

TARANAKI

2050

ENVIRONMENTAL SCIENCES

TRANSITION PATHWAY ACTION PLAN

venture

TARANAKI

Te Puna Umanga

ENVIRONMENTAL SCIENCES

TRANSITION PATHWAY ACTION PLAN

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Executive summary

In August 2019, Taranaki launched a co-designed Roadmap for how the region will transition to a low-emissions economy by 2050. A collaborative process has been used to further develop detailed actions across the 12 pathways the Roadmap identified. This document describes the actions required in the Environmental Sciences pathway and is primarily a record of an action framing process held with sector and regional participants in February 2020.

Introduction

This Transition Pathway Action Plan (TPAP) considers environmental sciences. ‘Environmental sciences’ is an umbrella term for a range of disciplines that relate to, and help us understand, the physical, chemical and biological components of the environment. In Taranaki these include diverse sciences – from geology to Mātauranga Māori to environmental chemical engineering (among many others).

The transition to a sustainable and low-emissions future envisioned by the Taranaki 2050 Roadmap requires high-quality evidence-based decisions and community buy-in to the need for change. Environmental science is an important part of delivering both of these prerequisites. The region needs to be measuring the right things, at the right time, in the right place and using this information to inform future decision making, as well as ensuring that this information is communicated transparently and simply. Environmental science also offers an opportunity to grow jobs and intellectual property in the region. There are areas where Taranaki is a leader, such as work going on in biodiversity with *Taranaki Taku Tūranga - Towards Predator-Free Taranaki*.

Action statement

The 2050 Roadmap vision informed the development of an action statement at the Environmental Sciences TPAP workshop. This was:

“Using our collective passion, enthusiasm and knowledge we will collaborate to effectively apply environmental science and Mātauranga Māori to inform a just transition to a low-emissions economy by 2050, and measure and validate our progress in restoring our taiao¹ with robust data and positive stories.”

When participants reviewed the action statement against where we are now, the following focus areas were apparent:

- 1) We need to integrate and increase relevant data to get a complete picture of the state of our environment across a wide range of measures;
- 2) We need to communicate effectively about environmental performance; and
- 3) We need talented people to continue to develop our environmental science research base.

The following actions have been identified:

¹ Taiao is an holistic and symbiotic concept that encompasses the world, Earth, natural world, environment, nature, country (translation provided by <https://maoridictionary.co.nz/>).

Action	Overview
<p>1. Robust integration and measurement to ensure a complete, regional, cross-agency picture of the state of the environment and improvement opportunities</p> <p>a) Measure regional greenhouse gas emissions in order to develop a regional response</p> <p>b) Develop a standardised monitoring and reporting system for environmental data</p>	<p>Good environmental management decisions need good data. This action revolves around developing the regional approach to environmental data management to provide a baseline for improvement targets, and to ensure effective incorporation of Mātauranga Māori values across the board.</p>
<p>2. Ensure effective communication of environmental performance and meaningful engagement of people</p> <p>a) Develop a collaborative community behavioural change programme to empower environmental data collection and action</p>	<p>Telling the story and bringing everyone along on the 2050 journey is an integral component of the Environmental Sciences kaupapa. We want our citizens to easily understand the current state of Taranaki's environment and actively participate in helping us work towards our low-emissions future. Everyone can play a role in the collection of, and research into, environmental data.</p>
<p>3. Nurture and build talented people to develop our environmental science research base and grow sustainable and decent 'green' jobs</p> <p>a) Strengthen the education pathway for applied environmental sciences</p> <p>b) Maximise opportunities for increased employment prospects in the environmental sciences sector</p>	<p>There are multiple environmental programmes underway which would benefit from a more coordinated approach, from primary through to tertiary levels of education.</p> <p>Without jobs, newly trained workers are unable to put their skills towards undertaking the work that needs to be done to transition to a low-emissions economy.</p>
<p>4. Research area: Work collectively to ensure our food production platform is based on sound environmental management and indigenous techniques, and provides decent and meaningful work in the rohe</p>	<p>A particular area of interest for this pathway is the synergy with the Food & Fibre transition pathway and the opportunity for best practice environmental management to be at the heart of food production in Taranaki.</p>
<p>5. Establish a funding plan for regional environmental improvement</p>	<p>There were lots of ideas about increasing education and awareness to create</p>

	<p>behavioural change with environmental benefits.</p> <p>This action would use a collaborative approach to sustainable long-term resourcing, which will help direct funding to where it is needed most and reduce administrative load on smaller organisations.</p>
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Next steps

The actions in this pathway action plan will feed into a wider programme that will work with all stakeholders to take actions forward.

Context

Aotearoa New Zealand is moving towards a low-emissions economy

The world has committed to taking action to lower greenhouse gas emissions.

In 2016, Aotearoa New Zealand ratified the Paris Agreement. Under this agreement, New Zealand needs to reduce emissions to 30% below 2005 levels by 2030.

Taranaki is seeking to lead New Zealand's transition to a low-emissions economy. The coalition government's announcement that it would grant new petroleum exploration permits only for onshore Taranaki and nowhere else² has fast-tracked the need to shift to a new energy future. New Zealand's two largest contributing sectors for emissions are agriculture and energy (including transport)³, both of which are key parts of Taranaki's economy.

While forestry has considerable potential to offset emissions, moving to a low-emissions economy will be a significant transition for all New Zealanders.

In the first half of 2020, the COVID-19 pandemic led to major restrictions on the movement of people, with subsequent impacts on economic activity. New Zealand, including Taranaki, were not immune. The economic shock is expected to significantly increase regional unemployment, reduce gross domestic product (GDP) growth and lead to economic restructuring in industries most impacted⁴. These impacts may take time to manifest themselves given the dynamic nature of Taranaki's regional labour market.

The past shows us that large transitions, such as lowering our emissions and the economic shock of COVID-19, can lead to a legacy of negative impacts for some. A just transition is about managing these effects to continue to build a fair and inclusive New Zealand. For Taranaki, it means ensuring we keep what is great about our region while planning for more people to share in these benefits.

A just transition, requiring system-wide behavioural and institutional change to ensure more parity in outcomes, is needed. Co-creation with communities, iwi, local and central government, businesses, educators, unions and workers is the cornerstone of the approach we are taking in Taranaki. The Taranaki 2050 project has been designed so that the change process is developed from the bottom up and ensure no-one across Taranaki's communities is left behind.

² <https://www.beehive.govt.nz/release/planning-future-no-new-offshore-oil-and-gas-exploration-permits> . Note that existing off-shore permits remain in place.

³ *The New Zealand Productivity Commission, Low-emissions economy: Final report, August 2018, p.30. Data from 2016 figures.*

⁴ *Infometrics, Economic Impacts of COVID-19 on the Taranaki Economy – Early Estimates, April 2020. The report was commissioned by Venture Taranaki and the New Plymouth District Council and anticipates an 8.5% contraction in regional GDP for the year to March 2021. Jobs are expected to decline 9.5% in the region.*

Our vision is for Taranaki to be a low-emissions economy

Our vision for Taranaki in 2050 has been co-designed by the region. It considers not just how our economy will change, but all aspects of our lives. It provides the opportunity to plan for inclusive growth as we transition to a low-emissions economy.

The Taranaki 2050 Roadmap was launched as a draft on 9 May 2019 at the Just Transition Summit in New Plymouth, and issued in its final form in August 2019 after further input from a wide range of people and organisations. Overall, the Roadmap development involved over 70,000 engagements.

The Roadmap is the first step taken by the region to develop a just transition plan to a low-emissions economy. The draft was the culmination of 29 workshops on 12 transition topics, plus surveys and community outreach. There was also a creative challenge and specialist workshops/engagement for youth. More than 14,000 people viewed the introductory online video, and the creation process engaged ideas from more than 1,000 people. The workshops mixed the diversity and talent of our region with specialist expertise from around the country.

Following the launch of the draft Roadmap, public consultation included visits to more than 40 locations with over 1,000 people. Twenty-five separate email submissions were received from individuals and organisations that represented thousands of individuals, as well as 135 submissions via our online interactive tool.

Themes of the 2050 Roadmap

The people of Taranaki have a vision for 2050 that includes:

- *A strong sustainable environment*
- *Education options that move and flex with a changing world*
- *Attractive jobs*
- *A similar lifestyle to the one we enjoy now, shared by all*
- *Leading the way in sustainable, low-emissions energy*
- *A region that looks out for and cares for itself and its people.*

While there were some divergent views on the future of Taranaki across participants, there were also many common themes. What unites us as a region is stronger than what divides us as a region. The main consistent themes were: **sustainability**, **inclusivity** and **enterprise**.

These themes reflect the Māori values of guardianship of people and our environment (similar to kaitiakitanga), the importance of community and caring (similar to manaakitanga) and the need for collective action in our move forwards (similar to kotahitanga). They also signify a focus on long-term outcomes that span generations.

The Roadmap picture follows. To read more about the co-design process used for creating the Taranaki 2050 Roadmap, visit www.taranaki2050.org.nz

Transition Pathway Action Plans (TPAPs)

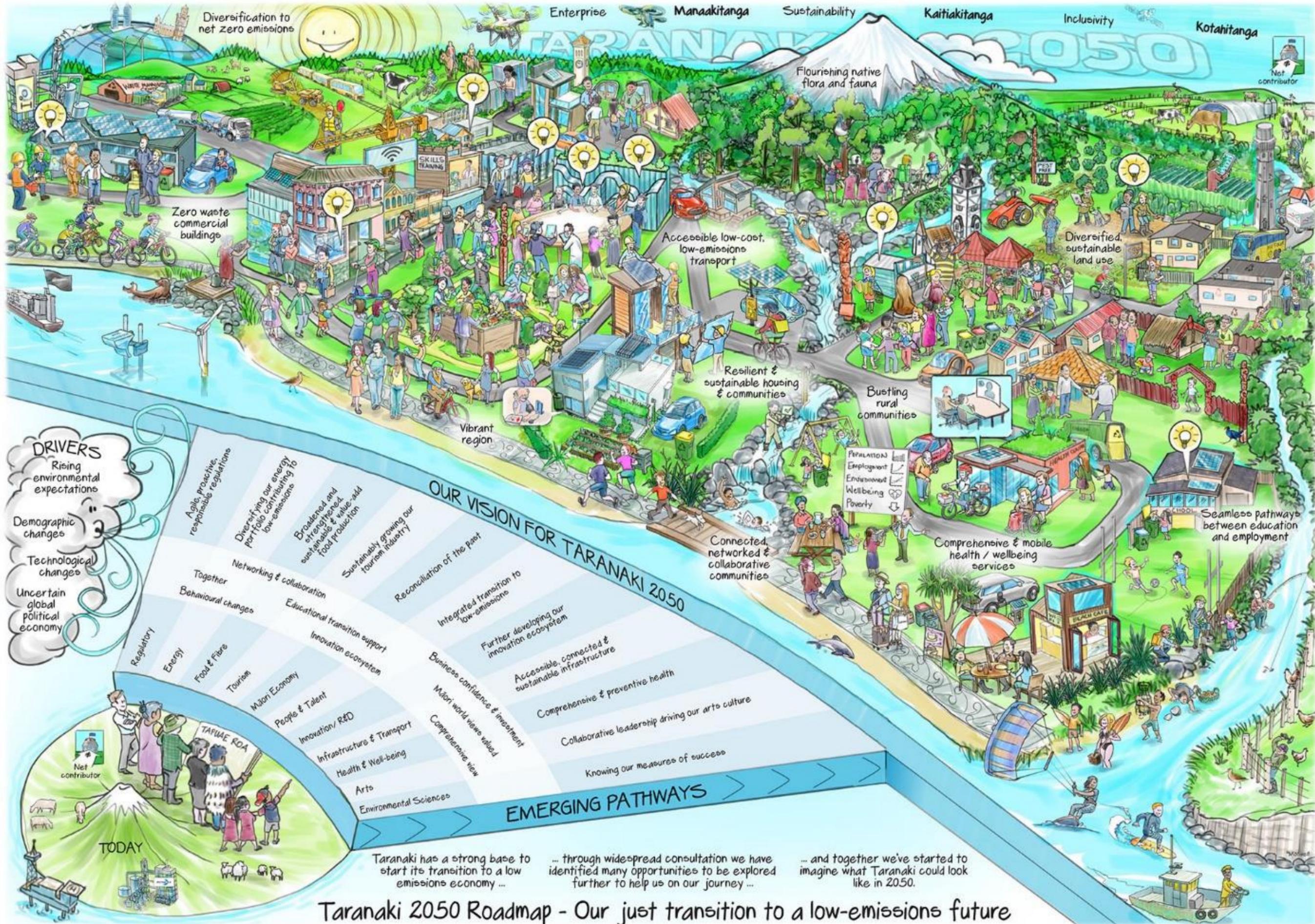
Following the finalisation of the Taranaki 2050 Roadmap, the Lead Group (20 volunteers from the seven pou – local business, iwi, community, unions, education, and local and central government – who guided the co-creation of the Roadmap) and a sub-group known as the Design Council, developed a ‘framing’ process commonly used in the energy sector. Participants of the Environmental Sciences workshops that helped co-design the 2050 Roadmap, representing a broad mix of the seven pou and with subject matter expertise, were invited to attend TPAP workshops. Others registered via an expressions of interest process on the Taranaki 2050 website.

The Environmental Science TPAP framing workshops were held in February 2020.

Based on the co-design themes and emerging opportunities identified in the Taranaki 2050 Roadmap, the divergent thinking and opportunities identified in the Roadmap were channelled into a convergent set of tangible actions and outputs. These defined the short-term actions and medium-term strategy needed to achieve the region’s long-term vision for 2050.

Environmental Sciences Transition Pathway Action Plan

The output from the three TPAP workshops is described in this document. In preparing it, the Taranaki 2050 team would like to thank everyone who has been part of the process. Your contribution has made a real difference in defining the short-term actions and medium-term strategy needed to meet the goals and vision of the Roadmap. We recognise your time commitment, but more importantly, your respect for the value of manaakitanga during the process. By showing respect, generosity and care for others, you helped create an environment where people felt comfortable sharing diverse opinions.



Introduction

This Transition Pathway Action Plan (TPAP) considers environmental sciences. This is an umbrella term for a range of disciplines that relate to, and help us understand, the physical, chemical and biological components of the environment, across air, land and water.

In Taranaki these include diverse sciences – from geology to Mātauranga Māori to environmental chemical engineering (among many others). The environmental focus in the Taranaki 2050 Roadmap is broader than lowering emissions. It includes reducing waste, increasing biodiversity and minimising our impact on the natural ecosystem.

The transition to a sustainable and low-emissions future envisioned by the Taranaki 2050 Roadmap can be supported by environmental sciences in a number of ways, including environmental science providing:

- Information to make high-quality evidence-based decisions about which activities to pursue to balance environmental impact and economic benefits;
- Credible, trusted and easy-to-understand information for the community to comprehend the need for change;
- Forecasts of potential Taranaki climate events to help make decisions on matters such as future land use and flood defences; and
- Meaningful, highly skilled jobs and intellectual property.

Strategic context

Long-term trends

There are a number of trends impacting environmental sciences.

- There is a move towards more multidisciplinary working teams, projects and initiatives. Many of these consider not just sciences, but the way social and cultural elements interact with them towards producing intended or desirable outcomes.
- Technology offers opportunities to measure more things more frequently and at lower costs. Software and hardware have the potential to support better data integration and analysis.
- Scientific information is being challenged by websites and ‘news’ on social media that can reduce trust in verifiable scientific information (although COVID-19 may have driven a swing back to empirical and credible science).
- There are global collaborations to work towards scientific consensus on major issues, such as the Intergovernmental Panel on Climate Change⁵ and the United Nations Convention on Biodiversity⁶.

⁵ Intergovernmental Panel on Climate Change <https://www.ipcc.ch/>

⁶ UN Convention on Biological Diversity <https://www.cbd.int/>

- There is an increase in the application and value of citizen science, both as a means to increase the scope of data collection and as a way of communicating science.
- National policy directions from Central Government are setting higher standards for managing, measuring and offsetting environmental impacts; for example, the National Policy Statement (NPS) for Freshwater and Proposed NPS for Indigenous Biodiversity.
- An increasing appetite among individuals, families and organisations to adopt a more sustainable approach to life and care for their surrounding environment. There is also an increasing number of students studying ecology and environmental sciences.

Government strategy

The current Government approach is centred around the aspirations to have an economy working for us all, to improve well-being and to make New Zealand proud⁷. It has a range of environmental changes and developments that relate to the Environmental Sciences transition pathway to consider and address, including:

- New and updated NPS's under the Resource Management Act and Biosecurity Act including Freshwater Management (2014, amended 2017 with a new NPS-FW expected to come into force later in 2020)⁸, New Zealand Coastal Policy Statement (2010), NPD Pest Management (2015) and the Proposed NPS for Indigenous Biodiversity (2020). These all require a strengthened approach to environmental management and reporting, creating additional responsibilities and adaptation from local Government.
- Additional Government funding streams which provide opportunities to fund environmental jobs, activities, research and data collection. Most significantly, the May 2020 COVID 19 Recovery Budget announcement allows for 11,000 extra environment jobs across the country and for additional funding to be injected into environmental projects⁹. Other Government funding avenues include the Provincial Growth Fund¹⁰ and the One Billion Trees programme¹¹.
- The Climate Change Response (Zero Carbon) Amendment Act 2019¹² sets out a framework to allow New Zealand as a country to develop and implement clear and stable climate change policies. It also provides an opportunity to contribute to the global effort to limit global temperature increase to 1.5°C, and allows the country to prepare for, and adapt to, the effects of climate change. This Bill resulted in the formation of the independent Climate Change Commission to provide expert advice and monitoring to keep the Government on track to meet its long-term goals.

⁷ <https://www.beehive.govt.nz/feature/our-plan-modern-new-zealand-we-can-all-be-proud>

⁸ <https://www.mfe.govt.nz/publications/fresh-water/national-policy-statement-freshwater-management-2014-amended-2017>

⁹ <https://www.doc.govt.nz/news/media-releases/2020-media-releases/investment-to-create-11000-environment-jobs-in-our-regions/>

¹⁰ <https://www.growregions.govt.nz/about-us/the-provincial-growth-fund/>

¹¹ <https://www.teururakau.govt.nz/funding-and-programmes/forestry/one-billion-trees-programme/>

¹² <https://www.mfe.govt.nz/climate-change/zero-carbon-amendment-act>

Givens

In developing actions for the Environmental Sciences pathway in Taranaki, the following were considered 'givens' by the workshop and cannot be changed:

- Technology is rapidly evolving, changing how we can collect, analyse and access data.
- We cannot manage what we cannot measure. If we do not understand how our actions are impacting the environment or well-being against a comprehensive baseline, we cannot optimise our response.
- Data and information can help us make decisions, but it will never give us 100% certainty. The cost of collecting this level of data to get certainty is prohibitive, if it is even possible.
- Given this uncertainty and the complexity of some problems, data is sometimes used in a way that confuses people, or in a way that can work against achieving environmental improvements.
- Our natural resources are scarce.

COVID-19 impact

COVID-19 has had a significant impact across the world. Generally, the global pandemic has resulted in a reduction in emissions and an opportunity for nature to 'take a breather', as residents of entire cities were locked down and confined to their homes. There are multiple reports of citizens taking more of an interest in their environment and rethinking the need for consumption and travel.

The Government's COVID-19 Recovery Budget announced in May 2020 had a significant focus on the environmental sector, acknowledging that the recovery needs to be a 'green' one. This package advocates for 11,000 new jobs through the provision of:

- \$433 million for new jobs in regional environmental projects;
- \$315 million for biosecurity, including weed and pest control;
- \$200 million for the Department of Conservation's (DOC) Jobs for Nature programme; and
- \$154 million for new jobs enhancing biodiversity on public and private land.

How these funds will be distributed is still being worked through, and the employment opportunities may be more at the low-skilled end. However, these additional opportunities for employment may increase interest in environmental pathways. It would be beneficial if the 'green' jobs package provided education and training pathways, and also linked into funding research programmes to show the impact of the increase in funding.

Vision

The Environmental Sciences 2050 Roadmap Vision

In the Taranaki 2050 Roadmap, the Environmental Sciences vision was:

- *Taranaki has accessible, reliable and independent environmental data that everyone understands and uses to measure their own environmental impacts and health and well-being.*
- *Mātauranga Māori is a core part of environmental science in Taranaki in 2050.*
- *Taranaki 2050 is home to skilled environmental science practitioners and research institutions, who have national and global connections and who collaborate to achieve outcomes in lowering emissions, environmental restoration and improving our health and well-being.*

To read the full introduction, vision, co-design themes and emerging opportunities visit [http://about.taranaki.info/Taranaki2050/Taranaki-2050-Roadmap-\(1\).pdf](http://about.taranaki.info/Taranaki2050/Taranaki-2050-Roadmap-(1).pdf).

The 2050 Roadmap vision informed the development of an action statement at the Environmental Sciences TPAP workshop. This was:

“Using our collective passion, enthusiasm and knowledge we will collaborate to effectively apply environmental science and Mātauranga Māori to inform a just transition to a low-emissions economy by 2050, and measure and validate our progress in restoring our taiao¹³ with robust data and positive stories.”

¹³ Taiao is an holistic and symbiotic concept that encompasses the world, Earth, natural world, environment, nature, country (translation provided by <https://maoridictionary.co.nz/>)

Current state

The current state of environmental sciences in Taranaki is summarised below across the main areas.

Environmental performance measurement

Freshwater, land, coast, ambient air and biodiversity

In New Zealand, the responsibility for environmental monitoring is shared across central Government agencies, Crown Research Institutes, and Local Government. There is an enthusiasm from community groups, iwi and hapū and citizens to collect data too.

Taranaki Regional Council (TRC) undertakes a wide range of environmental monitoring, including assessing the quality of the region's freshwater, land, coast, air and biodiversity. Technical reports on the results of monitoring are available on the council's website, with simpler summaries communicated through media and newsletters. Environmental data is shared online through Land Air Water Aotearoa, a partnership between the councils, Cawthron Institute and Ministry for the Environment (MfE), with support from the Tindall Foundation and Massey University¹⁴. TRC periodically produces a state of the environment report that provides an overview of environmental performance across all the areas above.¹⁵

On ambient air quality, TRC's approach is aligned to MfE's national ambient air quality guidelines, and measures aspects such as particulate matter, nitrogen oxide and carbon monoxide. Taranaki is one of only two regions in New Zealand that has never exceeded national air quality standards.¹⁶

At the national level, a range of other organisations also measure the environment in Taranaki, including the National Institute of Water and Atmospheric Research (NIWA), DOC and the Ministry for Primary Industries.

Community groups and iwi/hapū are also increasingly involved in the collection of data, particularly in the conservation field – using tools such as iNaturalist, Stream Health Monitoring Assessment Kit (SHMAK) – and on species distributions. Wild For Taranaki (the Taranaki Biodiversity Trust) is undertaking a project to collate the region's biodiversity data, drawing upon data gathered through citizen science projects and community restoration projects and organising it in a way that is accessible to all through a GIS platform. This could provide a starting point or template for incorporating other aspects of environmental monitoring.

Greenhouse gas emissions

New Zealand tracks greenhouse gas emissions from human activities to meet its international climate change reporting requirements. MfE publishes New Zealand's Greenhouse Gas Inventory. This is an official annual estimate of all human-generated greenhouse gas emissions and removals that have occurred in New Zealand since 1990.¹⁷ It uses data on industrial and human

¹⁴ <https://www.lawa.org.nz/about>

¹⁵ Information is available at www.trc.govt.nz

¹⁶ Taranaki Regional Council, Taranaki as One - Taranaki Tāngata Tū Tahī -State of the Environment Report 2015, p129.

¹⁷ Information is available from <https://www.mfe.govt.nz/climate-change/state-of-our-atmosphere-and-climate/new-zealands-greenhouse-gas-inventory>

activity and land use to estimate greenhouse gas emissions, and acknowledges those offset through forestry activities. Statistics NZ released a regional breakdown of greenhouse gas emissions in July 2020, and this is discussed in more detail in the Metrics and Evaluation TPAP. Taranaki councils have also been developing an estimate of emissions.

Currently district councils in Taranaki are looking to improve the monitoring and reporting of greenhouse gas emissions in their respective districts¹⁸. It is expected that once figures are collected, they can be used to compare the emissions of Taranaki alongside the emissions of other regions and nationally.

Mātauranga Māori

Environmental sciences are increasingly incorporating non-Western disciplines to ensure relevance to communities. In New Zealand, Māori have developed deep knowledge of our ecosystems and species over the last 1,000 years, through an intimate connection with the natural environment. Mātauranga Māori is an indigenous knowledge system that can help us achieve excellence in understanding and using environmental science in the transition to a low-emissions future.¹⁹ There are a range of mechanisms and pathways under development for incorporating Mātauranga Māori into decision-making. Some examples include:

- Iwi have been/are preparing environmental management plans to enable them to publicly state and exercise their kaitiaki roles and responsibilities. These plans must be taken into account in local policy development. Plans published to date include those of Te Kahui o Taranaki iwi²⁰, Ngā Rauru²¹ and Te Atiawa²² iwi. These initiate conversations around environmental science-related kaupapa.
- Te Korowai o Ngā Ruahine Trust and the Parihaka Papakainga Trust are working with Massey University scientists on projects funded by the Ministry of Business, Innovation and Employment Vision Mātauranga Capability Fund (2015-2017) with a strong environmental sciences focus.

Changes to the National Policy Statement for Freshwater Management (NPS-FM) now require that councils include Mātauranga Māori in their monitoring plans. TRC is in the process of considering how this can be incorporated alongside Western science into freshwater planning and monitoring.²³ TRC also works with a number of iwi and hapū to help them monitor water quality in their rohe with a SHMAK. A SHMAK provides simple, scientifically sound tools and resources monitoring the ecological health of streams. A number of Taranaki iwi are also using their own resources to do environmental monitoring in their rohe.

The Proposed National Policy Statement for Indigenous Biodiversity is also moving in this direction, where local authorities must develop monitoring plans that consider mātauranga and tikanga Māori

¹⁸ <https://www.newplymouthnz.com/Council/About-the-Council/Climate-Change/Climate-Change-and-Sustainability-Activities>

¹⁹ <https://www.trc.govt.nz/assets/Documents/Research-reviews/Freshwater/KaupapaMaoriFreshwaterAssessments-web.pdf>

²⁰ <https://www.dropbox.com/s/1nwgk1ue5q9gy9/Taiao%20Taioara%20-%20Environmental%20Management%20Plan%20for%20Taranaki%20Iwi%20rohe%20-%20Online-Version.pdf?dl=0>

²¹ http://rauru.iwi.nz/mt-content/uploads/2017/03/emp-review_final_sm.pdf

²² <https://www.teatiawatrust.co.nz/assets/Uploads/Te-Atiawa-Iwi-Environmental-Management-Plan.pdf>

²³ <https://www.trc.govt.nz/council/working-with-iwi/iwi-and-council/>

assessment methodology where relevant, and consider mātauranga when designing biodiversity offsets.

Environmental science research and innovation

Taranaki has hosted a range of environmental research projects. The region has links with NIWA, University of Waikato, Massey University, University of Auckland, GNS Science, and Manaaki Whenua/Landcare Research. This includes:

- Volcanic research on Mount Taranaki;
- The geology of the region;
- Biodiversity research including trees and flora, native bird life, impacts of predators, eels, blue whales and Māui and Hector's dolphins; and
- Freshwater quality, dairy agriculture and Taranaki's riparian management programme.

In addition, the region is being innovative in several areas:

- In biodiversity, the nation is closely observing how the *Taranaki Taku Tūranga - Towards Predator-Free Taranaki* project expands across the region, trialling a range of innovative techniques. For example, the zero-possum component of the project is using a combination of techniques and new technology to trial the eradication of possums across 8,600 ha in partnership with other organisations. The project is also using technology to increase efficiency of pest trapping across rural land, and has a widespread community backyard trapping campaign in urban New Plymouth. The National Predator-Free 2050 Strategy and five-year action plan are aligned with this inspiring project.
- The Taranaki Mouna project is pushing the boundaries in landscape-scale ecological restoration, enhancing the mauri (the vitality and life force) of Mount Taranaki over a 20-year period and beyond.
- The Wild For Taranaki collective of biodiversity practitioners and organisations was the first biodiversity hub in New Zealand. It is working towards a collaborative, best-practice approach to flora and fauna management. The collective is currently working on a regional biodiversity data hub. It has led work in scoping the regional coordination of conservation volunteer and environmental education.
- In freshwater quality, TRC's riparian management programme is believed to be the largest and longest-running environmental enhancement planting scheme on private land in New Zealand. The council's success can be attributed to its ability to work in partnership with landowners through a non-regulatory approach.
- Transitioning Taranaki to a Volcanic Future is a \$14m five-year research project led by University of Auckland with an interdisciplinary team of more than 40 researchers, from New Zealand, USA, Italy and Australia, spanning specialities in geology, statistics/mathematics, Mātauranga Māori and economics. Its research aims to help the national economy effectively respond to potentially decades-long volcanic activity, if Mount Taranaki erupts.

- Marine mammal monitoring programmes, which inform decision-making. Offshore petroleum operators and the fishing industry contribute significant resources and energy to these programmes.
- The Curious Minds Participatory Science Platform (funded by MBIE and delivered by Venture Taranaki) empowers communities to undertake research in collaboration with science experts. Since 2015 the platform has supported over 40 different research projects, with the vast majority focused on environmental science.
- Project Reef Life is a community-based environmental science initiative led by the South Taranaki Underwater Club. It began as a Curious Minds Participatory Science Platform project, and has continued to develop beyond this. This project focuses on identifying, monitoring and communicating about the marine life that exists within the South Taranaki Bight. Utilising novel technology and citizen science, the project aims to help provide much-needed information on the understudied South Taranaki marine environment.

Environmental science career pathways

This section discusses the current pathway to pursue education and training opportunities in environmental science, and then move into employment.

There are a number of initiatives in Taranaki that deliver environmental education and foster an interest in science, led by a range of organisations and groups. These include:

- Taranaki's 61 EnviroSchools, with funding contributed by TRC and district councils;
- TRC's education officer who provides class field trips, classroom lessons, study units, newsletters and teacher workshops and an associated education programme on a wide range of environmental areas. This programme runs alongside the Towards Predator-Free programme;
- DOC's community ranger who works with schools to undertake educational activities generally associated with the Taranaki Mounga project and the Experiencing Marine Reserves programme. DOC is also piloting the Collaborative Community Education Model (CCEM) in the Kaitake area with a view to rolling out across the region. This is based on the Kids Greening Taupo model;
- A collaboration between Wild For Taranaki and DOC to develop a Conservation Education Strategy in 2017. This could provide a foundation for collaborative strategy work under the Environmental Sciences pathway. It involved co-design workshops with environmental educators, and focused mainly on ecology and biodiversity. It has not been implemented due to a lack of resources;
- The WITT Taranaki Science and Technology Fair, which attracts entries that often have an environmental or energy focus, inspiring students to pursue careers in science and technology. Topics at the 2020 Fair (which was held digitally) included 'What is the best sustainable energy option for transport in Taranaki?' and 'Caring for the ocean';
- Learning Experiences Outside the Classroom (LEOTC) and environmentally related programmes including Rotokare Scenic Reserve Trust, Experience Purangi, Taranaki Kiwi Trust and Sustainable Taranaki, which are being led by a number of community groups;

- Iwi- and hapū-led initiatives such as Te Whenua Tōmuri Trust and Te Kahui Rangatahi o Waiwhakaiho, which seek to empower tangata whenua to learn about and care for Papatūānuku;
- District councils deliver environmental education programmes alongside their areas of operation including Brooklands Zoo, water infrastructure (Wai Warrior), Puke Ariki Museum and zero waste;
- Green School New Zealand, which opened in February 2020 in Oākura. This has a curriculum based on cross-disciplinary learning in subjects such as enterprise, environmental studies, arts, health and well-being for primary through to secondary students.

WITT currently provides a level 3 certificate in pest management. However, beyond this there are no face-to-face opportunities to study environmental science within Taranaki. There are some online options available. A number of universities have students undertaking research in the region; for example, the People, Cities and Nature programme through University of Waikato. A business case is currently being developed for a national biodiversity research institute to be based in Taranaki, which is highly relevant to the Environmental Sciences action pathway.

In terms of moving into employment, Taranaki's size limits the number of opportunities available. This issue is discussed more in the actions section.

SWOT analysis

The table below provides a SWOT analysis of Environmental Sciences in Taranaki:

Strengths	Weaknesses
<ul style="list-style-type: none"> • A range of innovative landscape-scale projects, particularly in biodiversity, such as Towards Predator-Free Taranaki, Taranaki Mouna project and Restore Taranaki • A diverse range of citizen science projects and education projects and programmes across the region • A diverse ecology to study including the maunga, rivers, marine environment, national park and marine reserves • Some industry research, for example, Corteva Agriscience’s research in the region. 	<ul style="list-style-type: none"> • No regional baseline of greenhouse gas emissions for the region yet (although being developed) • Taranaki does not have a Crown Research Institute or university located in the region. This exacerbates the difficulties in attracting scientists, who could offer equipment and resources, as they tend to follow major science projects elsewhere • Mātauranga Māori is not yet well integrated into mainstream discussions • Lack of standardised common reporting methods, storage, privacy and sharing of data, which are challenges to manage and improve through application of best practice.
Opportunities	Threats
<ul style="list-style-type: none"> • Interest in building Mātauranga Māori and incorporating this into measurements • Leveraging biodiversity programmes and innovation to create a biodiversity research institute • Improving the links between environmental research happening across the region with Crown Research Institutes, Government departments, universities and WITT • Being an early mover to a low-emissions economy could attract funding to measure emissions changes in the region • Technology offering more efficient and lower cost ways to measure the environment, report data and make more sophisticated regulations • The community’s interest in the environment and in citizen science, especially from young people • The potential to foster collaboration between environmental science education initiatives on the ground in Taranaki • The Government’s COVID-19 recovery package is focused on the development of ‘green’ jobs and a sustainable future economy. 	<ul style="list-style-type: none"> • Challenges to get enough resourcing for environmental measurement and environmental science due to other funding demands • Political interest and lack of continuity across political cycles • Environmental challenges such as freshwater and greenhouse gases causing division in the community • The global and national proliferation of fake news and misinformation that divides people and undermines trust in verifiable scientific information sources • Competition between environmental education providers for limited funds • Technological change, which has the potential to reduce jobs available and change the type of work done, e.g. automation of measurement devices, with supporting software.

- The potential for Taranaki's quality environment and innovative programmes to be the cornerstone for telling our story, attracting visitors and accelerating our economy.

Focus areas

A review of the current state against the vision identifies the following focus areas.

- 1) **Integration and increased measurement to get a complete picture:** While there are a range of measurement programmes in the region, there are some gaps. Information is derived from various sources (e.g. four councils, national organisations, businesses). Good decision-making requires good data. While resources are limited, technology offers opportunities to measure more and to integrate data. Mātauranga Māori also needs to be integrated into a range of scientific measurement. There is a national requirement to do this with freshwater (and soon biodiversity), and this is moving forward. However, there is not much movement in other areas of environmental performance.
- 2) **Communicating environmental performance effectively and involving people:** While organisations put in significant effort and use a range of channels to communicate and report environmental performance, there are many challenges in getting the messages across. Public debates on contentious issues also can undermine trust in official information sources. It's also important to empower people to collect their own information, such as promoting the use of citizen science. This not only increases the level of information, but also increases interest and trust in environmental reporting, and allows for the evolution and improvement of data collection and action.
- 3) **Talented people to develop our environmental science research base:** During the development of the 2050 Roadmap, many of Taranaki's rangatahi (young people) showed a passion for the environment. Taranaki has a number of interesting innovations, research areas and passionate talented people – but relatively weak connections with universities and research institutes. Taranaki has a large range of environmental education programmes to ignite our youth's passion, but we need to provide better pathways for them to study environmental science, as well as research infrastructure such as networks, educational institutes and shared communities of practice. This would not only build our Taranaki knowledge base and environmental movement, but would also provide a mandate for low-emissions jobs and income. After education, there are needs to be jobs available in this area.

Actions

The Environmental Sciences workshop and subsequent work has identified a number of potential actions; these are described below. More detailed discussion of some of the actions is provided under the main themes of the related areas of focus (see previous section).

1. Robust integration and measurement to ensure a complete, regional, cross-agency picture of the state of the environment and improvement opportunities

a) Measure regional greenhouse gas emissions in order to develop a regional response

This action would seek to set a baseline for greenhouse gas emissions in the region, and then use the inventory to help develop regional initiatives to reduce emissions. Actions suggested for the four Taranaki councils include:

- Meet to develop a carbon emission monitoring/reporting strategy;
- Collaboratively create an action plan to reduce barriers to emissions reductions and determine regulations under climate change legislation;
- Jointly lobby central Government for national funding for emissions reduction projects in Taranaki, and then develop a contestable regional fund for emission reduction projects; and
- Consider the best mechanism or organisation to publish data on regional greenhouse gas emissions.

b) Develop a standardised monitoring and reporting system for environmental data

Given the amount of raw data available across councils, businesses and national organisations, a system could be developed to turn this into meaningful and accessible information, through facilitation of a project planning group. This could provide a useful 'commons' of data, available for councils, businesses and citizens to refer to. This would improve environmental responses and allow for the development of well-reasoned cases for funding for improved data monitoring tools and assessment. This action could include:

- Assessing the demand for a standardised database or hub/portal and understanding what systems are in place. There are tools in existence or under development which could provide a foundation for the development of a collaborative platform. For example:
 - The regional emissions inventory and benchmarking programme (under development);
 - The work by Land, Air, Water Aotearoa (LAWA) - a collaboration of organisations with a common aim, to tell the story of our environment. Initially a partnership between New Zealand's 16 regional and unitary councils, LAWA has grown to include the Cawthron Institute, Ministry for the Environment and Massey University with support from the private Tindall Foundation.
 - The Environmental Monitoring and Reporting (EMaR) initiative - a partnership between Local Government NZ's Regional Sector and the Ministry for the Environment (MfE). The goal of EMaR is to achieve more consistent and integrated regional and national environmental data collection and reporting.

- The Wild For Taranaki collaborative GIS mapping system, used to organise and share biodiversity data across the region. This incorporates citizen science initiatives and would provide a solid foundation for incorporating other data.²⁴
- Quantifying the data organisations would collect/provide and how people would want to use the data available in the commons. Standards would need to be set for the coding, privacy, security and quality control of data. Establishing a digital commons where individual and company data is able to be shared and used requires strong privacy and security protocols. This would encourage participating parties to share their data while reducing fears that the data may be misused. The planning group would follow best practice for establishing the data commons;
- Assessing how Mātauranga Māori values can be effectively embedded into this system;
- Running a needs assessment for the sources of raw data available, amount of data storage required and technical expertise required;
- Advocating for investment in the data storage capabilities in the region, and a user interface platform. This includes the physical locations and the technical skills required;
- Proposing an increase in the data/computer science/GIS courses at WITT, and prioritising community science projects with a focus on the sharing and use of environmental data;
- Designing and building a data platform including the visual techniques used to communicate the available data to users. A media campaign could be launched to encourage data collection and sharing post development;
- Measuring and reviewing the use of data to evaluate its effectiveness.

2. Ensure effective communication of environmental performance and meaningful engagement of people

a) Develop a collaborative community behavioural change programme to empower environmental data collection and action

Environmental sciences have the potential to create significant and positive environmental outcomes, with synergies across many of the other transition action pathways. Celebrating these outcomes and promoting successful solutions can educate the region on environmental best practice and encourage behavioural change that supports positive environmental outcomes. This action could include:

- Stocktaking existing environmental behaviour change programmes and identifying potential collaborators. It is worth noting that there are multiple groups already working in this space; however, by collaborating effective key messages could be distributed widely through a range of mediums. Potential opportunities for collaboration include with Sustainable Taranaki on their three-year community behavioural change programme, and with Wild For Taranaki as they work to engage the region in Restore Taranaki. There are also synergies with the likes of Taranaki Mouna and Towards Predator-Free Taranaki, who are increasingly working with students and

²⁴ <http://www.datamap.co.nz/education/course/index.php?categoryid=1>

the community to help them collect data through citizen science, and training them in the use of the iNaturalist tool;

- Considering ways to collate information and resources for effective dissemination. MAIN Trust has been developing a 'citizen science wiki', a repository for outcomes and resources from regional citizen science projects, which could be used as a starting point. The DOC/Wild For Taranaki environmental education strategy identified that there was a need for a hub of environmental education resources with links to programmes and providers, which could be pursued through this work stream;
- Celebrating and promote successful stories of citizen science and solutions that have led to positive environmental outcomes. This would help all demographics become aware of environmental impacts, and the implications and examples of environmental best practice. In addition, it would assist training and education providers who, recognising the importance of the behavioural change programme, could implement findings and learnings within their current lessons.

3. Nurture and support talented people to develop our environmental science research base and grow sustainable and decent 'green' jobs

a) Strengthen the Education Pathway for applied environmental sciences

This action aims to develop an environmental education pathway for all levels – primary, secondary, tertiary and university of the third age (U3A). Actions could include:

- Undertaking a stocktake of the current environmental projects and education initiatives, which could be developed from the work done by DOC and Wild for Taranaki on a Regional Conservation Education Strategy. The existing expertise and resources available for programmes regionally and nationally will also be assessed;
- Uniting community groups, businesses, sectors, iwi and education providers to identify key educational resources with good fit for the region's needs, and/or to equip Taranaki students/personnel with knowledge and skills to help solve national/global environmental problems. Consider developing an online hub of environmental education resources with links to providers;
- Adopting DOC's CCEM, allowing kindergartens, schools and community groups to work in partnership to reach mutual environmental goals. Students lead this process which enables their vertical development from kindergarten through to secondary school and beyond;
- Engaging student cohorts in applied environmental projects in the region. The tools provided by the current citizen science programmes, such as Curious Minds (a participatory sciences framework) provide an existing foundation for development. The facilitators of such programmes should aim to optimise the delivery of the programmes and promote the use of the resource regionally. A citizen science hub is being developed, containing outcomes and resources from these projects which should be supported and built upon;
- Building partnerships with local iwi and hapū to foster indigenous education pathways for environmental management within the CCEM and other environmental education initiatives. Compartmentalise funding and resources for these indigenous environmental education programmes and incorporate more te reo Māori in schools' environmental curricula;

- Continuing to pursue opportunities for existing or new tertiary providers to operate in Taranaki – e.g. through local scholarships (like the George Mason Scholarship), summer student programmes hosted in local Government agencies, partnerships with WITT, or creating a new research institute.

b) Support the Tupu-ā-nuku Environmental Workforce Development programme

In 2018, research on future conservation-related projects in Taranaki showed significant forecast demand for local workers. This had not been done before across multiple players, and showed there is year round employment at scale and that this could be filled by Taranaki businesses. Under status quo it is likely that Taranaki contractors would not be able to invest in developing a local workforce to meet demand, and there was a high probability out-of-region workers would be used. There was also an identified gap in Taranaki for pathways from school into conservation training and employment, and the provision and delivery for local training and education in conservation.

The *Tupu-ā-nuku Environmental Workforce Development* programme has been developed as a collaborative model between five iwi in Taranaki, the private and public sector, community organisations and funding and pathway partners. It seeks to provide a clear and accessible pathway for rangatahi to undertake local education and training with pastoral care, and then gain sustainable employment in conservation-related work.

c) Maximise opportunities for increased employment prospects in the environmental sciences sector

This action is about working with domestic secondary and tertiary education providers, students and regional businesses to establish clear education to employment pathways for the environmental sciences. Providing a clear pathway for potential scientists, researchers and conservationists will bring more tertiary learners to Taranaki and provide businesses with the labour they need. This could be complemented by a promotional media campaign.

It is important that sustainable and decent jobs are available at the end of training. Taranaki has advantages in a number of areas, such as applied biodiversity research, and can look to build research expertise that supports environmental science roles. For example, Taranaki could establish a world leading applied biodiversity institute, building off the research and mahi already being undertaken. This probably has the most potential for creating meaningful jobs that make a real difference to our environment.

4. Research area: Work collectively to ensure our food production platform is based on sound environment management and indigenous techniques, and provides decent and meaningful work in our rohe.

Integrating the plans of the 12 action pathways will be critical in reaching an effective just transition. The opportunities created through a thriving environmental science sector could be across the board, and would have particular value for the food and fibre industry. Investment in environmental management techniques that prioritise value over volume, indigenous practices/engagement, low emissions and product stewardship in production are likely to be an asset for the regional food and fibre story. This will also sustain the favourable food production conditions that Taranaki offers.

To deliver this, this action could:

- Form a working group with leading food industry partners, iwi and environmental scientists across the region. Aim to develop a food production–environmental management collaboration culture across the region, in which businesses lead the way in designing out production waste and are stewards for the natural environment;
- Secure funding to conduct research on the market value of a regenerative and indigenous food production industry. The proposal could leverage the Food and Fibre TPAP initiatives to offer a strategic and targeted approach to redefining food production through environmental science;
- Identify the leading techniques in ‘greening’ food production and opportunities to incorporate indigenous management techniques. Integrate environmental indicators suited to lean manufacturing to monitor industry performance. Use these indicators to celebrate leading businesses and collaborations in the region, as these groups will be champions for regenerative practice and the volume to value transition.

5. Establish a funding plan for regional environmental improvement

Across the Taranaki 2050 project there has been discussion about increasing education and awareness to create behavioural change. For example, there has been discussion about how the wider community can take action to lower carbon footprints, create less waste and use resources more sustainably.

As already discussed, there are a number of community programmes focused on improving environmental outcomes, such as biodiversity.

Environmental education programmes and the implementation of environmental projects depend on funding. There is minimal funding specifically for projects in the Taranaki region. Programmes often rely on multiple funding sources; this presents challenges in administration and meeting long-term goals. Securing a sustainable funding stream will ensure the provision of environmental education programmes and a pathway for improving environmental outcomes through applied science in our region. This action would:

- Conduct a gap analysis of the funding options in the region – how much money do we need to create a pathway for beneficial environmental outcomes? Areas of focus include:
 - The environmental issues most relevant to the region and the current response to them;
 - The provision of environmental education programmes at all levels – primary, secondary, tertiary, internships and University of the 3rd Age (U3A); and
 - The resources required to reach existing and future environmental targets (e.g. low emissions).
- Quantify the sustainable funding streams and then identify the areas that need it;
- Assess other potential funding streams regionally. Use this network to seek other funding partners as well as connecting with Philanthropic NZ. Aim to maximise the amount of long-term funding partners. Unite the local council bodies, businesses, community groups, Wild For Taranaki, Puke Ariki, New Energy Development Centre (NNEDEC), WITT and schooling representatives to agree on mutually beneficial funding targets;

- Scope out successful funding models that have been used elsewhere. Employ this to develop a funding framework suited to the gaps previously identified.
- Roll out funding programme. Continue engaging stakeholders to develop the fund and continuously optimise the delivery of funding.

One of the core functions of Wild For Taranaki (the Taranaki Biodiversity Trust) is to raise funds and provide a mechanism to distribute funds to its members and the community for undertaking environmental enhancement and conservation projects. Seed funding has been provided by TRC, and the Trust is working to grow this fund by approaching large funders. This platform could be used as a starting point.

Critical success factors

The following critical success factors were identified:

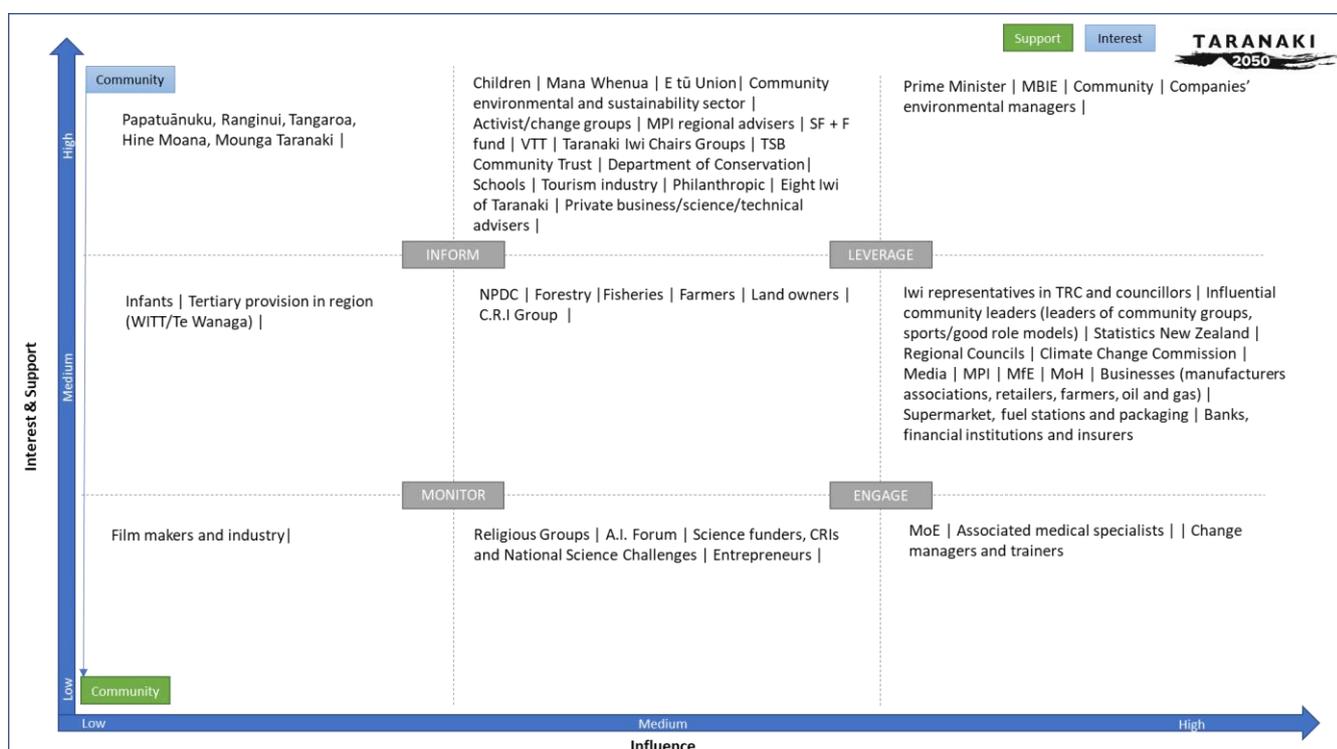
1. Having strong leadership, collaboration, coordination and integration;
2. Broad social support, with people seeing the value in environmental science and evidence-based decision-making;
3. Credibility and transparency of development of information so that people have trust in information;
4. Having a skilled and talented workforce;
5. Access to accurate, timely and complete data that informs measurement, evaluation and review. Use technology effectively and in ways that minimise costs;
6. Legislation and regulation that supports environmental sciences goals;
7. Engagement of iwi in the development of Mātauranga Māori;
8. Funding support from central Government.

Implementation

Stakeholders

A key step in the process is to review stakeholders and build an engagement plan with each to ensure the right level of engagement is attained throughout the action planning time frame. It should be noted that over time some stakeholders' level of influence and interest/support will change, and the stakeholder engagement plan will need to be updated.

The figure below identifies the influence and interest of the main stakeholders within the Environmental Sciences Action Plan. It was developed in a working session at the Environmental Sciences TPAP workshops, and consequently does not include all stakeholders. Positioning in the chart is indicative and reflects the point in time.



Next steps

The actions in this TPAP will be taken forward and considered by the Taranaki 2050 Lead Group. The Taranaki 2050 website will continue to be updated with progress made on the actions.

The impacts of COVID-19 will be considered as part of the 2050 Roadmap Pathway Action Plans in 2020 and the subsequent two years.

Taranaki 2050 Transition Pathway Action Plans implementation from 2020

Work to date has been part funded through the Provincial Growth Fund and supported with some resource from MBIE. A small amount of private funding has been made available from the TSB Community Trust and local businesses to support workshops, facilitation, printing, etc. The work has been carried out by a large number of volunteers.

Future work needs to be funded at two levels:

- 1) Coordination resourcing (to drive implementation); and
- 2) Funding for the specific projects and initiatives set out by the action plans.

Funding needs to be through:

- Government (central and local) – new and existing; and
- Private sector.

1) Taranaki 2050 funding – core coordinating resourcing

Resourcing needs are required for five people to facilitate and drive workstreams, as well as measure and track progress over five years.

Resources are to be Taranaki-based, with the suggested positions:

- 1 x leader
- 1 x administrator
- 3 x workstream leads

As well as facilitate and drive workstreams and measure/track progress, the team would be tasked with refreshing the Taranaki 2050 Roadmap in 2024.

Funding required for core coordination and resourcing is \$3.75m over five years.

Requests will be submitted to central and local Government for funding.

2) Taranaki 2050 Environmental Sciences TPAP project funding

The following investigatory projects have been identified as ready for kick-off/completion in 2020/21:

Opportunity	Description	Cost	Links
Regional greenhouse gas emissions data	The Taranaki councils work with Statistics New Zealand to further develop regional greenhouse gas emissions data	TBC	Metrics and Evaluation



knowledgements

The Environmental Sciences Transition Pathway Action Plan process has been a significant undertaking. We would like to acknowledge the Provincial Growth Fund and the Ministry of Business, Innovation and Employment for their financial and resource support.

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As a final acknowledgement, the Taranaki 2050 team would again like to thank everyone who has been part of the process – many people gave up significant hours to participate in workshops.

The team has been overwhelmed with people's passion and commitment to this region. It is clear there is an excitement and energy to achieve our vision for Taranaki 2050.



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