

## Editorial

Aotearoa New Zealand has the ninth longest coastline in the world, and the farthest point from the sea is 119 km. We are connected to our oceans and coast - many of us grew up in proximity to the sea. It provides food, recreation and protection zones, and for Māori, the coast has many traditional food-gathering areas. Oceans and water have a role in shaping us: they are a component of experiences that form us as individuals. Māori engagement with the sea is an opportunity to learn about tikanga, guidelines and protective measures that foster stewardship.

Degradation of the environment through urbanisation, industrialisation, and intensification of agricultural has had an impact on the sea, resulting in warmer temperatures, less available oxygen, and increased seawater acidity. Coastal development has caused runoff and sedimentation, impacting on estuaries and contributing to flooding events. Increasing concentration of trace elements in the environment is having adverse effects on coastal ecosystems, and overfishing has contributed to the depletion of fish resources.

The bulk of the articles published in this edition of *Junctures* stem from the Art + Oceans Project, a collaboration between scientist and artists culminating in an exhibition from July-August 2018. The rationale of the project is explained comprehensively in the article “Art–Science Collaboration: Blending the Boundaries of Practice” by Jenny Rock and Pam McKinlay.

Scientists in the Arts + Oceans Project report on research that has identified adverse impacts on marine organisms from changes in our oceans. Life in the oceans has evolved over billions of years to form complex interactive webs; the slightest environmental change can affect organisms and processes in ways that may not be immediately apparent. Key physiological processes such as growth, reproductive capabilities, and photosynthesis are at risk. Burning fossil fuels contributes almost ten billions of tons of carbon dioxide to the atmosphere every year. Close to 3 billion tons of carbon dioxide emissions dissolve into the oceans yearly; ocean acidification (OA), a condition of increased acidification and reduced pH, is the result.

As we try to reduce carbon emissions in response to global warming, the health of organisms that remove carbon become increasingly important. Marine phytoplankton, such as coccolithophores, fix carbon dioxide in their microscopic plating, made of calcite. When they die, they are buried

in the ocean sediments. With OA there is less available carbon, and the organism will struggle to grow. This could result in less carbon being removed from the carbon cycle, leading in turn to an increase in the carbon dioxide in the atmosphere. Ocean sediments accumulated over the Earth's history preserve key information about the chemical, biological and physical conditions in the oceans. These records can be used to investigate how past oceanic conditions reflect changes in the Earth's climate.

The degeneration of coral reefs through OA and destructive fishing practices such as bottom trawling is giving urgency to research on fish behaviour to inform the building of artificial reefs in marine ranches. Overfishing and the threat of extinction of many fish species has led to this concept of sustainable food production from marine resources. Man-made reefs provide habitat and shelter to spawning fish. As with construction of any shelter, the structure and design of reefs must reflect the needs of its intended inhabitants. They must be at a distance apart that allows in light to encourage growth of flora, but also of a closeness that will offer protection to fish from predators. Research into how far fish swim in flight informs the latter.

School programmes such as that the Ocean Guardian School in the United States work to foster awareness in children of the need to protect the integrity of our oceans. They reflect the ambition to protect the biodiversity of the coast and oceans, and their scenic beauty and economic productivity now and for future generations. Research shows clearly the high value children and parents place on the programme, indicating a strong commitment to address degeneration of marine ecosystems.

In a ruminative piece perhaps not immediately expected of a zoologist, we are asked to question our anthropocentric stance to fish: can we casually kill sharks in the belief they lack intelligence and self-awareness? And overfish the spiny dogfish to the extent their survival as a species is severely compromised?

Waves are adopted as an extended metaphor to illustrate the arrival of peoples in Jamaica. Diffraction of waves, involving bending around obstacles, the creation of new patterns, and the ability to adapt to resistance alludes to arrivants making home in that country. Waves are imbued with a spiritual power that diffracts the knowledge created by colonialism and enslavement, and resists attempts to purge African and Taíno Indigenities.

We are advised to listen to the scientists, who have revealed how key building blocks in the aquatic ecosystem are being compromised by careless practices. Disregard for, and indifference of the health of oceans is impacting directly on food chains of which we are a part. The artists who have worked with the scientists, or the scientists who have worked as artists, have re-contextualised findings from the studies and have created new meaning. Engaging the public in social arts, they challenge our assumptions and pose questions about our preconceptions of oceans. We are invited to reconsider our roles in the ongoing health of the marine ecosystem.

Oceans are not mere backdrops on which we cast our shadow, nor are they an infinite resource to be callously plundered. They are an integral part of an ecosystem on which we are dependent for our physical, spiritual and economic wellbeing.