



Appendix 1: Enduring questions

This chapter outlines the enduring questions and supplementary enduring questions by topic.

Topic 1 – Atmosphere

Enduring questions

What are the levels of air pollution in New Zealand and what is the consequential impact on ecosystems and human health?

To what extent has the stratospheric ozone layer over New Zealand been depleted, and what is the consequential impact on ecosystems and human health?

Supplementary enduring questions

A. What are the levels¹ and sources of air pollution² throughout New Zealand and how are they changing over time?

B. Who experiences poor air quality³ in New Zealand and what is the impact on their health?

C. What and where is the impact of air pollution on Māori, and how does the impact compare with that on the general population?

D. To what extent has the stratospheric ozone layer over New Zealand been depleted, and what is the impact on ecosystems and human health?

E. What is being done to reduce, mitigate, and prevent⁴ air pollution and stratospheric ozone layer depletion?

Notes

1. Levels cover, but are not limited to, average, peak, and exceeding air quality standards.

2. Includes rural and urban, natural and anthropogenic, sources of particulate matter. Odour and visual smoke are included, but indoor air quality and second-hand smoke are outside the scope of this domain plan.

3. Poor air quality can be defined by when air quality standards are exceeded. The definition of poor air quality also includes the impact of highest levels, and averages, for the air pollution sources described in note 2.

4. Includes expenditure on these activities to inform analysis of the costs, benefits, and value of environmental protection effort.

Topic 2 – Climate change

Enduring questions

How is New Zealand's¹ climate changing?

How are New Zealand's greenhouse gas levels² changing?

How are we adapting to the physical impact³ of climate change?

Which environments are most likely to be affected by climate change?

Notes

1. Includes the Ross Dependency and the Chatham Islands.
2. Refers to emissions and sinks.
3. Includes physical impact on sea temperature, sea level, ocean currents, river flows, and winter snow cover.

Supplementary enduring questions

- A. Where and how are New Zealand's climate and atmospheric composition changing?
- B. Where and how are New Zealand's anthropogenic greenhouse gas emissions and removals changing?
- C. What and where is the impact of climate change on Māori and Māori-owned assets?
- D. Where and how are ecosystems,⁴ people, and New Zealand institutions most affected by changes to climate and atmospheric composition, and how are they adapting?
- E. What greenhouse gas mitigation technologies and practices are we adopting?

Notes

4. Includes terrestrial, aquatic, and marine ecosystems.

Topic 3 – 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 biophysical¹ trends in the coastal and marine environment² and how are these predicted to change in the future?
- B. What is the current use of natural resources³ 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 services⁴ 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 activity⁶ on the coastal and marine environment, including the cumulative effect on its resilience⁷, and how is this changing over time?
- E. What is the current relationship⁸ 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 effort⁹ 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 environment includes 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 grouped into four main types – provisioning services (eg providing food), regulatory services (eg when oceans act as a 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.

Topic 4 – Ecosystems and biodiversity

Enduring question

To what extent is the native (indigenous) biodiversity of New Zealand being protected and sustained?

Supplementary enduring questions

- A. How and where is the diversity and condition of indigenous species changing?¹
- B. How and where is the diversity and condition of indigenous ecosystems changing?
- C. What impact does change to the diversity and condition of indigenous species and ecosystems have on natural capital² and the provision of ecosystem services?³
- D. What is driving the change⁴ to the diversity and condition of indigenous species and ecosystems, where does it occur, and how is it changing over time?

E. What ecosystem services⁵ are currently provided by New Zealand's terrestrial and freshwater environments, and how are these predicted to change in the future?

F. What and where is the impact of change to culturally significant indigenous taonga (treasured) species, mahinga kai (customary food gathering areas and practices), and ecosystems, and what is being done to protect and sustain them?

G. What and where is environmental protection effort⁶ being undertaken to protect and sustain the diversity and condition of indigenous species and ecosystems, including people and agencies, time and capital and how effective are the different efforts?

Notes

1. Changes include how and where the threats to indigenous biodiversity are changing, such as threats from exotic weeds and pests, human activity resulting in habitat loss, land use intensification, climate change, and air pollution.

2. Natural capital includes renewable and non-renewable resources in ecosystems (eg indigenous forests).

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

4. Changes include how and where the threat to indigenous biodiversity is changing (eg threats from exotic weeds and pests, human activities resulting in habitat loss, land use intensification, climate change, and air pollution).

5. Ecosystem services are grouped into four main types – provisioning services (eg providing food), regulatory services (eg when oceans act as a carbon sink), supporting services (eg nutrient cycling), and cultural services (eg the enjoyment visitors gain from marine reserves). Coastal and marine environment ecosystem services are considered in that Coastal and marine area.

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

Topic 5 – Energy

Enduring question

What is the environmental impact of New Zealand's generation, distribution, and use of energy, and to what extent are renewable options taken?

Supplementary enduring questions

A. What and where are New Zealand's current energy resources and what is the potential for future exploitation and development?

B. What and where is the environmental impact of energy¹ generation², distribution, and use in New Zealand?

C. What and where is the environmental impact through the life cycle³ of renewable energy generation, and which types of renewable energy best support New Zealand's sustainable development?

D. To what extent are energy conservation and energy efficiency options being taken, and where and how are these affecting the demand for energy?

E. What and where are the environmental-cultural risks and impact of energy generation, distribution, and use, for Māori, and how can they be minimised?

F. What and where is environmental protection effort⁴ being done to address the environmental impact of energy generation, distribution, and use?

Notes

1. Both non-renewable (includes, but is not limited to, coal, gas, and oil) and renewable (includes, but is not limited to, hydro, geothermal, wind, biogas, solar, tidal, and wave) resources.

2. Generation refers to extracting and capturing resources for productive use.

3. The life cycle covers the cumulative environmental impact of building power generation capacity, and maintaining, running, and decommissioning plant and equipment.

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

Topic 6 – Freshwater

Enduring question

How is the quality, abundance, and use of New Zealand's freshwater changing, and what is the impact on ecosystems and humans?

Supplementary enduring questions

A. What is New Zealand's freshwater¹ quality², what are the spatial and temporal trends,³ and how are these affected by climate change, human activity, and other pressures?

B. What is the quantity (stocks) of New Zealand's freshwater, what are the spatial and temporal trends, and how are these affected by climate change, human activity, and other pressures?

C. What is the use (flows) and allocation of our freshwater, what are the spatial and temporal trends, and how are these affected by climate change, human activity, and other pressures?

D. What impact does the change to quality, quantity, and use of freshwater have on ecosystems and humans?

E. What is the health⁴ of freshwater and freshwater mahinga kai (customary food gathering areas and practices) from a Māori perspective⁵, and how and why is this changing?

F. What, where, and how is environmental protection effort⁶ being done to maintain and improve freshwater?

Notes

1. Freshwater includes (but is not limited to) rivers, lakes, wetlands, rain, snow, ice, and ground water.
2. Quality includes measures of nutrient, heat, organic, sediment, macro-invertebrates, and bacteriological quality. Emerging contaminants, such as endocrine disruptors, may also be considered.
3. Trends include the general directions of the past and present, and predictions of future possibilities.
4. Health includes the look, sound, smell, and feel of freshwater, uses of the river, the abundance and diversity of mahinga kai, water quality, riverbank condition, water flow characteristics, and safety of the water to drink and other indicators.
5. At the catchment and site level.
6. Environmental protection effort includes remediating environmental damage, resource management, expenditure, areas protected under regulation and legislation, damage avoidance, research, and minimising natural hazards.

Topic 7 – Land

Enduring question

What are our land cover and land use profiles, how are they changing, what is driving these changes, and what is the consequential impact on New Zealand's soils, and natural and cultural landscapes, including urban environments and conservation lands?

Supplementary enduring questions

- A. What is New Zealand's land use, and how is this changing¹ spatially and temporally?
- B. What is New Zealand's land cover and how is this changing spatially and temporally?
- C. What is driving the changes² in New Zealand's land use and land cover?
- D. What is the current and potential future impact³ of land use and land cover change in New Zealand?
- E. What is the quality⁴ and quantity of New Zealand's soil and how is this changing spatially and temporally?
- F. What is the impact of land use and land cover profiles on Māori and Māori-owned land and how is this changing?
- G. What and where are New Zealand's protected areas,⁵ how are they changing, and what is the environmental protection effort⁶ done?

Notes

1. Changes in land use include land use intensification, change in soil quantity, and potential changes to land use.
2. Changes include market and non-market factors.

3. Impact of land use and land cover in New Zealand can extend to soils, freshwater, greenhouse gas emissions, natural hazards, biodiversity, coastal environments, ecosystem services, and the loss of versatile soils (fertile, well-drained, slopes less than 12 degrees valuable for food production, and an important natural resource) to urban development.
4. Soil physical quality could be judged against land use, with quality being regarded as meaning 'fit for purpose'. For example, even small patches of soil contaminated from past industrial or agricultural use may be of poor quality for urban residential land use, but of acceptable quality for some industrial use.
5. Protected areas include all lands legally protected for conservation purposes, including amenity areas, conservation parks, ecological areas, fixed marginal strips, government purpose reserves, historic reserves, local purpose reserves, national parks, private covenants (eg Queen Elizabeth II, Ngā Whenua Rāhui), recreation reserves, regional parks, scenic reserves, stewardship areas, wildlife management areas, and wildlife refuges.
6. Environmental protection effort includes remediating environmental damage, resource management, expenditure, areas protected under regulation and legislation, damage avoidance, research, and minimising natural hazards.

Topic 8 – Māori environmental statistics

Enduring question

From a Māori¹ perspective, why, where, and how is New Zealand's environment changing, and what impact is this having on Māori aspirations² and well-being?³

Notes

1. Māori includes individuals with a Māori cultural identity and ancestry (whakapapa); including Māori belonging to iwi / hapū / whānau (tribe / subtribe / family), marae, Māori organisations, urban authorities, kaitiaki (caretaking) groups, Māori landowners, Māori businesses, and Māori networks.
2. Aspirations include, but are not limited to, desired goals, preferences, and outcomes based on cultural values.
3. Well-being refers to, but is not limited to, cultural, spiritual, social, physical, economic, and political well-being.

Supplementary enduring questions

- A. How well are Māori represented in the governance and management of natural resources, and how effective is this representation for achieving desired outcomes for Māori?
- B. Where, why, and how are the abundance of taonga (treasured) species and mahinga kai (customary food gathering areas and practices) changing?¹
- C. Where, why, and how is the condition of taonga species and mahinga kai changing?
- D. What is the condition of sites of cultural, spiritual, and natural significance?²
- E. To what extent are Māori able to access natural and customary resources, and what, if any, are the impediments?

F. Where, why, and how are land cover and land use changing³ on Māori land through time?

G. Where and how are Māori practising and implementing kaitiakitanga (caretaking) across defined areas or regions?⁴

Notes

1. May include the presence/absence of such species or mahinga kai, the distribution/location, or the abundance/scarcity.
2. Can include significant sites and areas such as wāhi taonga and wāhi tapu (eg puke (hill), maunga (mountain), awa (river), manga (stream), roto (lake), repo (swamp), ara (pathway), marae (meeting area), pā (village) sites) at the discretion of iwi / hapū / whānau). Does not include highly confidential or sensitive areas.
3. Includes changes in areal extent of Māori land.
4. Includes land, air, freshwater, coastal, and marine areas.

Topic 9 – Materials and waste

Enduring question

How do production and consumption patterns in New Zealand affect waste generation and minimisation?

Supplementary enduring questions

- A. What and where are the effects¹ of production and consumption on New Zealand's environment?
- B. To what extent is New Zealand adopting technologies, production methods², and best practices that make more efficient use of natural resources, minimise waste, and reduce the impact on the environment from production and consumption?
- C. What and where is the total amount and composition of waste³ generated, recycled, and disposed of in New Zealand?
- D. What is the environmental impact of waste in New Zealand?
- E. To what extent are Māori values affected by current waste management practices?
- F. What environment protection effort⁴ is undertaken to reduce the impact of waste on the environment?

Notes

1. The effects of production and consumption include the physical flow of materials into, through, and out of the economy.
2. Production methods and practices to reduce waste and increase resource use efficiency include waste management, waste minimisation systems, technologies for achieving waste reduction, and improving natural resource use efficiency.
3. Waste includes hazardous waste; solid, liquid, and gaseous waste; and materials disposed of in landfill and dry fill.

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

Topic 10 – Mineral resources

Enduring question

What are New Zealand's on-shore and off-shore mineral resources, and what is the environmental impact of prospecting, exploration, production, refining, processing, and transporting the resources?

Supplementary enduring questions

- A. What and where are New Zealand's onshore and offshore mineral resources¹?
- B. What are the quantity, quality, and composition of these resources?
- C. What are the environmental constraints on exploration and development?
- D. What and where is the environmental impact of attaining² mineral resources?
- E. What mineral resources exist on Māori land and in tribal customary areas across New Zealand, both onshore and offshore?
- F. What, how, and where is environmental protection effort³ being done to understand, avoid, remedy, and mitigate the environmental impact of attaining mineral resources?

Notes

1. The difference between a resource and a reserve is that a resource has the potential for economic extraction. A reserve is limited to materials that can be extracted at a profit.
2. Attaining includes prospecting, exploration, production, refining, processing, and transporting.
3. Environmental protection effort includes remediating environmental damage, resource management, expenditure, areas protected under regulation and legislation, damage avoidance, research, and minimising natural hazards.

Appendix 2: Additional data sources

After the [Stocktake for the environment domain plan 2012](#) was published, several data sources within that were identified as informing additional enduring questions. For example, a data source listed in the stocktake as informing land was subsequently identified as also informing freshwater. This identification was made by subject matter experts during the gap analysis or in the topic workshops.

Table 24 lists these data sources. Note that the list is not exhaustive.

New data sources, identified after publication of the stocktake, are in table 25.

Table 24

Data sources in the stocktake

Data source	Data custodian	Topics informed	Data source topic origin
Solar UV-B database	<ul style="list-style-type: none"> Industrial Research Ltd (IRL) National Institute of Water and Atmospheric Research (NIWA) 	Climate change	Atmosphere
Airshed reporting	Ministry for the Environment (MfE)	<ul style="list-style-type: none"> Climate change Energy 	Atmosphere
Environmental health indicators	Ministry of Health	<ul style="list-style-type: none"> Climate change Energy 	Atmosphere
National Air Quality (nitrogen dioxide) monitoring programme	New Zealand Transport Agency	<ul style="list-style-type: none"> Climate change Energy 	Atmosphere
National climate database	NIWA	<ul style="list-style-type: none"> Freshwater Ecosystems & biodiversity 	Climate change
Environmental information relevant to monitoring climate change and its impacts	NIWA	<ul style="list-style-type: none"> Freshwater Ecosystems & biodiversity 	Climate change
Protected areas network – New Zealand	Landcare Research	Freshwater	Land
Agricultural production surveys/censuses	Statistics NZ	<ul style="list-style-type: none"> Freshwater Ecosystems & biodiversity 	Land
New Zealand freshwater fish database	NIWA	<ul style="list-style-type: none"> Freshwater Māori environmental statistics 	Ecosystems & biodiversity
Wetlands of ecological and representative importance	Department of Conservation	Coastal & marine environment	Freshwater
Ocean acidification time series	NIWA	Coastal & marine environment	In the stocktake appendix

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Table 24 continued

Data sources in the stocktake

Data source	Data custodian	Topics informed	Data source topic origin
S-map	Landcare Research	<ul style="list-style-type: none"> • Land • Ecosystems & biodiversity • Māori environmental statistics 	In the stocktake appendix
New Zealand fossil record electronic database	GNS Science	<ul style="list-style-type: none"> • Land • Mineral resources 	Climate change
LUCAS national forest permanent sample plot data	MfE	Land	Climate change
Freshwater ecosystems of New Zealand geo-database	DOC	Land	Freshwater
Snapshot of lake water quality in New Zealand	MfE	Land	Freshwater
Binary database of profiles – atmospheric composition database (particulates)	GNS	Energy	Atmosphere
Transport Monitoring Indicator Framework	Ministry of Transport	Energy	Atmosphere
Total column ozone measurements	NIWA	Energy	Atmosphere
Vertical ozone profile measurements	NIWA	Energy	Atmosphere
World Meteorological Organisation (WMO) and United Nations Environment Programme (UNEP) scientific assessments of ozone depletion and UNEP effects panel assessments	NIWA	Energy	Atmosphere
Binary database of profiles – atmospheric composition database (gases)	NIWA	Energy	Atmosphere
Greenhouse gas concentrations database	NIWA	Energy	Climate change
Scientific observer database	<ul style="list-style-type: none"> • Ministry for Primary Industries (MPI) • NIWA 	Ecosystems & biodiversity	Coastal & marine environment

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Table 24 continued

Data sources in the stocktake

Data source	Data custodian	Topics informed	Data source topic origin
Land Use Map	Landcare Research	Ecosystems & biodiversity	Land
Land Cover Database (LCB1,2, and 3)	MfE	Ecosystems & biodiversity	Land
New Zealand plant conservation network	New Zealand plant conservation network	Ecosystems & biodiversity	Appendix
National Aquatic Biodiversity Information System	MPI	Ecosystems & biodiversity	Coastal & marine environment
Biods (marine biodiversity and biosecurity) database	MPI	Ecosystems & biodiversity	Coastal & marine environment
Trawl survey database	MPI	Ecosystems & biodiversity	Coastal & marine environment
Snapshot of groundwater quality in New Zealand	MfE	Ecosystems & biodiversity	Freshwater
Freshwater organisms	NIWA	Māori environmental statistics	Freshwater
Marine reserve monitoring	DOC	Māori environmental statistics	Coastal & marine environment
Areas of coastal and marine environment	DOC	Māori environmental statistics	Coastal & marine environment
Marine pollution response services database	Maritime NZ	Māori environmental statistics	Coastal & marine environment
Main catch/effort database	• MPI • NIWA	Māori environmental statistics	Coastal & marine environment
Non-fish by-catch database	• MPI • NIWA	Māori environmental statistics	Coastal & marine environment
Recreational fishing database	• MPI • NIWA	Māori environmental statistics	Coastal & marine environment
Biodiversity Data Inventory metadata	DOC	Māori environmental statistics	Ecosystems & biodiversity

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Data sources in the stocktake

Data source	Data custodian	Topics informed	Data source topic origin
Biodiversity Data Inventory spatial data	DOC	Māori environmental statistics	Ecosystems & biodiversity
Marine species sighting database	DOC	Māori environmental statistics	Ecosystems & biodiversity
Island invasion incidents database	DOC	Māori environmental statistics	Ecosystems & biodiversity
Threatened environment classification	Landcare Research	Māori environmental statistics	Ecosystems & biodiversity
Predicted potential natural vegetation of New Zealand	Landcare Research	Māori environmental statistics	Ecosystems & biodiversity

Table 25 presents the new data sources identified after the stocktake was published.

Table 25

New data sources

Data source	Data custodian	Topics informed	Comment
Climate and Māori society webpages www.niwa.co.nz	National Institute of Water and Atmospheric Research (NIWA)	Climate change	May be out of scope
Background composition measurements excluding ozone www.niwa.co.nz	NIWA	Climate change	
Climate and chemistry-climate model simulations www.niwa.co.nz	NIWA	Climate change	
Continuous plankton recorder time series www.niwa.co.nz	Ministry for Primary Industries (MPI)	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Annual bottom trawl footprint data www.fish.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
ARGO (deepwater environmental monitoring) www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal and marine environment 	
Aquaculture monitoring www.fish.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Estuary monitoring www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Intertidal monitoring www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Ocean climate change atlas www.niwa.co.nz	NIWA	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Rocky reef monitoring www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Sandy beach monitoring www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
Sea grass/mangrove monitoring www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
University monitoring programmes www.mpi.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	

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Table 25 continued

New data sources

Data source	Data custodian	Topics informed	Comment
Marine protection in the Exclusive Economic Zone (benthic protected areas) www.fish.govt.nz	MPI	<ul style="list-style-type: none"> • Climate change • Coastal & marine environment 	
New Zealand Census of Population and Dwellings www.stats.govt.nz	Statistics NZ	Atmosphere	Question on type of heating used in homes
Time-series monitoring http://apps.linz.govt.nz/positionz/	Geospatial Office	Freshwater	
Māori database www.gns.cri.nz	GNS Science	Land	
Cadastral database www.gns.cri.nz	GNS Science	Land	
Meshblock database www.gns.cri.nz	GNS Science	Land	
Innovation in New Zealand Survey www.stats.govt.nz	Statistics NZ	Materials & waste	
Hazardous substance and new organisms application register www.epa.govt.nz	Environmental Protection Authority (EPA)	Materials & waste	
Controls database www.epa.govt.nz	EPA	Materials & waste	
Seal database www.gns.cri.nz	GNS	Mineral resources	
Petroleum spatial data extension www.gns.cri.nz	GNS	Mineral resources	
Well database www.gns.cri.nz	GNS	Mineral resources	
Taranaki 4D mapping database www.gns.cri.nz	GNS	Mineral resources	
Active source seismic datasets www.gns.cri.nz	GNS	Mineral resources	
Wireline log reference datasets www.gns.cri.nz	GNS	Mineral resources	

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Table 25 continued

New data sources

Data source	Data custodian	Topics informed	Comment
Stand-alone geospatial databases and data series products www.gns.cri.nz	GNS	Mineral resources	
Taranaki reservoir quality www.gns.cri.nz	GNS	Mineral resources	
New Zealand inventory of biodiversity www.niwa.co.nz	NIWA	Ecosystems & biodiversity	
Our environment www.mfe.govt.nz	Ministry for the Environment	Māori environmental statistics	Iwi/cultural environmental monitoring
Historic Places Register www.historic.org.nz	Historic Places Trust	Māori environmental statistics	



Appendix 3: Gap analysis process

This chapter presents the process adopted to complete the gap analysis. It shows an example of how the gap analysis was undertaken and finishes with lessons learned from that process.

The process

To help identify the information needs around our enduring questions and how well existing data informed the questions, we analysed the strengths, gaps, overlaps, and deficiencies of our data.

For this work, we asked subject matter and end-user experts to assess, for each of the questions and for each of the datasets:

- How well does this dataset inform us about that question?
- Given all the datasets, how well informed was that question overall?

Experts were given a spread sheet with the questions along the top, and the datasets listed down the side. They were asked to put a grade for each dataset with either zero, low, medium, or high to indicate how well they thought that dataset informed that question. Where a ranking couldn't be assigned (for example, where the expert didn't know enough about a particular dataset), they left the square blank.

Spreadsheets from all the experts were then combined using a text string to indicate the cumulative grading. The text string was B:0:L:M:H. The numbers in that string match a number assigned to the organisation that graded that data or question. The overall scores were listed at the bottom of the spreadsheet in a similar way.

Using the experts' scores, the following factors were used to assess how well the questions were informed:

- the number of organisations assigning each of the five grades in the 'overall' scoring row for this question
- the average scores across all datasets, for all organisations and each grading category
- the maximum grade given for each question by each organisation
- the weighted sum of the number of organisations scoring low (weight = 1), medium (weight = 3), and high (weight = 5) across all the questions and datasets.

These indexes were used to suggest an overall classification of the level at which each question was informed (low, medium, or high).

The gap analysis spreadsheets were also used to assess how useful each dataset was in informing all the questions. The process here was to count the various grades across a row, and then look for the highest number of 'highs' or 'mediums'. A search for the datasets that generally produced zeros or lows was also used to highlight datasets that were not useful in informing these questions. However, this is not an evaluation of the value of the datasets which may still successfully provide data for their intended purpose.

In the example below (see figure 1) on the climate change topic, 10 organisations responded to the requests to undertake the gap analysis.

The indexes showed that the first two paleoclimate datasets, New Zealand Paleontological Database and New Zealand Fossil Record File, had 23 zeros each for informing the climate change questions, indicating they may not be that useful in informing these questions.

Conversely, the Agricultural Production Survey had 11 ‘high’ scores, showing it is very useful in answering the climate change questions.

Question A ‘How is New Zealand’s climate changing?’ was highly informed, with six organisations agreeing that it was highly informed overall, and four organisations not providing a grade (ie the overall score was blank).

Figure 1

Gap analysis process spreadsheet for climate change

	A	B	C	D	E	F	G	H	
4		Climate Change	0:0:L:M:H						
5		New Zealand Paleontological Database	2:2:4:1:1	3:6:1:0:0	15:23:8:2:2			15:23:8:2:2	
6		New Zealand Fossil Record File (FRED)	2:3:3:1:1	3:6:1:0:0				15:23:8:2:2	
7		New Zealand Ice Core Research Facility	2:0:2:3:3	2:3:3:0:2				14:17:9:3:7	
8		New Zealand's National Communications under the United Nations Framework Convention on Climate Change	3:0:2:3:2	2:0:3:0:5				4:1:4:0:1	3:0:6:0:1
9		Net Position Report	4:4:1:1:0	3:0:1:1:5	4:4:1:0:1	3:4:1:1:1	2:1:2:3:2	18:13:6:6:9	
10		New Zealand's Greenhouse Gas Inventory	3:3:2:1:1	3:0:0:1:6	5:4:0:0:1	4:3:2:0:1	3:2:4:0:1	18:12:9:2:10	
11		National Land-use and Land-use Change Mapping	3:4:1:1:1	2:0:1:2:5	3:2:1:3:1	2:2:1:2:3	3:2:2:2:1	13:10:6:10:11	
12			3:4:2:0:1	2:1:2:2:3	3:3:2:1:1	2:2:2:2:2	3:6:0:0:1	13:16:8:5:8	
13		B:0:L:M:H	3:4:2:1:0	3:0:1:2:4	5:4:0:0:1	4:4:2:0:0	4:2:1:2:1	19:14:6:5:5	
14			3:4:1:0:2	3:6:1:0:0	4:1:2:2:1	4:1:2:2:1	4:5:1:0:0	18:17:7:4:4	
15			3:0:0:2:5	4:5:0:0:1	4:0:2:3:1	4:1:2:1:2	4:5:1:0:0	19:11:5:6:9	
16		Environmental information relevant to monitoring climate change and its impacts	4:0:1:3:2	3:4:0:3:0	5:0:2:2:1	3:0:2:2:3	5:4:0:1:0	20:8:5:11:6	
17		Greenhouse Gas Concentrations Database	3:0:0:2:5	3:0:3:1:3	5:4:1:0:0	4:3:3:0:0	4:4:1:0:1	19:11:8:3:9	
18		Surface Radiation Measurements	4:1:2:1:2	4:4:2:0:0	5:5:0:0:0	4:4:1:1:0	4:5:1:0:0	21:19:6:2:2	
19		New Zealand Glacier Inventory	4:2:1:1:2	3:6:1:0:0	5:2:3:0:0	4:1:2:1:2	4:6:0:0:0	20:17:7:2:4	
20		Permanent Plot Sample Database	4:4:1:0:1	3:1:2:0:4	5:2:1:1:1	4:1:2:1:2	3:4:1:1:1	19:12:7:3:9	
21		Secondary Sources - Atmosphere							
22		Binary Database of Profiles – Atmosphere Composition Database (Particulates)	3:1:2:2:2	3:4:0:1:2	5:4:1:0:0	4:4:2:0:0	4:5:0:1:0	19:18:5:4:4	
23		Transport Monitoring Indicator Framework (TMIF)	4:5:0:0:1	5:1:2:1:1	5:4:0:0:1	3:1:3:2:1	3:3:1:1:2	20:14:6:4:6	
24		Total Column Ozone Measurements	4:0:2:0:4	5:3:1:0:1	6:3:1:0:0	5:3:2:0:0	4:5:0:1:0	24:14:6:1:5	
25		Vertical ozone profile measurements	4:0:2:0:4	5:3:1:0:1	7:2:1:0:0	5:3:2:0:0	4:5:0:1:0	25:13:6:1:5	
26		Binary Database of Profiles – Atmosphere Composition Database (Gases)	3:0:2:1:4	4:1:2:1:2	6:3:1:0:0	5:3:2:0:0	3:5:1:0:1	21:12:8:2:7	
27		Secondary Sources - Land							
28		Nationally Significant Soil Database	3:4:2:0:1	3:3:2:1:1	4:2:4:0:0	5:2:1:1:1	4:5:1:0:0	19:18:10:2:3	
29		Farm Monitoring Programme	4:2:3:0:1	5:3:0				24:7:7:4:8	
30		National Exotic Forest Description (NEFD)	4:4:2:0:0	5:2:0				18:10:8:5:9	
31		Agriculture production census/survey	4:4:1:0:1	5:3:0	20:10:8:1:11			20:0:3:1:11	
32		Secondary Sources - Energy							
33		Domestic Travel Survey (DTS)	4:6:0:0:0	4:0:3:1:2	4:4:2:0:0	3:2:3:1:1	3:1:3:2:1	18:13:11:4:4	
34		Vehicle Fleet Statistics	4:5:1:0:0	3:0:2:3:2	4:4:2:0:0	4:3:1:1:1	3:1:2:2:2	18:13:8:6:5	
35		New Zealand Ongoing Household Travel Survey	4:6:0:0:0	3:1:3:2:1	4:4:2:0:0	3:3:2:1:1	3:1:2:2:2	17:15:9:5:4	
36		Secondary Sources - Ecosystems and Biodiversity							
37		Natural Heritage Management System (NHMS)	4:4:1:0:1	5:2:1:1:1	5:2:2:0:1	4:1:2:1:2	4:3:1:2:0	22:12:7:4:5	
38		National Vegetation Survey Databank (NVS)	4:4:1:0:1	4:2:2:0:2	4:3:1:1:1	4:2:1:1:2	4:4:2:0:0	20:15:7:2:6	
39									
40		Overall score for this question gis	4:0:0:0:6	4:0:0:0:6	3:0:1:1:5	4:0:3:3:0	3:0:4:2:1	3:0:3:2:2	17:0:11:8:14
41		Column average totals	5:3:1:1:2	5:2:1:1:2	6:3:2:1:1	5:2:2:1:1	5:4:1:1:1		
42		Number organisations who had a	1:0:0:2:6	0:1:0:0:8	1:0:2:4:2	0:0:2:2:5	0:1:1:3:4		
43		Column total	38	45	181	330	250		
44			H	H	M	H	M		
45		Suggested Overall Score							

Lessons learned

We learned several lessons from the gap analysis.

We found that some experts graded each dataset by its ‘value’ rather than how well the dataset informed the questions. That is, they said ‘this dataset is highly valuable’ rather than ‘this dataset tells us a lot about the question’. For example, knowing where the petroleum reserves are is highly valuable, but only tells a little about the question ‘Where and what are New Zealand’s mineral resources?’ This meant there were more ‘highs’ in the columns than were represented in the overall score.

The enduring questions are complex. Often, an enduring question would be made up of multiple questions. This made it very hard to earn overall high scores. There may have been instances where part of an enduring question was well informed, but not all of it.

The different scoring indexes we used in the gap analysis process showed different results. This made it hard for us to assign an overall score. This issue is generally a reflection of the 'value' problem listed above. We found that the most useful indicator was from the 'overall' score, that is, whether a question had a low, medium, or high overall score.

Despite these limitations, the gap analysis process showed how current information informed the supplementary enduring questions. This was reflected in the comments that were forthcoming in the workshops, where the foibles in the analysis were acknowledged and the conversation moved on. As the analysis was primarily there as a conversation starter, it served a 'fit for purpose' function as initiating thinking and discussions in the workshops on the prioritised initiatives.



Appendix 4: Workshop process

After the gap analysis process, we held nine topic workshops and a hui for the Māori environmental statistics topic. The aim of the workshops was to seek initiatives to address the issues identified by the gap analysis. These workshops were co-facilitated by a Statistics NZ staff member and a skilled independent facilitator.

The first step was to make clear to everyone the purpose and processes involved in the environment domain plan. This included highlighting the wide consultations held to create the enduring questions, the stocktake, and the gap analysis.

After this, the topics' enduring questions and the gap analysis results were presented (see appendix 3, Gap analysis process).

The independent facilitator then sought everyone's initial reactions to the gap analysis results. These reactions were written on a whiteboard, which began the process of identifying the issues from the gap analysis. It also helped explain the various 'positions' held by the workshop participants.

The next part of the workshop was a facilitated discussion, in which the issues were further teased out and logged on the whiteboard.

To begin the process of finding the initiatives needed to address the identified issues, individuals were instructed to write ideas onto 'stickies'. These were then shared in small groups and then reported back to the main session, with the stickies placed in clusters of related themes on the wall.

Sentences summarising the various clusters were then crafted by the group (using the facilitators to wrangle the ideas) onto a whiteboard. These sentences became the initiatives.

Prioritising these initiatives was achieved by giving each organisation five votes (coloured sticky dots) that could be placed on the board against any initiatives they thought should be a priority.

The resulting high-priority initiatives were highlighted, followed by a presentation on the future steps for the domain plan.

Workshop participants were informed of the next steps for the domain plan and their potential involvement in the initiatives.



Appendix 5: Participants

This chapter presents the list of participants involved in developing the environment domain plan.

Statistics NZ led the process in partnership with the Ministry for the Environment and the Department of Conservation. Other agencies and organisations have an interest in New Zealand's environmental statistics, whether as users, producers, or data custodians. Their level of involvement throughout the domain plan process has varied.

Central government

Ministry for the Environment

Department of Conservation

Ministry for Primary Industries

Ministry of Business, Innovation, and Employment

Ministry of Business, Innovation, and Employment – Science, Skills and Innovation:
Science Investments

New Zealand Petroleum and Minerals

Ministry of Health

Ministry of Transport

New Zealand Transport Agency

Maritime New Zealand

Land Information New Zealand

Energy Efficiency and Conservation Authority

Environmental Protection Authority

Te Puni Kokiri

Ministry of Foreign Affairs and Trade

Electricity Authority

Local government

Local Government New Zealand

Auckland Council

Environment Canterbury

Environment Waikato

Dunedin City Council

Taranaki Regional Council

Wellington City Council

Greater Wellington Regional Council

Crown research institutes

National Institute of Water and Atmospheric Research

GNS Science

Landcare Research

Scion Research

Ag Research

Cawthron Institute

Plant and Food Research

Māori representatives

Kevin Prime

Gail Tipa

Percy Tipene

Gina Rangī

Garth Harmsworth

Rick Witana

Julian Jackson

Riki Ellison

Karen Coutts

Bob Hill

Tamati Olsen

Chris Insley

Other

New Zealand Climate Change Research Institute (Victoria University)

Allan Wilson Centre (Victoria University)

Federated Farmers of New Zealand

Emission Impossible

Genesis Energy

Fish and Game Council

World Wildlife Fund New Zealand

Seafood New Zealand

Environment Defence Society

Wastebusters

WasteMINZ

Climate Change Iwi Leadership Group

Freshwater Iwi Leadership Group

Appendix 6: Environment domain plan history

This chapter presents the background to domain plans and the environment domain plan in particular. The topics are discussed here, including how the Māori environmental statistics topic developed. Finally, a success story highlights how the domain plans can be used.

Domain plans

The Official Statistics System (OSS) includes all government agencies led by Statistics NZ. In 2003, a review of the OSS recommended that Statistics NZ take a greater role in leading the system.

This greater leadership role drove Statistics NZ to create new and review existing domain plans. This increased attention resulted in the environment domain plan.

The environment domain plan

Frameworks were discussed for domains plans across the social, economic, and environmental domains. Three steps were outlined for them.

The steps for the environment domain plan are:

- **demand for information** – a description of the information needed (enduring questions)
- **supply of data** – documentation of existing data sources (stocktake)
- **statistical development activity** – a prioritised list of statistical development activities (prioritised initiatives).

The environment domain plan process followed these three steps (for more information see the 'Process for developing this domain plan' section under 'Snapshot of the environment domain plan' chapter).

Topic areas

Statistics NZ, the Ministry for the Environment, and the Department of Conservation agreed on and developed 10 topic areas for the environment domain plan (see chapter 1, Introduction).

One of the first topics was environmental protection effort. This topic was intended to cover matters such as risk mitigation, resource management, and protection expenditure. While the boundaries between topic areas are somewhat arbitrary (for example, ecosystems and biodiversity occur on land and in freshwater), it was reasoned that environmental protection effort was strongly interwoven into all of the other nine topics. So it was decided that environmental protection effort would not be a topic on its own but instead be absorbed into the other nine topics. Environmental protection effort is reflected in the supplementary enduring questions, with each set of topic questions including a designated question on environmental protection effort.

As well as having a question on environmental protection effort, each topic includes a Māori-themed question. However, after consultation with the Māori Statistics Advisory team, it was decided that these questions only have a 'Crown view' flavour to them, and for completeness, the environment domain plan should capture the more holistic Māori views. The Māori environmental statistics topic was created to capture wider Māori views.

The scope of this topic was purposely broader than the other nine topics to include the cultural aspects of the environment from a Māori perspective.

Success story

Now that the environment domain plan is complete, the key challenge is to see the initiatives realised. The [Domain plan for energy sector 2006–2016](#) is a good example of what a domain plan can achieve. It proposed many development initiatives, one of which was on measuring energy end-use. This initiative led to the formation of the [Energy Use Survey](#), which is currently produced by Statistics NZ.

The next phase of the environment domain plan will be to work with the right parties to act on the initiatives, and to create stories such as the example provided by the energy domain plan.