Who are we?

The Groundwater Forum members are scientists and technical staff from regional councils and unitary authorities who work on groundwater.

We are one of many Special Interest Groups (SIGs) under the overview of the Resource Managers Group, while the entire SIG network is overseen by the Regional Chief Executive Officers. The regional sector also has a Science Advisory Group who, with a view to the science funding framework, advise how Councils can pursue high quality, relevant research, and timely and appropriate knowledge transfer mechanisms.

The Groundwater Forum acts as a source of cross organisational collegial advice, able to network people to fill gaps, build knowledge and share experiences. The scope of our members' work includes monitoring, investigations, communication and input to policy and resource consents. We work closely with researchers (CRIs and other research agencies) and with government departments, particularly the Ministry for the Environment, Ministry of Primary Industries, and the Science and Technology section of the Ministry of Business, Innovation and Employment (MBIE). We can commission our own knowledge transfer and tool development through MBIE's Envirolink fund.

Research design

At a workshop to develop and test groundwater science priorities, it became clear that the research design and the implementation pathways provided are critical to uptake of research by regional councils.

The way research is conceptualised, carried out and communicated is as important as the research questions. We have separated the research design (the "how") from the research questions (the "what").

The Groundwater Forum has identified seven elements of research design that make groundwater research most useful to regional councils.

Seven essential elements to be included in research design that make groundwater research most useful to regional councils.

The Research Science and Technology Strategy has four goals and 10 priorities

Goal 1
To provide timely, authoritative and respected direction to science research and funding.

Goal 2
To catalyse and enhance science delivery.

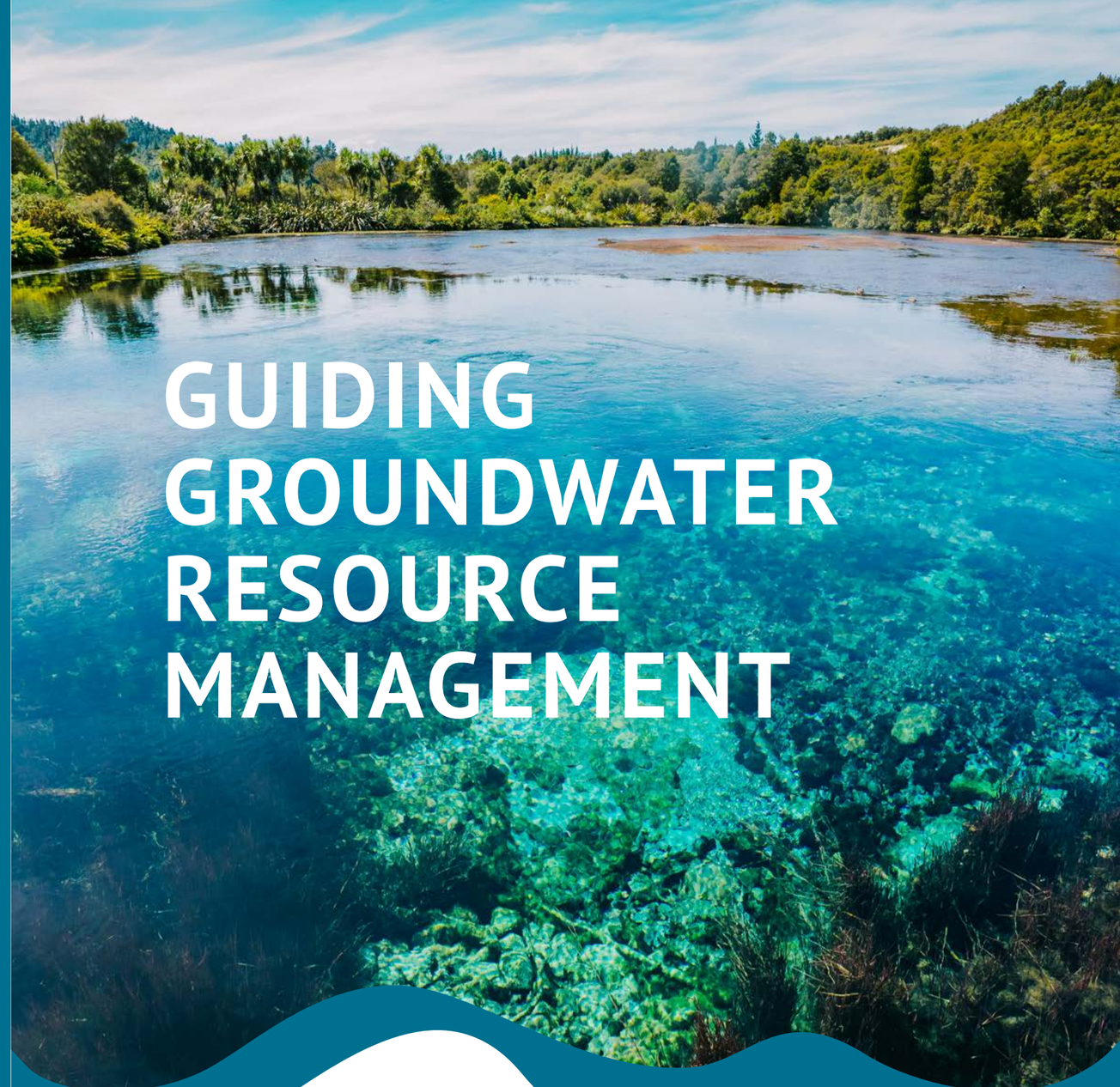
Goal 3
To facilitate science uptake.

Goal 4
To ensure an ongoing RS&T strategy process.

Priorities

1. Influencing government science direction
2. Incorporation of mātauranga Māori
3. Better science utilisation
4. Enhancing policy effectiveness
5. Integrating land and water science for enhanced sustainable production
6. Improving biosecurity and biodiversity
7. Better hazard risk management
8. Improving coastal management
9. Cross-cutting themes: Adaptation and mitigation to climate change and improving data management
10. Retaining and building science capability and capacity

This Groundwater Forum Science and Technology Strategy responds directly to Goal 1 and contributes to other goals and all the priorities.



GUIDING GROUNDWATER RESOURCE MANAGEMENT

GROUNDWATER FORUM
SCIENCE AND TECHNOLOGY STRATEGY **2021**

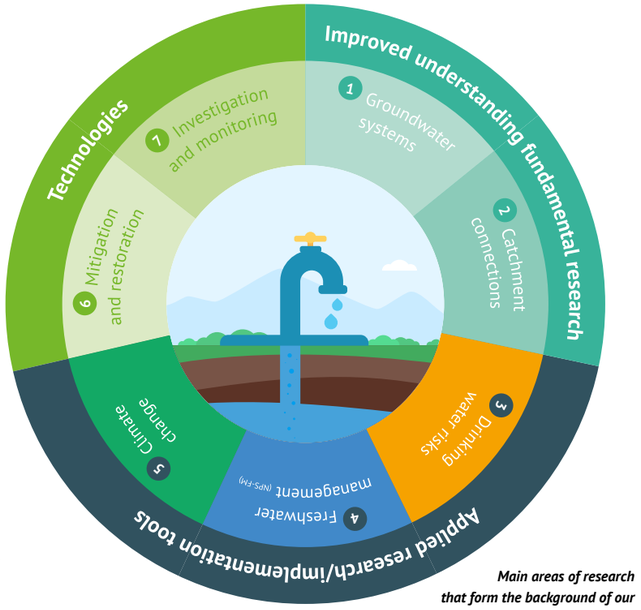
This document presents the strategy at a glance. To read the full strategy, go to:

https://www.envirolink.govt.nz/assets/Guiding-groundwater-resource-management-Groundwater-Forum-RST-strategy-2021-v2.pdf

Priority research questions

These pages summarise a set of research questions that are the "what" and complement the "how" research is undertaken, and implementation tools provided. Here we outline the set of 16 priority research questions grouped into 7 sections as follows.

Some of the priority questions have been the subject of past research and understanding continues to evolve. As research progresses, we are able to answer questions at a greater range of temporal and spatial scales and appropriate to more risks.



Main areas of research that form the background of our priority research questions.

The importance of groundwater to New Zealand

Main drivers for groundwater science and research in New Zealand, which also form the main drivers for the Groundwater Forum Science and Technology Strategy.

Main drivers for groundwater science research in New Zealand

Freshwater management
- Freshwater reforms: stop further degradation and reverse past damage
- Give effect to Te Mana o te Wai

Drinking water protection
- Taumata Arowai - Three Waters reforms
- Delineation of protection zones

Climate change
- Groundwater can both buffer and exacerbate the effects of climate change
- Risks to infrastructure from rising coastal groundwater levels

Improved understanding fundamental research

Research priorities 1 and 2 relate to improving understanding (fundamental research) on groundwater itself (research priority 1) and groundwater interactions with other parts of a catchment (research priority 2).

1 Understanding groundwater systems – essential for protecting Te Mana o te Wai

Improving our understanding of groundwater systems and how they function by researching Te Ao Maori view of groundwater systems, groundwater ecosystems, geology, hydrogeology and contaminant movement.

- ***Q 1.1*** How to provide for Māori outcomes for groundwater?
- ***Q 1.2*** What is the role and sensitivities of groundwater ecosystems?
- ***Q 1.3*** How to improve assessment of groundwater geology and hydrogeology?
- ***Q 1. 4*** How to predict the movement of contaminants within groundwater?

2 Ki uta ki tai - Understanding catchment connections of groundwater

Improving our understanding of the contribution groundwater makes to the health of a catchment through its connections with other water bodies, land use and cultural use.

- ***Q 2.1*** How does groundwater contribute to the health of surface water ecosystems?
- ***Q 2.2*** How to bring groundwater knowledge into ki uta ki tai catchment assessments?

Applied research and implementation tools

Research priorities 3 to 5 are more applied research questions arising as regional councils respond to three important drivers – drinking water (research priority 3), freshwater management and the NPS-FM (research priority 4) and climate change (research priority 5).

3 Groundwater and the influence on drinking water risks

Developing guidelines on protection zone delineation for drinking water supply bores and management of land use and risks within those zones.

- ***Q 3.1*** How to continually improve the delineation and management of drinking water protection zones and risks?

4 Groundwater and the National Policy Statement on Freshwater Management

Identifying how our existing data and research aligns with the National Policy Statement on Freshwater Management and the requirements on maintaining or improving water quality, setting environmental flows and levels, monitoring and freshwater accounting and how we can improve groundwater resource management to align better with these requirements.

- ***Q 4.1*** How should groundwater be considered in the setting of freshwater outcomes and environmental flows?
- ***Q 4.2*** How to consistently describe the current state of groundwater quality?
- ***Q 4.3*** How to integrate groundwater into ki uta ki tai monitoring?
- ***Q 4.4*** How to incorporate groundwater into freshwater accounting?

5 Groundwater and climate change

Improving our understanding of how groundwater systems will be affected by climatic change and sea level rise, when groundwater buffers or exacerbates the effects of climate change and what the implications are for other freshwater sources and users in the catchment.

- ***Q 5.1*** How will climate change alter groundwater flows and groundwater quality?
- ***Q 5.2*** How might groundwater assist in climate change resilience?
- ***Q 5.3*** How does groundwater influence natural hazards under climate change?

Technologies

The final two research priorities move more towards technologies: research priority 6 concentrates on mitigation and restoration options and research priority 7 on technologies for monitoring and investigations.

6 Mitigation and restoration techniques for groundwater

Identifying techniques to restore groundwater flows and quality including techniques that adjust land use, make use of natural features of groundwater and restore surface water flows and quality.

- ***Q 6.1*** What options are available to mitigate and restore groundwater quantity and quality?

7 Technologies for groundwater investigation and monitoring

Identifying cost-effective techniques that improve our understanding of the groundwater resource in relation to aquifer types, isotopes, emerging contaminants, flow rates, recharge, denitrification and groundwater biota.

- ***Q 7.1*** What cost effective technologies could be used to better understand groundwater?