

Activity 7: Issues for marine environments



Let's learn about
issues for marine
environments and how
they can influence
ecosystems



CURRICULUM LINKS

Learning areas

Science: Levels 1–4:

- Planet Earth and Beyond: Interacting systems
- Living world: Ecology
- Nature of Science: Participating and contributing

Science capabilities: Gather and interpret data, Use evidence, Engage with science

Te Marautanga o Aotearoa:

Tikanga ā iwi; Pūtaiao: The natural world

Social Sciences: Social Studies

Mathematics and Statistics:

Statistics

Learning intention

Students are learning to:

- Understand the causes and effects of issues in our oceans and how humans influence marine environments.

Success criteria

Students can:

- Identify and explore an issue for oceans and marine reserves that is relevant for their local community.

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BACKGROUND NOTES

HOW DO PEOPLE INFLUENCE MARINE ENVIRONMENTS?

People can change marine environments with their behaviour and actions. Many of the issues described in this activity have a substantial impact on our oceans and marine ecosystems. Over time, people everywhere can contribute to issues that threaten the health of the marine environment.

WHAT IS AN ISSUE?


An issue is a problem that could have dire consequences for the sea/ocean and marine reserves.

WHAT ARE SOME ISSUES FOR THE MARINE ENVIRONMENT?

Some of the major issues for New Zealand's marine environment include climate change, overfishing and pollution.

Climate change, ocean warming and acidification

Climate change is increasing the temperature and acidity of our oceans and the balance of life within them. These changes will eventually affect all animals within ocean ecosystems. Acidification of the oceans will also alter marine food webs, habitats and ecosystems. See University of Otago's NZ Marine Studies Centre resource *The ocean of tomorrow: ocean acidification and the marine world*:

 www.otago.ac.nz/marine-studies/resources/download/otago636544.pdf.

Overfishing

Overfishing is taking more fish from an ecosystem than can be replaced by natural processes such as breeding and migration. Both commercial and recreational fishing have had an enormous impact on our fish supply and ocean ecosystems over the last 100 years. Fishing technologies are making more fish available to more people but are also helping us to limit bycatch and fish in a more sustainable way. Dredging and trawling can be particularly damaging to the sea bed.

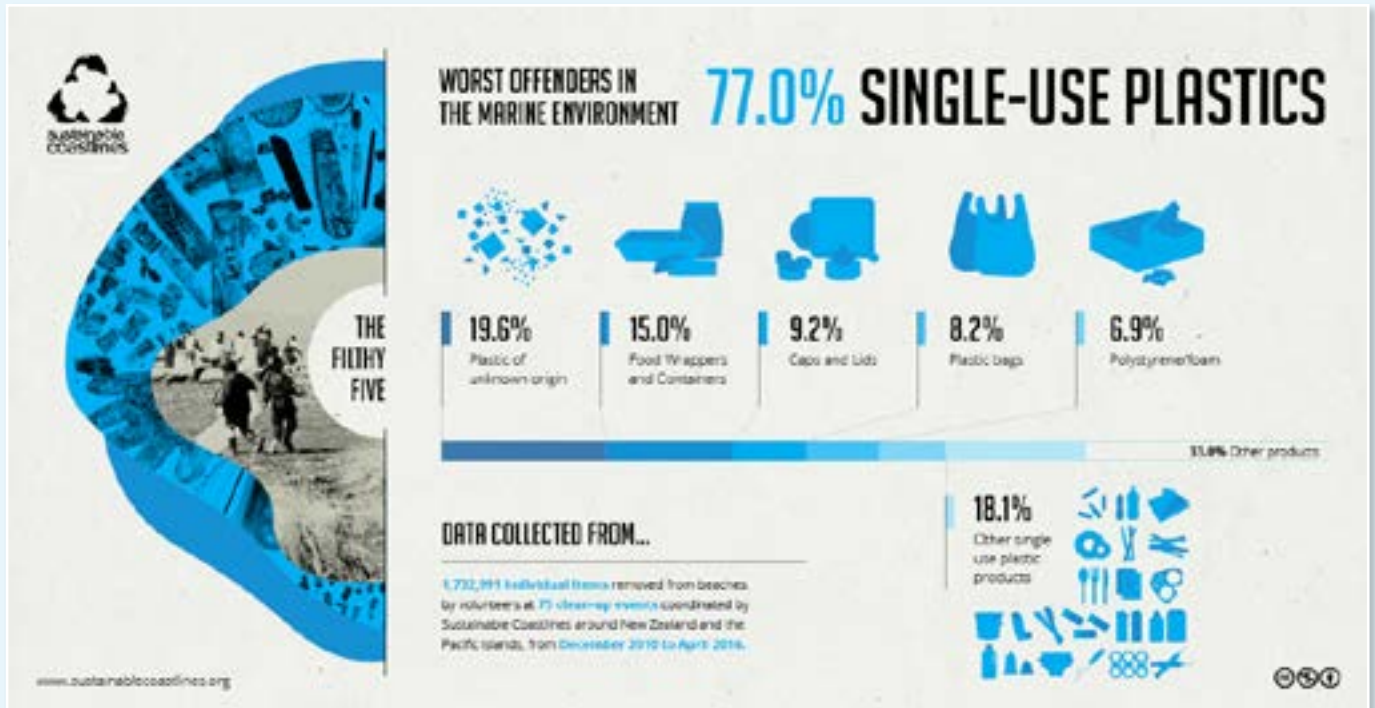
Pollution

Pollution can come in many forms, from litter, rubbish and plastics to chemicals and harmful substances such as concrete. These can all cause problems for animals living on the coast and in the ocean. Anything that ends up in a stream, drain or in our stormwater system, can become a marine issue when it washes out to sea.



Rubbish and plastics

Litter or rubbish causes problems for all life in the ocean. Plastic rubbish can look like food to marine animals like turtles and seabirds and can harm or kill them if they eat it.



For more information about rubbish on the coast and what we can do about it, see:

<http://sustainablecoastlines.org>

Sedimentation and run-off

Sediments are natural products of erosion (they are fine, mud-like substances in water) but too much sediment is lethal to many marine animals and creates long-term changes in the habitat.

Biosecurity threats and marine pests

Marine pests are unwanted living things growing in the marine environment. Pests on the hulls of boats and aquatic equipment can be spread throughout areas such as harbours and estuaries. We already have marine pests such as Mediterranean fanworm, Asian paddle crab, and clubbed tunicate/leathery sea squirt. If you come across a suspect marine pest animal or plant, or signs of illness in marine life, report it as soon as possible to the Ministry for Primary Industries (MPI) by calling the Pest and Disease Hotline 0800 80 99 66.


See MPI's *New Zealand marine pest ID guide*: <https://www.mpi.govt.nz/dmsdocument/10478-new-zealand-marine-pest-id-guide>. See also the LEARNZ video about MPI: *The aquatic biosecurity system* (05:32 min): https://www.youtube.com/watch?v=aW3HyrJ_WrI.

See also this MPI teaching resource: *Biosecurity - protecting our local environment*:

<https://www.mpi.govt.nz/dmsdocument/19580-te-ao-turoa-levels-1-and-2-biosecurity-protecting-our-local-environment>.

Dogs and other introduced predators

Introduced predators affect marine animals as well as land animals. Uncontrolled dogs running through nesting areas can crush bird eggs, disturb nesting adults, and kill chicks. Many beaches have dog restrictions and owners should respect and obey these. Other introduced predators such as rats, cats, hedgehogs and mustelids prey upon bird eggs and chicks, e.g. fairy terns. They can also sometimes eat fish eggs laid in shallow water or on leafy material.


Our seabirds are particularly vulnerable to predators because they often nest on the ground. For more information about seabirds, see:  www.doc.govt.nz/education-taiko.

See  www.doc.govt.nz/pestfree for more information about pest-free islands.

Lack of protection of marine environments

New Zealand has a variety of rules, laws and other tools for protecting its marine environment, including marine mammal sanctuaries and marine reserves. The area of no-take marine reserves around our coasts is tiny in comparison to our total marine area of over 4 million square kilometres.

Illegal harvesting

There are rules for each type of fish about how big they have to be before we can catch them and how many of each type each person is allowed. Unfortunately, not everyone always follows these rules. This can deplete the supply of fish and other resources. For information about size and catch limits, see:  <https://www.mpi.govt.nz/travel-and-recreation/fishing/fishing-rules>.

Disturbing the shore: vehicles on beaches

Vehicles can damage vulnerable coastal plants and animals. Shorebirds breed in sand dunes and some nest on the beach itself. Their eggs can be well camouflaged and difficult to see. For this reason many shorebirds have declining populations. Vehicles can also be dangerous to people on beaches and can damage shellfish beds.

Lack of education/information and awareness in the community

Sometimes people haven't had experience of how marine reserves and marine protected areas can benefit fisheries and the economy. Bringing awareness to the issues above and discussing ways to tackle them could help inform people in your community. Listening to a range of perspectives is important to enable people to reach consensus and form locally appropriate solutions.

Habitat destruction and reclamation

The demand for housing and land development, especially near the coast, is becoming more tangible as time goes on, and reclamation and habitat destruction is becoming more of a threat to marine environments. Find out about development plans for your area and discuss potential consequences for the marine environment and animals.



LEARNING EXPERIENCE 7: ISSUES FOR MARINE ENVIRONMENTS

Resources for this activity

- *Our marine environment at a glance* by the Ministry for the Environment:  <http://www.mfe.govt.nz/publications/marine/new-zealands-marine-environment-glance>
- Padlet page about marine issues for New Zealand:  <https://padlet.com/conserved/wutqw400lsqn>
- *Example litter investigation*  pages 8–9

Vocabulary

Issue, threat, pollution, marine protected area, bycatch, overfishing, ocean acidification, sedimentation.






Inquiry stage 4: Extending thinking



INTRODUCING ISSUES IN MARINE ENVIRONMENTS

Note: These are suggestions only, teachers are encouraged to adapt and change material to suit their students



- Either individually or in pairs, students can start to consider issues in the marine environment on their devices:  <https://padlet.com/conserved/wutqw400lsqn>.
- View or read this article to see examples of human impacts on marine environments and what effect they have on animals: 'Giving the Ocean a voice', *Connected*, Level 2, 2013. Scientists journey on board waka to observe the health of the Pacific Ocean. Google slides version:  <https://goo.gl/uL1QPV>.
- After reading, discuss:
 - Which marine issues did scientists in this article come across on their journey? (Rubbish in the ocean, coral bleaching, shark finning). Which animals would be affected by these issues?
 - Have students seen any examples of these issues in their own environment?
- To further investigate issues in the marine environment, explore the Ministry for the Environment's infographic/poster: *New Zealand's marine environment at a glance* (see  Resources for static and interactive versions, and the image over the page).





More information at www.mfe.govt.nz or www.stats.govt.nz
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- Ask students to Identify issues presented in the infographic, e.g. *climate change, ocean temperature warming, ocean acidification, at-risk species, fishing bycatch, non-native (introduced) species and pollution and sedimentation.*

Issues in your local marine environment

- Are these issues a problem in your marine environment or local marine reserve? If possible, visit or view photos of your local coast and identify which issues are also a problem for your area.
- Identify and list the current issues for marine ecosystems in your local area. How do these issues influence habitats and species?
- If possible, identify a relevant marine issue for your community. Gather data about the issue in your marine environment. This may be an issue from this activity or one unique to your community. Look for patterns or trends in your data to try to determine the cause of the issue (see *Example litter investigation* on page 9).



REFLECTING ON LEARNING





- Students can then identify and explore **one main focus issue** for their local marine environment. Does solving this issue meet a need in your community?
- Consider the underlying cause/s of this issue. What can students do about these causes?


Google Docs version:  <https://goo.gl/ryzUsx>.


EXTENDING LEARNING



- Find out more about threats to the marine environment from the Love Your Coast website:  www.loveyourcoast.org.nz/learn.
- Learn more about climate change and what you can do to help in this interview by LEARNZ in their field trip to Antarctica What's this thing called climate change? (04:17 min):  <https://vimeo.com/245134432>.

Looking ahead to possible actions resulting from your findings

There could be many targeted, effective environmental actions resulting from students' thinking, findings and results. For example, from the *Example litter investigation* below, students could decide to make posters informing people about the consequences of leaving their litter from eating/drinking at the beach, or they could petition the council about the use of non-biodegradable parking tickets. See:  <http://www.stuff.co.nz/environment/87034677/young-scientists-spot-problem-with-councils-plastic-parking-tickets>.

- Consider what actions could be appropriate to target your marine issue.
- For more information about taking action for the marine environment, see  *Activity 11: Action for marine environments*.

Items	Number
Plastic: bottles	5
Plastic: lids	22
Plastic: cups	4
Plastic: straws	8
Plastic: bags	6
Plastic: cutlery	5
Plastic: pegs	3
Plastic: wrappers	16
Other plastic	15
Polystyrene	9
Parking tickets	7
Fishing line	4
Other (not plastic)	9
Total pieces	113

Example litter investigation

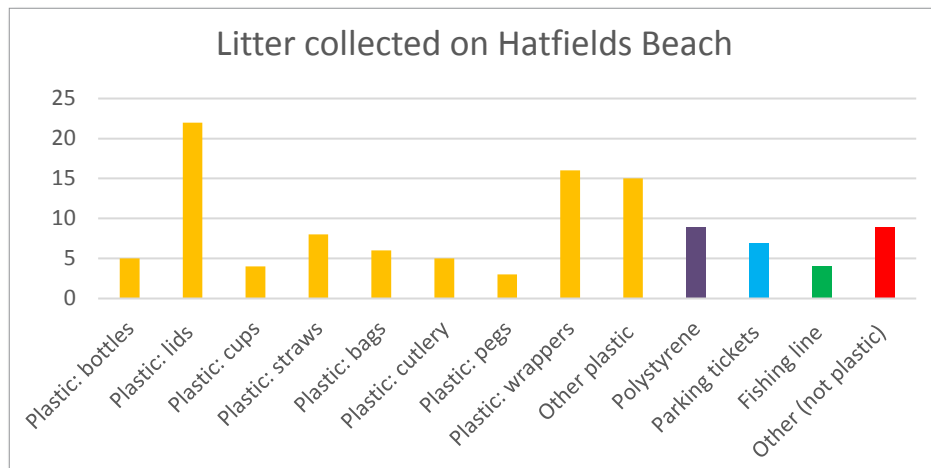


In this example, students investigated litter on a local beach. They had seen a lot of litter there during a previous visit and thought this was a significant issue for their local area. During a 30-minute litter survey, they collected 113 pieces of litter. They grouped the litter according to what it was made from to try to see any patterns with littering on their local beach.

Continued over the page...



Graph of litter survey results



Possible questions and answers from litter investigation results:

1. What patterns can you see in the data and graph?

For example 'Most of the litter on Hatfields Beach is plastic', or 'Most of the plastic litter is from people eating/drinking on the beach'.

2. What conclusions could you reach from these results?

For example '73% of litter on Hatfields beach is single-use plastic'.

3. Do you think your local beach would have similar results? Why?

Results will vary with your location, population and the type of marine environment you are surveying. For example, some beaches may be very popular with fishers, so may have more fishing-related waste.

4. Try a similar survey in your local marine environment and compare your results.








Litter collected in 30 minutes. Photo: Shanthie Walker

For information about how to conduct your own litter audit, see: www.loveyourcoast.org.nz/learn and *How to: Collect and share clean-up event results*, (01:44 min): www.youtube.com/watch?time_continue=5&v=7yGq2ba3NhQ.



OTHER USEFUL RESOURCES ABOUT ISSUES FOR MARINE ENVIRONMENTS

- Learn more about ocean acidification and marine issues in this University of Otago NZ Marine Studies Centre resource, *The ocean of tomorrow: ocean acidification and the marine world*:  <http://www.otago.ac.nz/marine-studies/resources/download/otago636544.pdf>.
- *School Journal*, Level 3, Aug 2017: The Subantarctic Islands:  <http://instructionalseries.tki.org.nz/Instructional-Series/School-Journal/School-Journal-Level-3-August-2017>.
- Find out more about the *Rena* oil spill disaster in 2011 with this Science Learning Hub video clip, *Rapid response to the Rena*, (04:41 min):  <https://www.sciencelearn.org.nz/videos/609-rapid-response-to-the-rena>.
- Play the Games for Change game: *Ciclania*, which is about solving environmental issues such as global warming:  <http://www.gamesforchange.org/play/ciclania>.
- Try an activity and online game about water issues, *Water island game*:
 <http://www.seqwater.com.au/education/water-island-game> and
 <https://www.sciencelearn.org.nz/resources/1561-water-issues>.
- DOC seabird/tāiko/black petrel resource:  www.doc.govt.nz/education-taiko.
- DOC webpage about New Zealand fairy tern threats:  www.doc.govt.nz/fairytern.



An issue in our marine environment and what we can do

The main issue affecting our local marine environment is:

The causes of this issue are:

Some other problems that contribute to this issue are:

Is there anything we can do about this issue?