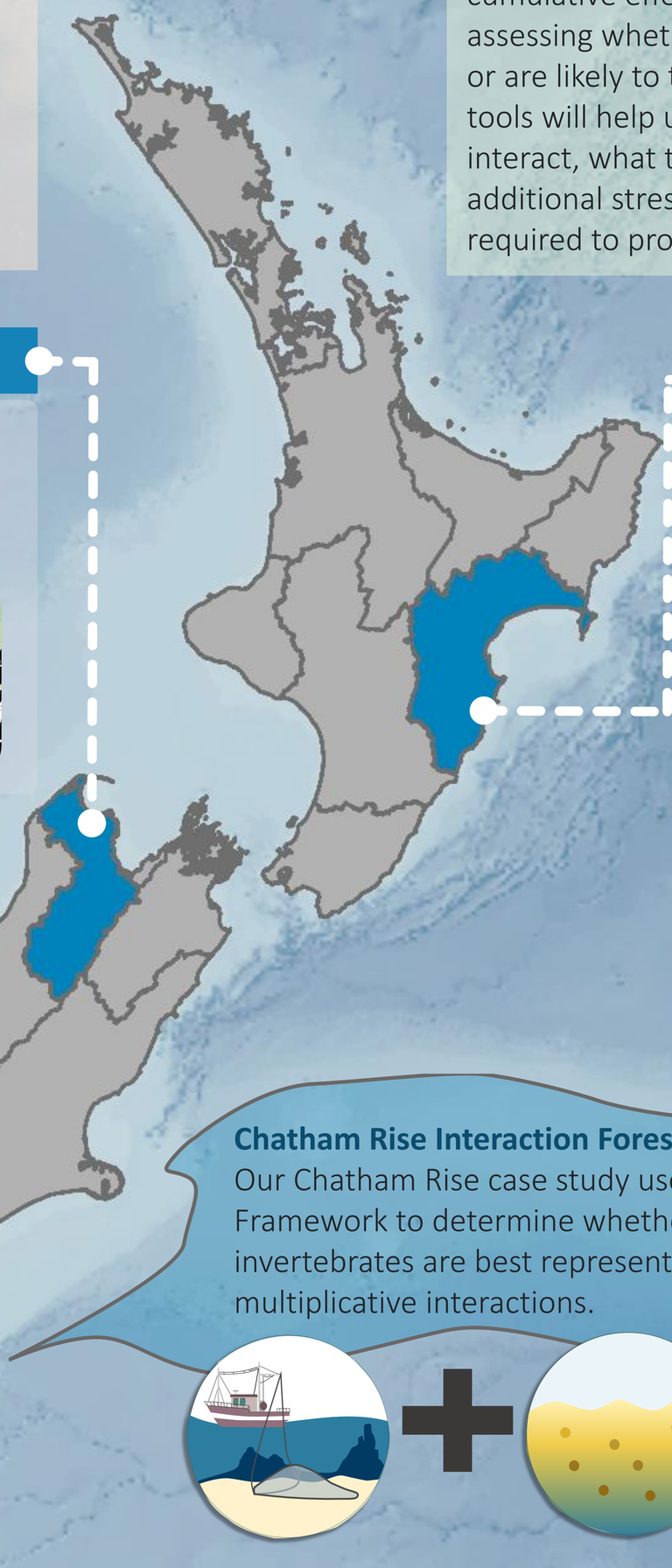
National Institute of Water and Atmospheric Research, Hamilton, School of Environment, University of Auckland

The Problem

Managers and kaitiaki of the marine environment are often lacking methods with which to consider how multiple, impacting stressors impact biodiversity, which limits the inclusion of such considerations in decision-making. Current marine management practices typically focus on single stressors, or single sectors, single habitats, or single species. However, the interactions between multiple stressors and where and when a stressor footprint occurs are important considerations when determining effects on ecosystems.

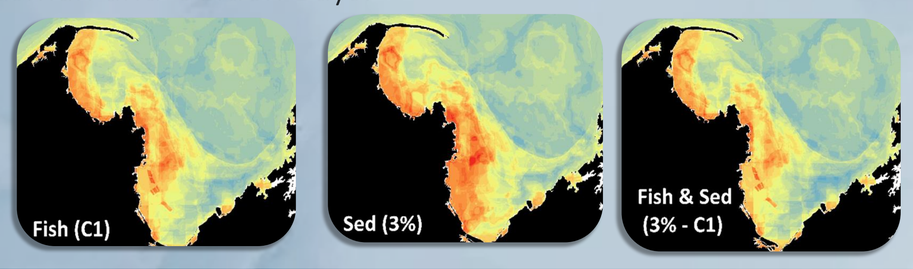
The Solution

This project is building tools to assess the cumulative effects of multiple stressors in marine ecosystems. These new tools can help decision-makers better understand cumulative effects and develop robust criteria for assessing whether new activities can be accommodated or are likely to trigger an ecological tipping point. These tools will help us better understand how stressors interact, what the system capacity is to cope with additional stressors, and how much stressor reduction is required to promote recovery dynamics.



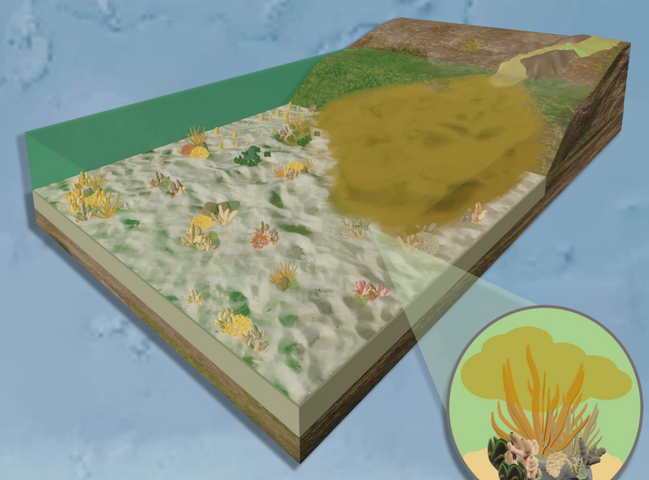
Multiple stressors in Tasman and Golden Bays

Our project supports a University of Waikato PhD student who is integrating multiple stressors into species distribution models and marine spatial planning in Tasman and Golden Bays.



Managing for recovery of seafloor habitats in the Hawke's Bay

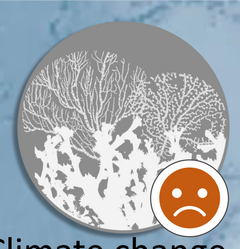
In the Hawke's Bay, we are building on a seafloor disturbance model used in project S1 'Enabling EBM in the Hawke's Bay' to add spatially-explicit sedimentation dynamics.



Managing deep sea corals for the future

We are collaborating with project 3.2 to explore risk of two stressors (climate change and bottom fishing) to deep sea coral populations.

Climate change winners



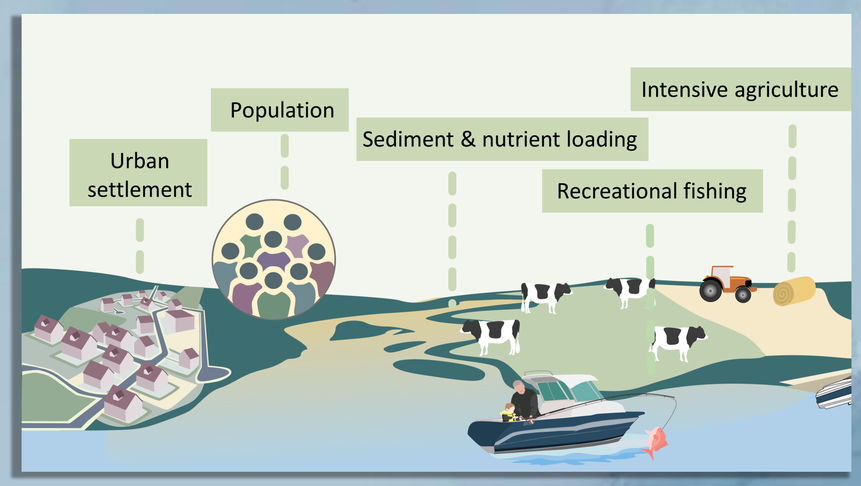
Climate change losers

Chatham Rise Interaction Forests

Our Chatham Rise case study uses an Interaction Forest Framework to determine whether stressors on benthic invertebrates are best represented by single, additive or multiplicative interactions.

Virtual tool

We are developing an online tool to allow resource managers, marine spatial planners, iwi/hapū, and the general public to explore what stressors are present in coastal ecosystems around Aotearoa New Zealand.



Project Team:

NIWA: Carolyn Lundquist, Tom Brough, Eva Leunissen, Katie Cook, Nidhi Yogesh, Mel Hayden, Di Tracey, Vonda Cummings, Amy Whitehead
Tidal Research: Richard Bulmer
Pisces Consulting: Hilke Giles
MWLR: Hugh Smith, Anne-Gaelle Ausseil (now at MfE)
DOC: Shane Geange
Whetu Consulting: James Whetu
UOW: Stephanie Watson

NIWA Taihoro Nukurangi | pisces consulting | Department of Conservation Te Papa Atawhai | The University of Auckland Te Whare Wānanga o Tāmaki Makaurau New Zealand | Tidal Research | Manaaki Whenua Landcare Research | The University of Waikato Te Whare Wānanga o Waikato | National Science Challenges SUSTAINABLE SEAS | Ko ngā moana whakauka

March 2023

Graphic design by Nidhi Yogesh (NIWA)