4 Coastal and marine environment

This chapter lists the questions about the coastal and marine environment that need to be addressed. It presents a summary of the analysis of the official data that addresses those questions, followed by the initiatives to address coastal and marine environment information needs.

New Zealand's marine environment is one of the largest in the world, containing an archipelago of more than 330 islands with 18,218km of coastline (Ministry for the Environment, 2008). New Zealand's ocean floor area is over 20 times the size of our land mass and is one of the largest of any nation. New Zealand's marine environment is divided into different management zones: the Territorial Sea, the Exclusive Economic Zone, and the extended continental shelf.

This vast marine area contains a range of ecosystems, from the shoreline to the deepest trenches, and from subtropical to sub-Antarctic waters that support a wide range of marine biodiversity.

New Zealand has a rich diversity of marine habitats, which provide homes to over 15,000 known species. Scientists estimate there may be as many as 65,000 marine species in New Zealand waters. Our isolation means many of these species are not found anywhere else in the world.

Scientists estimate that as much as 80 percent of New Zealand's indigenous biodiversity may be found in the sea. Yet, less than 1 percent of our marine environment has ever been surveyed. On average, seven new marine species are identified every fortnight (Department of Conservation, nd).

Māori are also interested in the coastal and marine environments, such as reserves and customary fishing areas.

New Zealand's coastal and marine environment contributes to the economy through fishing, aquaculture and offshore mineral extraction. The wider value of the coastal and marine environment extends to tourism, scientific research, recreation, transport, and wider ecosystem services.

Environmentally responsible realisation of resources would benefit New Zealand. To do this, we need to gather data to enhance the baseline knowledge of the region and the growth of technical expertise. New Zealand has the opportunity to gather this data now. The data will be essential in guiding resource-management decisions. These decisions will contribute to achieving economic growth and environmental conservation, and minimising usage conflicts.

Coastal and marine environment questions

This section presents the enduring question and the supplementary enduring questions on coastal and marine environment.

Enduring question

How is the quality and use of our marine environment changing and what is the impact of human activity, including resource use, on the marine environment?

Supplementary enduring questions

A. What are the spatial and temporal biophysical[1] trends in the coastal and marine environment[2] and how are these predicted to change in the future?

B. What is the current use of natural resources[3] in the coastal and marine environment, what is the intensity of this use, how is this use changing spatially and temporally, and how is it predicted to change in the future?

C. What ecosystem services[4] are currently provided by New Zealand's coastal and marine environment and how are these predicted to change in the future?[5]

D. What is the impact of human activity[6] on the coastal and marine environment, including the cumulative effects on its resilience[7], and how is this changing over time?

E. What is the current relationship[8] between Māori and the coastal and marine environment, how is this changing, and what is the impact of human activity, resource use, and climate change on this relationship?

F. What is the conservation and environmental protection effort[9] for the coastal and marine environment?

Notes

1. Biophysical environment includes the physical environment and the biological life forms within the environment, including conditions and other variables that affect the relationship between life forms and their physical environment.

2. Coastal and marine environmental includes the areas of the world usually covered by or containing sea water, including seas and oceans, harbours, river estuaries, salt-water marshes and mangroves, and coasts and beaches – including biological and physical elements such as water temperature, salinity, and the composition and spread of marine species.

3. Natural resources include renewable and non-renewable resources in the coastal and marine environment such as fish, mineral and gas reserves, and the resources supporting aquaculture.

4. Ecosystem services are generally grouped into four main types – provisioning services (eg providing food), regulatory services (eg when oceans act as carbon sink), supporting services (eg nutrient cycling), and cultural services (eg the enjoyment visitors gain from marine reserves).

5. We consider ecosystem services provided by terrestrial and freshwater environments under the ecosystems and biodiversity topic.

6. Including resource use, climate change, pollution, invasive species, and waste assimilation.

7. Resilience means the ability to recover readily from some shock or disturbance, adjust to change, or recover from a catastrophic failure in a system.

8. The relationship between Māori and the coastal and marine environment includes the impact on taonga (treasured) species.

9. Environmental protection effort includes remediating environmental damage, resource management, expenditure, areas protected under regulation and legislation, damage avoidance, research, and minimising natural hazards.

Gap analysis

Table 8 summarises how well official information (including Crown research institute data) informs the supplementary enduring questions on coastal and marine environment. See appendix 3 for details of the analysis process.

Table 8

How well official data informs supplementary enduring questions on coastal and marine environment

Supplementary enduring question (SEQ)	Question topic	Level at which official data informs SEQ
A	Biophysical trends	Medium
B	Current and future use of natural resources	Low
C	Ecosystem services	Low
D	Impacts of human activities	Low
E	Relationships between Māori and the coastal and marine environment	Low
F	Conservation and environmental protection effort	Low

Four data sources scored moderately as informing one or more of the supplementary enduring questions:

- statistical/sustainability information on fish stocks
- national aquatic biodiversity information system
- main catch/effort database
- trawl survey database.

Coastal and marine environment initiatives

This section presents the coastal and marine environment initiatives by priority and a discussion of each in detail.

CM1 Identify baseline habitat state

The highest-priority initiative identified in this workshop is to identify the baseline state of habitats in New Zealand. This initiative specifies baseline-data gathering in the coastal and marine environment to assess the capacity of habitats to withstand pressures from climate change and other activities in the New Zealand context (eg. fishing, mining, and energy generation).

Essential to this initiative is achieving an agreed definition of the baseline and its parameters.

These baseline parameters could include:

- water column and seafloor characteristics
- water composition (including productivity and pH)
- water temperature

- ecosystem health
- biodiversity
- benthic habitats (ie physical and biotic)
- sensitive habitats
- fish populations.

Key benefits from this initiative are:

- better understanding of the biophysical baseline of New Zealand's coastal and marine environment
- improved mapping of our marine resources, including a systematic complete mapping of the New Zealand seabed in the Exclusive Economic Zone and the continental shelf. Mapping benthic habitats will enhance our understanding of sensitive habitats and the environmental constraints on marine resource use.

CM2 Expand statistical governance over coastal and marine data

Priority initiative 2 is to create a statistical governance group for coordination, facilitation, and decision-making among data custodians, policymakers, researchers, and other stakeholders in the coastal and marine environment.

The benefits of having a statistical governance group include:

- improve coordination of gathering, custodianship, and information sharing between government agencies involved in marine protection
- reinforce the open government initiative to make existing data readily available
- improve understanding of coastal management under the New Zealand Coastal Policy Statement
- understand the extent of coastal development and demand, gather information on subdivisions resource consents, and develop an online system to monitor this.

Intrinsic to this initiative is the whole-of-government integrated research plan linking research to this domain plan. This initiative will link with initiatives currently underway in the Natural Resources Sector (NRS).

CM3 Review existing datasets

Review existing datasets to identify priorities for integrating them, acquiring future data, and having wider access to existing data. This initiative requires coordination between and unrestricted access to all datasets. This initiative is supported by initiative CM2, expand statistical governance over coastal and marine data.

This review can check for overlaps in effort, and see if any datasets can be more useful with only minor changes. Preliminary work under the Ministry for Primary Industries' Marine Environmental Monitoring Programme Project is almost complete and could be a starting point for any future development. A critical requirement is making existing data readily available through expanding data access for national use. Making more use of existing data sources, such as samples, specimens, acoustic readings, cores, or video footage adds more value to these existing datasets.

This initiative will identify databases that could be integrated to provide more than the sum of their parts. As an example, the trawl survey database and National Aquatic Biodiversity Information System could be integrated. Analysing these two databases could improve our understanding of trends in fishing and its impacts on the environment.

Building inter-operability between environmental, economic, social, and cultural datasets will encourage improved integrated policy and decision-making, which is transparent, robust, and supports the resilience of the coastal and marine environment.

CM4 Integrate current marine research and initiatives

Integrate marine research and initiatives across government, for example, the NRS research strategy; Ministry for Primary Industries, Department of Conservation, and Ministry of Business, Innovation, and Employment investment; and NIWA's MV *Tangaroa*. Maximising these efforts can clarify the approach to integrated coastal and marine research. A whole-of-government research plan, which the NRS could lead, can address the gaps raised by this domain plan and recognise other research and initiatives.

Initiative CM2, expand statistical governance over coastal and marine data, can support the coordinated decision-making on research and initiatives. This initiative can build on existing activities and outcomes, such as the Ministry for Primary Industries-funded Marine Environment Monitoring Programme. This programme can ensure the integrity of core sites, promote standards, and fill gaps in knowledge by designing a strategic research plan for the study of marine mammals.

An integrated approach to data collection will enable us to assess and better understand long-term trends in the New Zealand coastal and marine environment. It will allow us to better understand marine variability and assess marine ecosystem resilience. Creating a marine project meta-database of all government marine projects and reports help us integrate current research and new initiatives, such as that being done under the Marine Environment Monitoring Programme.

We need to ensure that long-term marine research and data collection strategies occur across national and regional government boundaries. Expanding from national reporting to international reporting has value, and aligning with international standards can also be thought of as 'good world citizenship'.

CM5 Complete Ocean Survey 20/20 project

The Oceans 20/20 project is a Government initiative, which aims to provide New Zealand with better knowledge of its ocean territory, including the Exclusive Economic Zone, Continental Shelf, and the Ross Sea region.

Further work on the sub-projects of the Ocean Survey 20/20 will strengthen statistical knowledge of New Zealand's ocean territory (sea floor, water column, subsurface, and atmosphere).

The benefits of a completed Oceans 20/20 project would be a fuller understanding of coastal and marine environment characterisation.

The Oceans 20/20 project includes:

- having a more comprehensive information base on the character of the nation's sea-floor, oceanography, and ocean resources, both physical and biological
- having a robust and expanding knowledge base on the nature and distribution of marine biodiversity, from the coast and estuaries to the deep sea
- generating a considerable body of new scientific data on an unprecedented scale, providing ongoing opportunity for research and development in marine sciences
- contributing to the sustainable management of critical ecosystem services and important economic and biological resources
- mapping ocean resources that will support effective marine management in the same way that mapping New Zealand's land area has delivered extensive benefits for land management
- having greater ability to predict how these ecosystems will respond to future use pressures and management intervention.

CM6 Produce a System of Environmental and Economic Accounting account of coastal and marine mineral and energy resources

Produce a System of Environmental and Economic Accounting (SEEA) account of coastal and marine mineral and energy resources. This account will be part of a suite of SEEA accounts on the environment and economy produced by Statistics NZ in partnerships with data providers. This initiative requires resources, commitment, and planning from Statistics NZ and information from the NRS and additional parties.

Building this full account of New Zealand's marine and energy resources using an internationally comparable method would provide useful information to New Zealand.

CM7 Develop national spatial and temporal monitoring

Develop national spatial and temporal monitoring of the coastal and marine environment through the national Marine Environment Monitoring Programme. By doing this, we will be able to assess long-term trends and cycles and the variability of biological, physical, and chemical properties of the sea.

This initiative requires resources and combined efforts among the Natural Resources Sector.

Spatial and temporal monitoring will enhance our understanding of the following trends in the coastal and marine environment:

- What effects will climate change have on the marine environment, including effects of sea-level rise on coastal productivity and changes in oceanic currents on plankton production? The Marine Environment Monitoring Programme has already completed lots of the ground work.
- What is the connection between the New Zealand ocean system and the bigger drivers (eg. the Antarctic Marine processes)? New Zealand Antarctic Research Institute is looking at this connection.
- The potential for temperature and chemistry changes in the coastal and marine environment to affect and be affected by aquaculture. Ministry for Primary Industries is examining this.
- Assessing the vulnerability of marine species due to changes in water temperature and chemistry and link this to biodiversity changes.
- Assessing fish populations.
- Assessing biosecurity risks due to changes in the marine environment.

CM8 Expand data access and interpretability

Expand data access and interpretability for national use.

This initiative supports the New Zealand Government Open Access and Licensing (NZGOAL) framework, a government initiative to make existing data readily available for reuse by others. Achieving this initiative requires extensive coordination and agreement between many parties.

CM9 Increase data mining

Increase data mining to make more use of existing data and interpretation.

Making more use of existing data will provide more return on any investment. It will also give data users greater detail and more information.

Existing data sources may be from the Marine Environment Monitoring Programme and other initiatives, such as Tier 1 statistical development.

CM10 Improve monitoring of marine protected areas

Improve monitoring of marine protected areas and marine reserves, which may help:

- measure the response to protection of species and habitats in marine protected areas
- understand the impacts of extractive activities outside protected areas
- provide a nationwide picture of the state of New Zealand's marine protected areas, including aspects such as location, scale, and representation.

Monitoring marine protected areas, along with strong national spatial and temporal monitoring (initiative CM7), will also help in setting thresholds, limits, and tipping points for marine environment ecosystems, especially those related to activities and the use of resources and ecosystem services.

Overall, this initiative will analyse existing efforts for conservation and environmental protection, and look at opportunities for integrating data and filling gaps of areas needing protection. The Department of Conservation and Ministry for Primary Industries already work together in this area.

CM11 Complete an assessment and valuation of marine resources

Complete a strategic environmental assessment of ocean resources. This includes assessing and valuating marine resources, such as mineral, fishing, and other assets. It could also include an assessment and valuation of marine ecosystem services.

Related to this initiative is CM6, produce a System of Environmental and Economic Accounting (SEEA) of coastal and marine mineral and energy resources. However, further SEEA accounts will be needed to assess and value non-mineral or energy marine resources.

CM12 Identify priority monitoring sites

Identify priority monitoring sites for environmental variables. These sites may be needed for other initiatives, for example, CM5, complete Ocean Survey 20/20 project, and CM7, develop national spatial and temporal monitoring.

CM13 Undertake baseline mapping

Undertake systematic baseline mapping, which may be important to and needed as part of other initiatives, for example, CM7, develop national spatial and temporal monitoring, CM1, identify baseline habitat state, and CM5, complete Ocean Survey 20/20 project.

CM14 Conduct horizon scanning

Conduct foresight and horizon-scanning and produce papers on key emerging issues, including cost-benefit analysis.

CM15 Improve international reporting alignment

Align New Zealand reporting with international reporting. The objective is to maintain and improve our international reputation by improving data use and alignment to national and international commitments.

CM16 Assess coastal vulnerability

Assess the vulnerability of economic, cultural, social, and environmental assets in coastal areas to sea-level rise and storm surge. This initiative is linked to Ministry of Business, Innovation and Employment's Natural Hazards Research Platform.

CM17 Improve resource information reuse

Make better use of existing samples and resources, for example, seabed footage. This initiative relates to initiative CM9, increase data mining.

CM18 Map and characterise benthic habitats

Map and characterise all, or a representative sample, of New Zealand benthic habitats. This initiative is included in CM1 Baseline habitat state and links to CM5, complete Ocean Survey 20/20 project.

Coastal and marine environment initiatives table

Table 9 lists the coastal and marine environment initiatives by priority, estimates of their complexity, and the supplementary enduring questions they address.

Table 9

Coastal and marine environment initiatives by priority, complexity, and supplementary question (SEQ) addressed

Initiative number	Initiative name	Priority	Complexity	Helps inform which SEQ
CM1	Identify baseline habitat state	1	Highly complex	A, B, D, E
CM2	Expand statistical governance over coastal and marine data	2=	Highly complex	All
CM3	Review existing datasets	2=	Moderate	All
CM4	Integrate current marine research and initiatives	4=	Moderate	All
CM5	Complete Ocean Survey 20/20 project	4=	Moderate	A
CM6	Produce a SEEA of coastal and marine mineral and energy resources	6	Moderate	B
CM7	Develop national spatial and temporal monitoring	7=	Highly complex	A, D

Table continued next page

Table 9 continued

Coastal and marine environment initiatives by priority, complexity, and supplementary question (SEQ) addressed

Initiative number	Initiative name	Priority	Complexity	Helps inform which SEQ
CM8	Expand data access and interpretability	7=	Highly complex	All
CM9	Increase data mining	7=	Moderate	All
CM10	Improve monitoring of marine protected areas	7=	Moderate	F
CM11	Complete an assessment and valuation of marine resources.	11	Highly complex	B
CM12	Identify priority monitoring sites	12	Moderate	A
CM13	Undertake baseline mapping	13=	Moderate	All
CM14	Conduct horizon scanning	13=	Moderate	All
CM15	Improve international reporting alignment	13=	Low	All
CM16	Assess coastal vulnerability	16=	Moderate	A, D, E
CM17	Improve resource information reuse	16=	Moderate	All
CM18	Map and characterise benthic habitats	16=	Moderate	A