



Habitat Heroes

Te tūhura i tō taiao moana rohe **Explore your local marine environment**

New Zealanders love spending time in and around the sea!

Our marine environment is made up of just over 4 million square kilometres of ocean. We have the fourth largest marine environment in the world! New Zealand's oceans provide rich and diverse habitats for over 15,000 known marine species.

Our remote location in the south-west Pacific means that many of these species are not found anywhere else in the world (e.g. the New Zealand sea lion, Māui and Hector's dolphin).



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Introduction

Our 17,000 km of coastline provides us with diverse environments including rocky shores, beaches, coastal sand dunes and sheltered estuarine mudflats. The type, number and variety of plant and animal species present – the **biodiversity** of the marine environment – determines the health of the area. For example:

- Invertebrates – animals without a backbone, such as crayfish, snails, octopus, and coral – are good indicators of estuarine health. A healthy estuary can support a wide range of invertebrate species, while an unhealthy estuary can only support a small number of pollution-tolerant species (e.g. worms).
- Shellfish are filter feeders. Because of this they eat contaminants found in water. Sediment (fine mud) can bind to chemical contaminants and keep them in the seafloor. Therefore, shellfish and sediment are often monitored to build a picture of overall water quality and its effect on the environment.
- Native plants play an essential part in forming and stabilising sand dunes. They also provide habitats for native insects and birds.

For more information about marine environments, visit:

www.doc.govt.nz/nature/habitats/marine

www.mfe.govt.nz/marine/marine-pages-kids/nz's-ocean-environment

www.kcc.org.nz/sea

www.sciencelearn.org.nz/Contexts/Life-in-the-Sea/Science-Ideas-and-Concepts/Marine-habitats

Factors affecting the health of marine environments

Human activity	Impact
Fishing/harvesting	<p>With advances in fishing equipment, larger ships and new tracking technologies, many fish stocks around the world have significantly reduced. Unsustainable fishing practices can have other negative impacts on the marine environment. For example, some dredging and trawling disturbs sediment on the sea bed, which clogs the gills of many marine animals.</p>
Pollution and littering	<p>Our oceans have been used for a long time as an intentional dumping ground for all sorts of waste, including sewage, industrial run-off and chemicals. Some marine pollution may be accidental (e.g. oil spills caused by shipping accidents), and some are indirect (e.g. pollutants flowing to sea via stormwater drains found on our urban roads, streams and rivers). Some types of rubbish discarded from boats or dropped along shorelines are specifically harmful. For example, fishing hooks with lines still attached can injure sea birds.</p> <p>All marine pollution has the potential to seriously damage marine life in the sea. Scientists are concerned that marine pollution places extra stress on already threatened or endangered marine life.</p>
Disturbing the shore	<p>Too many pedestrians or vehicles can destroy habitats and can crush creatures (barnacles, snails, tubeworms and some bivalves) on hard shores.</p> <p>Vehicles travelling along the top of sandy beaches and dunes destroy the eggs and shallow nest scrapes of many shore-nesting birds such as fairy tern, white-fronted tern, New Zealand dotterel and northern variable oystercatcher. Vehicles can also damage dune vegetation, causing wind and wave erosion.</p>



How to use this resource

KEY CONCEPTS:

Biodiversity Endemic Erosion Invertebrates Muddy shore Rocky shore Sand dune Sandy shore

This resource provides various activity ideas that can be adapted to your context. It could be used to support outdoor exploration during/leading up to Conservation Week, or as an inquiry unit.

The intention is for you to choose activities based on your students' prior knowledge, and the time and equipment you have available.

Curriculum links	Learning intentions (WALT ...)	Success criteria (Students can ...)	Activity
Nature of Science – Investigating in science (L3) Living World – Ecology (L1–3) Living World – Life processes (L1–3) Mathematics – Statistics (L1–3) English – Speaking, Writing, and Presenting (L3)	Investigate the health of our local marine environment by carrying out scientific tests and observations.	Explain what biodiversity is and how it helps to determine the health of a local marine environment. Gather data/information to determine the health of a local marine environment, and share findings.	Introduction activities Investigation activities Sharing and presenting findings
Social Sciences (L4)	Investigate how human activities affect the health of our local marine environment. Understand that people have social, cultural and economic roles, rights and responsibilities.	Identify how humans have affected the health of our local marine environment	Investigation activity – litter audit
Social Sciences (L3–4) Health and Physical Education (L2) Nature of Science – Participating and contributing (L3–4)	Decide what conservation actions would improve the health of our local marine environment.	Use our new knowledge, understanding and skills to take action and improve the health of our local marine environment.	Planning for action

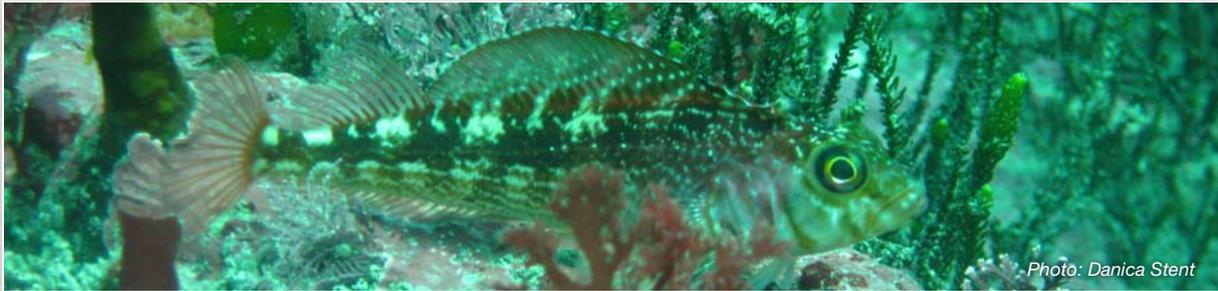


Photo: Danica Stent

Science

Nature of Science – Investigating in science

- Ask questions, find evidence, explore simple models, and carry out appropriate investigations to develop simple explanations. (L3)

Nature of Science – Participating and contributing

- Use their growing science knowledge when considering issues of concern to them. (L3-4)
- Explore various aspects of an issue and make decisions about possible actions. (L3-4)

Living World – Ecology

- Recognise that living things are suited to their particular habitat. (L1-2)
- Explain how living things are suited to their particular habitat and how they respond to environmental changes, both natural and human-induced. (L3)

Living World – Life processes

- Recognise that all living things have certain requirements so they can stay alive. (L1-2)
- Recognise that there are life processes common to all living things and that these occur in different ways. (L3)

Mathematics

Statistics

- Conduct investigations using the statistical enquiry cycle. (L1-3)

English

Speaking, Writing, and Presenting

- Integrate sources of information, processes, and strategies with developing confidence to identify, form and express ideas. (L3)

Social Sciences

- Understand how people view and use places differently. (L3)
- Understand that events have causes and effects. (L4)

Health and Physical Education

Healthy Communities and Environments – Social attitudes and values

- Explore how people's attitudes, values and actions contribute to healthy physical and social environments. L2



Photo: DOC

Dive in: Introduction activity ideas

ACTIVITY

Class discussion

- What is a marine environment? Brainstorm and write a class definition.
- Think, Pair, Share – Think of a marine environment you have recently visited. Share where this was, what you saw and did there.
- Where is our local marine environment? Map the location, describe how to get there from school.
- What does it look like? Refer to a photograph to prompt discussion. List attributes and/or sketch:
 - What lives in and around the marine environment?
 - How do people use the marine environment?

Resources needed

- Printed map, or use Google Maps to locate local marine environment
- Photograph of your local marine environment

ACTIVITY

Determining the health of our local marine environment

Understanding Biodiversity

1. Introduce the idea of variety by giving students a one-minute challenge to write down the names of all the plants, animals and insects they've seen and/or heard in a marine environment they've visited.
2. Explain that 'diversity' is the name that we give to this variety. Develop the idea that this diversity is what makes life interesting.
3. Introduce students to the concept of variety in nature.
 - Can you imagine a world where there was only one type of plant or fish?
 - Can you imagine a world with only buildings and roads and no beaches to visit? What would it be like to live in this type of environment?
4. Class discussion
 - What do plant and animal species need to survive in a marine environment?
 - What could be preventing animals from living in a marine environment?



ACTIVITY

Photo: Brian Mackie

Preparing for your marine investigation

Explain to students that they are going to carry out scientific investigations to learn about the biodiversity of a local marine environment, in order to help determine its health.

Class discussion

- How are we going to gather information about the biodiversity in our marine environment? What tests and/or equipment can we use to gather this information?
- How will we determine whether our marine environment is healthy or unhealthy?

Ask students to predict how healthy they think their local marine environment is. Their **hypothesis** (prediction) could be based on surrounding land use/human activity.

Plant and animal species on the seashore

Introduce students to the applicable shore guide (choose one based on the marine environment you will be visiting).

- [Northern NZ Sandy and Muddy Shore Guide](#)
- [Northern NZ Rocky Shore Guide](#)
- [Southern NZ Sandy and Muddy Shore Guide](#)
- [Southern NZ Rocky Shore Guide](#)

More information about specific species can be found by searching the [Marine Life Database](#).

Refer to pages 8–20 of the [Backyard Buffers booklet](#) for background information about common dune plants.

Students could then carry out the [Plant ID activity](#).

In small groups, students could do a mini inquiry to familiarise themselves with species they might find in the marine environment. Allocate each group one or two of the species groups (e.g. plants, bivalves, fish and sea anemones). Use these questions to guide the inquiry:

- Describe two examples of species that live in a marine environment.
- What interesting characteristics does this group of species have?
- How do these species live? (E.g. how do they breathe? eat?)

Findings could be presented to a particular audience (e.g. school, other class and parents) through a variety of tools, (e.g. blogs, school newsletters, website, PowerPoints, picture books, artwork and drama).



Photo: Trevor Johnston

Time to explore: Investigation activity ideas

These activities aim to encourage exploration and learning IN your local marine environment. The information students collect will enable them to determine the health of their local marine environment, and support them to uncover potential solutions to local environmental issues.

On completion of their investigation, students complete the conclusion statement about the health of the marine environment, and justify their findings – see the [data collection sheet](#). Encourage students to take photographs to document their key findings.

Ensuring safe and fun exploration

A pre-visit to the site by the teacher is recommended to carry out a risk assessment. A template for this can be found at eotc.tki.org.nz/EOTC-home/EOTC-Guidelines (see *Tool Kit Sample forms > download Sample form 19*). Important factors to consider include:

- Plan where the different activities will take place and form groups before you reach the site. Ensure that there will be adequate adult supervision. A ratio of 1:4 is advised.
- Before visiting the site, develop a list of guidelines with students to ensure that the plants and animals they find are not harmed (see page 1 of the Shore Guides for guideline examples).
- Complete a RAMS form and other school-required risk management procedures.



ACTIVITY



Photo: Dr Kim Westerskov

Marine Metres Squared (Mm2) (20–30 minutes)

Mm2 project is a nationwide citizen science initiative run by University of Otago's NZ Marine Studies Centre. It is a simple way to investigate the plants and animals living in your local marine environment. Not only do you get to discover what is living in your marine backyard, you also get to help NZ scientists in their investigations by sharing what you find.

1. Register (for free) on the [Mm2 website](#) to get access to free resources, including the data collection guides. Visit the Resources page and select the 'Training for participants' tab.
2. Watch the instructional video on how to carry out a Mm2 survey in a rocky shore, or sandy/muddy shore (depending on where you are visiting) and download the applicable Mm2 'How to' guide and data sheet.
3. In groups of 3 or 4, students carry out the Mm2 survey. Use the shore guide to help identify species found.
4. Back at school, students upload the information from their survey onto the Mm2 website.

Equipment needed

- Pens/pencils
- Printed copies of the applicable Shore and Mm2 guides
- Quadrats (instructions on how to make these are included in the Mm2 guides)

Sourced from www.mm2.net.nz with permission from Marine Metre Squared project.



ACTIVITY



Photo: Sarah Thorne

The role of plants on dunes (10 minutes)

Plants play an essential role in maintaining the health of sand dunes. New Zealand native dune plants are worth protecting as 75% of them are endemic! Dune vegetation:

- *Traps and collects sand, thereby building up sand dunes. This allows sand dunes to act as a buffer, protecting the land from storms.*
- *Reduces wind erosion by decreasing wind speed. Dune grasses slow and filter the wind, so sand drops out of the wind stream and builds up around the plant.*
- *Reduces wave erosion. Where sand is blown into plants, the sand is well aerated, enabling dunes to absorb waves*

1. Where possible, select a location where the dune system represents three or four zones.
2. In groups of 3 or 4, students identify plant species and record information on the [data collection sheet](#). Use the [Plant ID cards](#) and/or the [Backyard Buffers booklet](#) to help identify plants on the dune.

Reflect – Which plants are most common? What are the characteristics of these plants? What would it be like to live in the different zones?

Equipment needed

- Pens/pencils
- Data collection sheet
- Printed copies of pages 8–20 of the [Backyard Buffers booklet](#) and/or [Plant ID cards](#)

Adapted from [Life's a Beach education resource](#) (2013), reproduced with permission from Bay of Plenty Regional Council



Human impact observation – Litter audit (15–20 minutes)

The presence of litter on beaches highlights the negative impact that human activities have on our marine environments.

1. In small groups, collect litter along the beach.
2. Decide how harmful each type of rubbish could be if it came in contact with marine animals and/or people.
3. Record information on the [data collection sheet](#). Take turns collecting litter and recording information.
4. Sort out the litter collected. Can some of the rubbish be recycled?
5. Dispose of rubbish correctly, and/or take some back to school to use in a visual display.

Reflect – How did the rubbish get there? What could be done to prevent this happening again?

Equipment needed

- Pens/pencils
- Data collection sheet
- Gloves
- Rubbish bags



Sharing and presenting findings

Ask students to share their key findings and conclusions.

- Was your hypothesis about the health of the marine environment correct?
- Were any of your findings surprising or disappointing? Why?

The data collected could be presented in various ways:

- Upload data onto the Mm2 website. The website will produce a pie graph that students can use to interpret their findings. Compare findings between groups.
- Create a display using the litter collected on the beach (e.g. see [Sustainable Coastline's public artwork project](#) on Youtube).
- Use photographs taken with explanations and descriptions of findings.
- Write a report – Share key findings and conclusions on your class blog, school website or school newsletter.



Planning for action: How can we improve the health of our local marine environment?

As a group, identify one issue that is affecting the health of your local marine environment. The action plan template below can be used to plan how to address this issue.



* Contact DOC and/or your local council, and visit the [Nature Space](#) website to learn about groups, individuals and landowners undertaking ecological restoration in your area.

Action ideas

- Create signs to deter traffic from pedestrians and/or vehicles on beaches and/or sand dunes.
- Plant native dune plants to help protect sand dunes
- Organise a beach clean up – Picking up other people’s rubbish, if it is safe, is an easy way to help reduce pollution on our beaches and in the ocean. Visit the [Love Your Coast](#) website to see if any clean ups are happening in your area. If there aren’t any, you could start your own!
- Reduce your rubbish – Studies have shown that about 80% of marine pollution comes from the land. By using fewer products that create less rubbish, and by disposing of waste correctly, we can keep marine environments litter free.
- Take care of a local stream – since most streams and rivers flow into the ocean, taking care of them can help reduce marine pollution.

Going further

Education resources and programmes to support further learning about, and exploration in your local marine environments include:

- [Young Ocean Explorers](#): Steve and his daughter Riley present a captivating series of stories about what happens when a teenager comes face to face with the marine animals we’re all curious about, such as stingrays, orca, and turtles.
- [Sustainable Coastlines](#): A collection of useful information, inspiring media, great people, and other pieces of gold that help us learn more about looking after the coastlines we all love.
- [Shag Force, Episode 1 Waste Warriors](#): Fun cartoon developed by the Waitemata Harbour Clean-up Trust that simply and effectively explains the origins and effects of ocean pollution.
- [Midway, Message from the Gyre](#): Photographs highlighting the impact waste disposal has had on marine life.
- [Seaweek](#): Seaweek is New Zealand’s annual national week about the sea. It’s about exciting and inspiring all New Zealanders to renew their connections with the sea! Visit the website to see what events are planned in your area.
- [Experiencing Marine Reserves](#): EMR is a national programme empowering schools and communities by providing equipment and expertise for experiential learning opportunities in the ocean.

Marine environment data collection sheet 1

Location name:

Date and time:

Name of group/observers:

Hypothesis (prediction)

We think the health of the marine environment, and the life within it, will be excellent / ok / poor because ...

The role of plants on dunes

Staying on pathways so that you don't walk on the dunes, make a list of plants that are growing on your local sand dune.

Plant name	Describe what it looks like (plant characteristics). Is it a tree, shrub or grass? Is it leafy? Is it flowering?	Where on the dune is the plant found? Near the sea or far from the sea?

Coming to conclusions

We think the health of this marine environment, and the life within it, is excellent / ok / poor because ...

We can improve the health of this marine environment by ...

Marine environment data collection sheet 2

Location name:

Date and time:

Name of group/observers:

Hypothesis (prediction)

We think the health of the marine environment, and the life within it, will be excellent / ok / poor because ...

Human impact observation – Litter audit

Item	# collected	Harm rating – marine animal/plant	Harm rating – people
		(1=rarely , 2=sometimes , 3=very harmful)	
<i>e.g. Fishing net</i>	<i>IIII (4)</i>	<i>3 (entanglement, could be mistaken for food)</i>	<i>2 (could wrap around a boat propeller)</i>

Coming to conclusions

We think the health of this marine environment, and the life within it, is excellent / ok / poor because ...

We can improve the health of this marine environment by ...