



Where to from here? How we ensure the future wellbeing of land and people

The Ministry for the Environment's Long-term Insights Briefing 2023



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Message from the Chief Executive

I am pleased to present the Ministry for the Environment's first Long-term Insights Briefing: *He aha ngā mahi ka whai ake ināianei? Me pēhea te whakarite i te toiora o te whenua me te tangata ā muri atu | Where to from here? How we ensure the future wellbeing of land and people.*

Long-term Insights Briefings provide an opportunity to explore challenges and opportunities that are important to all New Zealanders.

This closely aligns with the Ministry's role as an environmental steward.

As well as looking after the land today, the [Environment Act 1986](#) requires us to think broadly, and to look ahead. This includes considering the intrinsic value of ecosystems, the values people place on the environment, principles of Te Tiriti o Waitangi | the Treaty of Waitangi, the sustainability of natural and physical resources, and the needs of future generations.

In this briefing we look to the future of land and people.

Land is a taonga. A healthy whenua is fundamental to all aspects of people's wellbeing. Our quality of life, livelihood, health and identity are entwined with it. This connection is epitomised in the whakataukī (saying):

Ko au te whenua, ko te whenua, ko au.

I am the land, and the land is me.

We need to ensure the land remains healthy for future generations, and for the sake of the wider environment. Because land is connected to every part of the environment, its health affects the air, water, plants and animals, and vice versa.

However, for many years, Aotearoa New Zealand's land has been facing pressures. If current trends continue, those pressures could increase – affecting both the health and resilience of the land, and the wellbeing of future generations of New Zealanders.

Our briefing explores some of the most important pressures facing the land today, along with key drivers of change that will affect the land in the future.

The briefing then looks ahead to 2050, to present an aspirational future where deep environmental responsibility and reciprocity are core values that unite Aotearoa New Zealand. Finally, it proposes pathways that could help achieve transformational change.

I believe the Ministry's work programme has the potential to have a profound and lasting positive impact on our environment.

However, we cannot do it alone. Making transformational change requires collaboration across all our communities and all parts of society.

It is important to remember that Long-term Insights Briefings are not government policy. They are produced independently of Ministers. We also recognise that while this briefing does not represent the voices and visions of all New Zealanders, it is intended to add to the conversation about how we all use, manage, and care for the land.

By looking well into the future – and reflecting on what we have heard from rangatahi who will be here long after we are gone – this document gives a voice to important perspectives that may not otherwise be heard.

I give my thanks and appreciation to all the people and organisations who contributed to the development of this briefing. Your insights, knowledge and perspectives enhanced our thinking about the issues and options.

We look forward to continuing the kōrero (conversation) about how to secure a sustainable future for both land and people across Aotearoa New Zealand.

Vicky Robertson
Chief Executive

Executive summary

Whenua (land) is an intergenerational taonga (treasure). It provides fundamental needs like food, jobs and spaces to live and play. It is also an integral part of Aotearoa New Zealand's culture and identity, for both Māori as tangata whenua and many other New Zealanders.

How we care for the land affects many aspects of our wellbeing.

For many years, Aotearoa New Zealand's land and soil have been facing pressures. These include more intensive agricultural practices, pollution, urban sprawl, rural fragmentation of highly productive land, invasive species and climate change.

If current trends continue, it is likely these pressures will increase. Political, social, economic and environmental disruptions could harm the land deep into the future. Because land is connected to every part of te taiao (the environment), that will suffer too.

We need to change course, and to do so in a coordinated way. If we do not, the pressures on the land could disrupt the economy, increase inequities between different generations and communities, harm wellbeing and continue to destroy unique species and ecosystems.

How do we ensure a resilient, sustainable future for the land and all New Zealanders?

This Long-term Insights Briefing proposes ways that Aotearoa New Zealand can start moving forward. Land is an integral part of the broader environment and society itself. This briefing starts a conversation about its future.

Working with multiple rangatahi (youth) groups and the Ministry for the Environment's executive leadership team, and through two rounds of [public consultation](#), we have created a vision of what the state of the land, and New Zealanders' relationship with it, could look like in 2050.

In this vision, which is premised on deep environmental responsibility and reciprocity, the relationship between people and whenua is stronger, people give back to the land as much as it provides, and an intergenerational perspective is embedded within society. Iwi and Māori exercise meaningful kaitiakitanga (stewardship), and people's connections with the land are reflected in the country's politics, economy and everyday life.

Achieving such a vision would involve major transformations of Aotearoa New Zealand's politics, economy and society. Existing initiatives can only get us partway there. Achieving meaningful transformational change would require confronting the root causes of environmental crises.

Tracing back from an aspirational future to the present situation – a futures-analysis technique known as backcasting – identifies nine pathways we could use to influence change. These are structured across three tiers, with three specific leverage points in each.

Achieving incremental change – leverage points that are effective at increasing resilience and addressing specific events, but which have less effect on overall systemic pressures:

- increasing effectiveness of policy and legislation
- investing in sustainable infrastructure and technology
- empowering communities.

Supporting transitional change – leverage points that go deeper into the origins of the problems and help transition systems and institutions for more widespread change:

- investing in environmental education and knowledge transfer
- investing in science and mātauranga Māori
- embracing collaborative governance and coordination.

Enabling transformational change – leverage points that address the root causes of environmental issues. While more complex and challenging to implement, they have greater ability to bring about long-lasting change:

- embedding environmental responsibility into Aotearoa New Zealand’s institutions
- enhancing equity
- building resilience to global pressures.

We have included case studies to show how New Zealanders are already applying some of these leverage points.

With the many pressures on the environment, transformational change will be needed to ensure a resilient and sustainable future for the land and all New Zealanders. Making any kind of transformational change requires participation and collaboration from people across society, including communities, institutions, iwi and hapū, businesses and individuals. It involves openly discussing the benefits and costs, and carefully considering how the choices made will affect government fiscal priorities, economic sectors, communities and generations.

In this briefing we have proposed some ways to support the transformational change required to ensure the future wellbeing of land and people.

This is intended to stimulate conversation that will need to take place over the coming years and decades, through bringing to the fore the perspectives of future generations.

By thinking, planning and acting now, we can better ensure the demands of the present do not override the needs of future generations and the sustainability of the land. Inclusive, transparent governance and decision-making that make space for everyone’s input are crucial for ensuring this transition happens in an equitable way.

1 Introduction

Purpose of Long-term Insights Briefings

Futures thinking is critical to the Ministry for the Environment's role as an environmental steward and system leader. Taking a long-term perspective helps us to understand where and how action may be required today to meet our stewardship goals. The [Environment Act 1986](#) requires us to take a full and balanced account of the needs of future generations as part of the management of natural and physical resources in Aotearoa New Zealand. Futures thinking is also important to future-proof policy design and make sure the needs of future generations are represented within this governance (PCE, 2021; United Nations, 2021a). This is essential for undertaking change that moves beyond short-term gain to engage with long-term challenges (Krznicaric, 2020).

Long-term Insights Briefings (LTIBs) present medium- and long-term trends, risks and opportunities that affect the interests of Aotearoa New Zealand and the wellbeing of New Zealanders. They are intended to provide analysis and explore options for addressing these risks and issues and are 'think pieces' rather than governmental policy. They are independent of ministers and give the public service an opportunity to think innovatively about issues in a longer timeframe. The briefings are a new requirement of the [Public Service Act 2020](#), and departmental chief executives must release briefings every three years.

The purpose of LTIBs is to spark debate on long-term issues of significance and contribute to future decision-making. This requires all of us to think about, anticipate and act on the future interests and aspirations of New Zealanders.

Ministry for the Environment's Long-term Insights Briefing

The topic of the Ministry for the Environment's first LTIB is *He aha ngā mahi ka whai ake ināianei? Me pēhea te whakarite i te toiora o te whenua me te tangata ā muri atu | Where to from here? How we ensure the future wellbeing of land and people*. This places an emphasis on whenua (land) – an intergenerational taonga (treasure). The topic was chosen because land connects every part of te taiao (the environment). How land is cared for affects lakes, rivers, oceans, air, climate and native species. The health of the land and wellbeing of people are also closely interconnected, because land is central to Aotearoa New Zealand's economy, culture and many other aspects of society. The land must be well looked after to ensure a resilient, sustainable future for everyone.

This LTIB looks towards the year 2050, which represents an important timescale for both climate change and native ecosystems. Aotearoa New Zealand has committed to being carbon neutral by 2050 ([Climate Change Response \(Zero Carbon\) Amendment Act 2019](#)). [Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy](#) outlines a framework for the protection, restoration and sustainable use of indigenous biodiversity through to 2050 (DOC, 2020). This aligns with the [Convention on Biological Diversity](#), which outlines a global vision to combat ecosystem loss (DOC, 2018; United Nations, 1992).

While 2050 is the marker point for this LTIB, actions taken today will be felt well beyond this. The Ministry's aspiration – a flourishing environment for every generation – means looking further into the future at the wellbeing of generations to come. Our impacts on future generations are often not reflected in decision-making, and so this briefing sought out perspectives of young people, that their voice might be heard.

In this LTIB, we propose ways Aotearoa New Zealand can change the relationships it has with the land. Achieving transformational change requires participation and collaboration from people across all areas of society, including institutions, iwi and hapū, businesses, communities and individuals. It is important everyone can take part. This briefing is intended to contribute to the ongoing conversations in this area, to engage New Zealanders on the long-term future of the land and offer a path forward.

New Zealanders' wellbeing is connected to the state of the environment

The wellbeing of the environment and that of society are inseparable. While wellbeing has different meanings for different people, broad agreement has been reached that it is closely linked to the environment. If the environment is degraded, human wellbeing suffers as a result (Ausseil et al, 2021; MfE and Stats NZ, 2022; PCE, 2021).

The Treasury's Living Standards Framework (LSF) and its He Ara Waiora (HAW) framework report on various statistics that can inform progress on wellbeing from different perspectives. Several relate to the environment and its contribution to both the current and future wellbeing of individuals, whānau and communities (New Zealand Treasury, 2021). This draws from a growing body of scientific evidence that shows the links between the environment and wellbeing in multiple ways. A healthy environment supports livelihoods, provides important services and resources, enhances mental and physical health, and fosters connections and relationships (Dasgupta, 2021; MfE and Stats NZ, 2022).

In te ao Māori, the interdependence between the wellbeing of people and ecosystems is clear. Harmsworth and Awatere (2013) write that Māori "see themselves as a part of ecosystems rather than separated from ecosystems" (p 276). In this worldview, it is impossible to separate the wellbeing of people from that of the environment, because they are the same ([Te Awa Tupua \(Whanganui River Claims Settlement\) Act 2017](#)).

Humans are linked to ecosystems through whakapapa: a connection, lineage or genealogy that situates people in a network of intergenerational relationships with all other animals, plants and parts of the environment. With these relationships comes responsibility. Whakapapa "binds iwi/hapū to the natural environment, ancestral homelands, the wider community, mokopuna or future generations, and empowers mana whenua to carry out their duties as tangata kaitiaki (human guardians) that strengthen those bonds" (Scheele et al, 2016, p 5).

Damage to the environment means a loss of mauri – the energy or spark of life that permeates all living and non-living things (MfE and Stats NZ, 2022). Shifts in the mauri of one part of an ecosystem eventually affect the whole (Harmsworth and Awatere, 2013). Harm to the mauri of a part of the environment also affects the mauri of people who exist within that environment and, therefore, their wellbeing.

Land and wellbeing

The connections people have to the land form an important part of their relationships with the environment. For Māori, the relationship between tangata (people) and whenua is indivisible (Hutchings, 2015). Māori understanding and worldviews emerge from this connection, and Māori are often referred to as tangata whenua – people of the land (Hutchings et al, 2018). In te reo Māori, the word whenua means both ‘land’ and ‘placenta’. A person’s whenua (placenta) is often buried at a significant place, such as a marae, acknowledging the intimate spiritual and physical connection between land and people (Harmsworth and Awatere, 2013).

Land and soil contribute to wellbeing in many ways, with benefits including food, employment, energy, health, recreation and identity. These connections are explored in the reports [Our Land 2021](#) (MfE and Stats NZ, 2021b) and [Environment Aotearoa 2022](#) (MfE and Stats NZ, 2022).

In many ways, Aotearoa New Zealand’s identity is tied to the land, forests, wild areas, greenspaces and pastoral environments. All contribute to a sense of place. Spending time in nature enhances our mental and physical wellbeing, especially during challenging events (MfE, 2022g), and improves our connections to other people (Ausseil et al, 2021). Economically, production from the land generated more than \$50 billion in export revenue in the year to June 2022 (MPI, 2022a), and Aotearoa New Zealand is known as being one of the world’s largest exporters of milk products (Ledgard et al, 2020). While soil is the basis for food production, healthy soils provide many other benefits, such as supplying building materials, filtering nutrients and contaminants, helping store water and mitigate floods, decomposing wastes, and maintaining biodiversity (Dominati et al, 2010).

Land is shaped by what we value

Land provides many benefits, as shown in the examples above. The different ways we use land change the benefits it can provide, and have implications for the health and resilience¹ of the wider ecosystem.

For example, using soil in ways that increase food production can boost the economy. However, that may reduce other benefits of healthy soils, such as flood mitigation, biodiversity and nutrition (Ng and Zhang, 2019; Powers et al, 2020; Stronge et al, 2020).

The choices people make depend on how they value the different options available to them. People bring distinct balances of values to bear on the land. Three value perspectives illustrate how people connect with nature: instrumental, intrinsic and relational (Chan et al, 2020; IPBES, 2022a; Pascual et al, 2017).

- **Instrumental values** refer to the value attributed to nature as a means to an end. They comprise both market values (often measured in monetary terms) and non-market values

¹ ‘Resilience’ has been defined by the IPCC, in their *Special Report: Climate Change and Land* (2020), as “[t]he capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure.” In addition, Donovan et al (2021) define resilience as “...the capacity to maintain and recover function in response to disturbance. A highly resilient system is one that exhibits a low disturbance impact and a fast recovery rate, ‘low’ and ‘fast’ being defined relative to the distribution of responses.” Among other things, a resilient soil ecosystem is, therefore, generally less prone to land degradation (erosion and soil structure breakdown) (Webb et al, 1997; Greenwood, 1999). While a soil can be inherently resilient, how land and soil are managed will also contribute to the degree of its resilience.

(including regulating ecosystem services) – a combination that illustrates how natural resources can provide usefulness to people, satisfaction of needs, and material benefits.

- **Intrinsic values** refer to the value of nature for itself, independent of any benefits it provides to people.
- **Relational values** refer to the importance of meaningful relations between people and nature. People and nature are seen as inseparable, with humans embedded in their environment. This often implies a moral duty of care: that is, because the environment supports us, we have a reciprocal responsibility to take care of it (Arias-Arévalo et al, 2018; Chan et al, 2016). This perspective aligns most closely with Māori understandings of the environment – with humans and ecosystems tied to one another through whakapapa (Harmsworth and Awatere, 2013).

These three value perspectives all co-exist in individuals and influence people’s choices and behaviours. In the [public consultation](#) the Ministry conducted last year, respondents highly valued the mental and physical wellbeing benefits that land provides (MfE, 2022e). The values that people draw on to guide their choices and behaviour can change depending on their stage of life or their context at a particular time. Recognising the plurality of these values is essential for achieving effective and positive environmental outcomes. This ensures that the multiple ways in which nature matters to people can be considered, weighed and deliberated equitably (IPBES, 2022a). It also reduces the dominance of instrumental values associated with materialism and individualism.

All three types of value should be considered together when making decisions about the future of the land. However, instrumental values tend to be emphasised in studies that examine the value of nature (IPBES, 2022a). These focus mainly on direct-use values from nature that can be marketed and have short-term benefits. Non-market values of nature are less represented, because valuation is made more complex when it involves concepts that cannot be easily compared using monetary amounts (IPBES, 2022b; NZIER, 2018). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (2022a) reported that of the studies that value nature, 74 per cent focused on instrumental values, particularly market-based values, with 20 per cent focused on intrinsic values and only 6 per cent on relational values.

Focusing on only one set of values (eg, instrumental values) may fail to resonate with views on personal and collective wellbeing, or ‘what is right’ with regard to nature and the environment. This can lead to the absence of relational and intrinsic values from decision-making (Chan et al, 2012; IPBES, 2022b). Such limited focus may inadvertently promote worldviews at odds with fair and desirable futures.

A more pluralistic consideration of values can reframe the discussion about environmental protection. This can result in genuine inclusion of diverse groups in environmental stewardship, achieving social-ecological relationships that benefit every generation, as well as potentially more productive policy approaches (Chan et al, 2016).

However, simply recognising different values may not in itself lead to better outcomes for nature and people. Specific changes will need to be made to the processes through which institutions make decisions. This includes giving a voice to under-represented groups and values (see ‘Principles for managing the transition’ in chapter 4), broadening the types of knowledge included, and paying attention to procedural justice (IPBES, 2022a).

To bring about transformational change in people’s relationships with the land, and to enhance the health and wellbeing of both people and nature in the future, we will need

to ensure we enable the balanced expression of values. This will involve recognising limits to instrumental and extractive engagement with the whenua.

Protecting the whenua through the challenges ahead

Aotearoa New Zealand's land and soil, and the ecosystems that depend on them, are facing many pressures. These include land-use change and intensification, population growth, invasive species, pollution, natural resource use and climate change (MfE and Stats NZ, 2022). Chapter 2 explores these in more detail. These pressures on and changes to the land result in social and cultural changes, as well as the loss of culture and tradition. Adequately meeting these challenges will require changes in how nature is valued across many parts of society.

This LTIB recognises that achieving these aspirations will require a shift in approach to decision-making. This shift will need to recognise different values and perspectives while looking holistically at the many ways land and people interact. Importantly, it will require making near-term decisions in the context of longer-term outcomes. To inform this process, chapter 2 provides insight into how people's actions and historical legacies are affecting the land today, and the pressures and challenges the land will face in the future. Chapter 3 then lays out an aspirational vision for the wellbeing of whenua and people, based on engagement both within and beyond the Ministry. Finally, chapter 4 proposes a framework for navigating through today's challenges to a better future. It identifies strategic leverage points that together could unlock transformational change to give full play to New Zealanders' inherent values of environmental responsibility.

2 State of the land and drivers of future change

... for young people, the importance is realising that the environment is their future, and it is essential to ensure this intergenerational relationship, not just for short-term gain or because “it’s always been this way” (when it hasn’t), but it is life or death. To accept the state of the environment is to accept that we won’t make it to 2050.

(Rangatahi voice who contributed to the LTIB)

Introduction

People value the land for many different reasons. The focus on economic aspects and short-term benefits has placed considerable pressure on the land. This has flow-on effects on the rest of the environment and various aspects of wellbeing in Aotearoa New Zealand, particularly for future generations.

To reduce these pressures, we first must know where we are now and the challenges ahead.

This chapter provides a high-level overview of the current pressures on the state of the land, then looks ahead to the important drivers that will bring increasing change and uncertainty in the coming decades.

Land is under pressure

The pressures facing the land are well-documented and include land-use change and intensification, invasive species, pollution, natural resource use and climate change (IPBES, 2019).

The effects of these pressures have been detailed in the Ministry’s environmental reporting series – see the reports [Our land 2021](#) and [Environment Aotearoa 2022](#) (MfE and Stats NZ, 2021b; MfE and Stats NZ, 2022). This section is therefore not intended to be a comprehensive discussion or exclusive list of pressures; rather, it aims to summarise the state of the land and main pressures facing it.

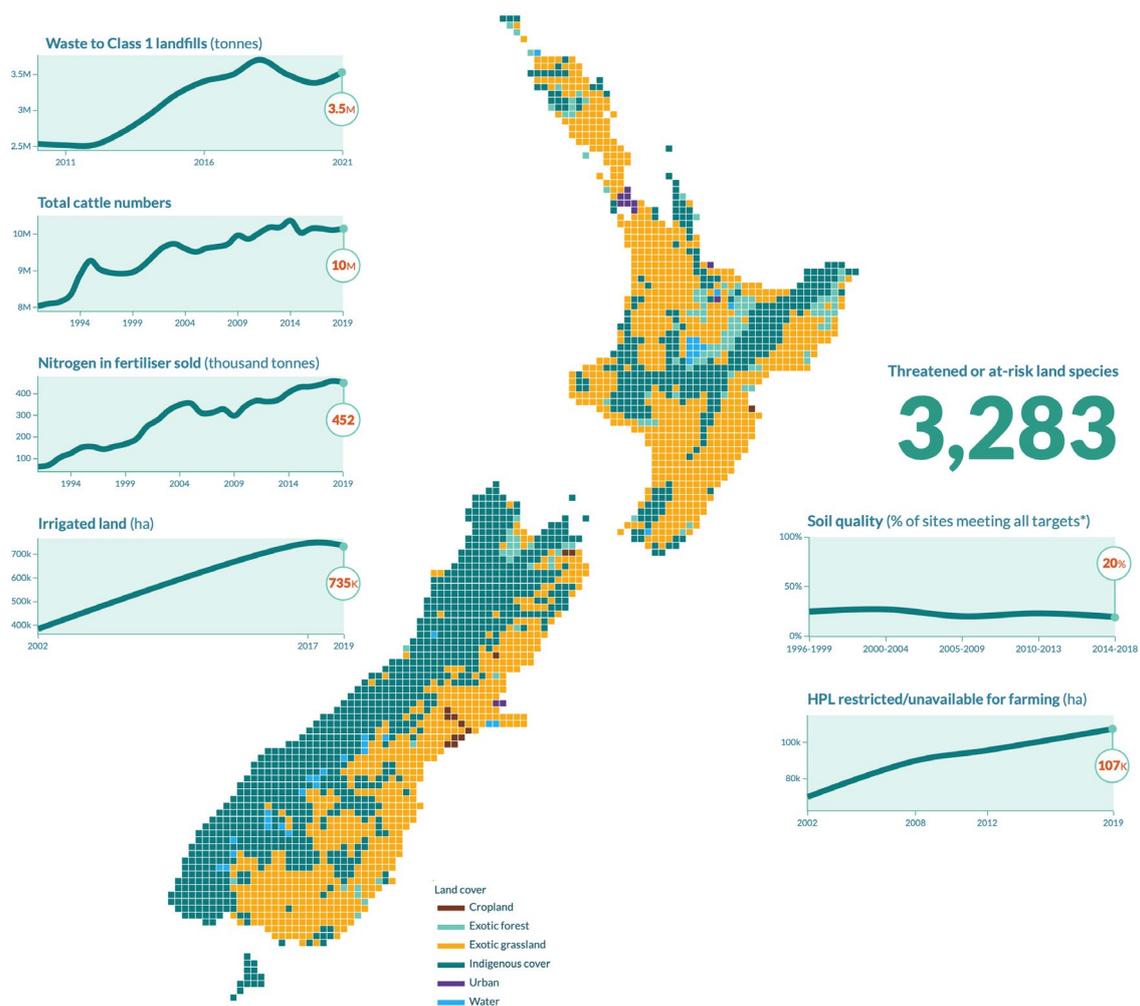
Aotearoa New Zealand’s native plants, animals and ecosystems are under threat

Much of Aotearoa New Zealand’s native wildlife is at risk of extinction, due to pressures from introduced species, pollution, landscape changes and over-harvesting of indigenous species (Craig et al, 2000).

- Just over half of Aotearoa New Zealand’s total land area is used for agriculture, forestry and urban areas. The rest is under native land cover (see map in [dashboard](#) in the overleaf and indicators: [Exotic land cover](#), [Urban land cover](#), [Indigenous land cover](#)). Around a third of Aotearoa New Zealand’s land area is public conservation land. Current changes in land cover are relatively minor, but the extent of many ecosystems such as wetlands and kauri forests have already been severely diminished (MfE and Stats NZ, 2021b)

- Aotearoa New Zealand is recognised as a global biodiversity hotspot, with many unique species found nowhere else in the world (IPBES, 2018; Myers et al, 2000). Yet more than 4,000 native species, of which more than 3,000 are land based, are currently threatened with or at-risk of extinction (Stats NZ, 2021a). This includes taonga species important to Māori. The loss of these taonga can result in the loss of language, tikanga (customs and protocols) and mātauranga (knowledge) associated with them (Rainforth and Harmsworth, 2019).

Climate change will further disrupt native species and ecosystems and may exacerbate many of the pressures they face. We do not know the exact effects of climate change on Aotearoa New Zealand’s native biodiversity. A lack of data and long-term studies currently limits our ability to understand how species will be affected in the future (IPCC, 2022a; Macinnis-Ng et al, 2021).



Dashboard illustrating some summary statistics as detailed in Our land 2021 (MfE and Stats NZ, 2021b)²

² The map uses a grid of 10x10 km cells to provide a simplified view of land cover. Each cell is coloured based on the dominant land-cover type inside it. In other words, cells with multiple land-cover types will only reflect the land-cover type with the largest area in that location. As a result of this loss of resolution, some urban areas (for instance) do not show up, as they are technically not dominant in their respective cells.

Amount of highly productive land is shrinking

Fifteen per cent of land in Aotearoa New Zealand, using baseline figures, is classified as highly productive (Land Use Capability (LUC) classes 1, 2 and 3). This land is particularly good for food production, because it has suitable soil for multiple rural land uses, is flat or gently sloping, and has an optimal growing climate. Protecting this land is important because, among other things, it allows more food to be grown with fewer inputs and environmental effects. However, there is increasing competition for this land (Mackay et al, 2011).

- In many areas, the most highly productive land is being subdivided into smaller pieces or turned into urban land, a long-standing issue dating back to at least the 1950s (Hunt, 1959). This shifts highly productive land out of agricultural or horticultural production (MfE and Stats NZ, 2021b).
- While these trends are being seen across the country, with over 100,000 hectares unavailable or restricted from use as farmland as at 2019 (see [dashboard above](#) and indicator: [Land fragmentation](#)), they are escalating in some more densely populated regions. In Auckland, small-sized land parcels (less than 8 hectares) with a dwelling made up 40 per cent, 44 per cent and 25 per cent of the region's LUC class 1, 2 and 3 land in 2019. This is an increase of 74 per cent, 32 per cent and 44 per cent, respectively, since 2002 (Curran-Cournane et al, 2021).
- The loss of land and soil to development is irreversible. Even with interventions, which are needed to slow the rate of loss, the trend will likely continue due to the challenges of wholly avoiding the development of these soils for housing (MPI and MfE, 2019b; MfE, 2022f). This is particularly an issue for LUC class 1 and 2 land that represents only 0.9 per cent and 4.5 per cent of total land area in Aotearoa New Zealand, respectively, before the loss that has already occurred.

Population growth and the need for more housing puts pressure on the availability of highly productive land, particularly given lower costs of developing flat land and public concern about housing affordability (Greenhalgh et al, 2017). At the same time, consumer demands for locally produced fresh produce incentivises the protection of highly productive land near urban areas, along with the need to ensure a resilient food system for every generation. Aotearoa New Zealand's export economy, based on primary industries, also needs a good supply of land to grow on (MPI, 2019b; MPI and MfE, 2019a).

Ways the land is used are degrading soil and water

Land-use changes have shaped Aotearoa New Zealand since human settlement. Land-use changes for farming and agriculture have had a substantial influence on the land, leading to the deforestation of hill country, and increasing Aotearoa New Zealand's naturally high rates of erosion.

- An estimated 192 million tonnes of soil are lost to erosion every year, of which 44 per cent comes from pasture (McIntyre et al, 2019; Our Land and Water, 2021).
- Over the past 30 years, land use has also intensified with the shift from sheep and beef farming to dairy farming that requires more resources (MfE and Stats NZ, 2021b, also see [dashboard above](#)).
- Intensive irrigation and fertiliser use over the last two decades also put pressure on the environment (see the irrigated land area and the nitrogen in fertiliser sold statistics in the [dashboard](#)). Leaching of nutrients and erosion sediment from agriculture and forestry have caused declines in freshwater and marine quality (MfE and Stats NZ, 2020b).

- Intensive land management practices can degrade the quality of the soil. Soil quality indicators of monitored sites between 2014 and 2018 showed:
 - signs of compaction at nearly half of sites
 - 40 per cent had too much phosphorus
 - 26 per cent of cropping sites had too little soil carbon, which can be attributed to soil disturbance
 - 20 per cent of sites met all seven soil quality targets (see dashboard above and indicator: [Soil quality and land use](#)).
- These soil quality states and pressures have generally persisted since the mid-1990s when the monitoring was first established. While no signs are evident of further degrading, nationally soil quality is not improving either despite promotion of best management practices (MfE and Stats NZ, 2021b).

Climate change puts further pressure on soil degradation, with extreme events such as floods and droughts increasing the risk of erosion and loss of valuable soil (Neverman et al, 2023). Also, export-driven demand encourages the intensive use of land and soil for production on the limited and diminishing amount of productive land we have (MfE and Stats NZ, 2021b).

Environments in urban areas are polluted

Many cities and towns in Aotearoa New Zealand have polluted air, land and water. The precise extent is not known (MfE and Stats NZ, 2018). In 2022, the population was about 5.1 million people, growing by more than 1.6 million people since 1991 (Stats NZ, 2022a). The growing population has increased pressure on the environment, particularly in urban areas where 83.7 per cent of New Zealanders live (EHINZ, nd). This pollution comes from many sources, including home heating, vehicles, historic industries, waste, wastewater and stormwater (MfE and Stats NZ, 2019). A polluted urban environment harms human health and reduces people’s ability to engage with nature (Panagopoulos et al, 2016).

- It is estimated almost 18 million tonnes of waste are generated per year, of which 72 per cent goes to landfills (MfE, 2021a). The amount of waste is also increasing. Between 2010 and 2019, it rose 48 per cent. Per capita waste increased more than 27 per cent (from 580 kilograms to 740 kilograms per person) annually over this time (MfE, 2021a). According to analysis of data from the Organisation for Economic Co-operation and Development (OECD), Aotearoa New Zealand ranked 29th out of 38 countries in the OECD in terms of waste management (Sensoneo, 2022). Only about a third of the material put out for kerbside collection is recycled or composted (MfE, 2022b).
- Levels of heavy metals in soil in urban environments are not only influenced by underlying geology but by human activity. For example, of monitored sites in urban Auckland, high-traffic locations were the most highly polluted, compared with native urban forest sites (Curran-Cournane et al, 2015).

Most of Aotearoa New Zealand’s future population growth will be in cities, and this will add pressure to pollution and waste in urban environments (MfE and Stats NZ, 2021a; MfE and Stats NZ, 2021b).

Drivers of future land change

The pressures outlined above will continue to affect the state of the land, wider environment, and people's wellbeing. The precise ways these pressures will affect people will shift, along with broader changes in society.

Local and global drivers of change – broad social, demographic and economic developments in societies – will also shape the future of the land in Aotearoa New Zealand. Some will increase pressures and demands on the land, while others may improve conditions. Understanding the likely directions of these trends is essential for understanding what the future might look like and what choices can be made in response.

This section outlines major drivers, in a broad sense, that will shape people's relationship with the land 30 years into the future (see [appendix 1](#)). Drivers are inherently interconnected; many will have overlapping causes and effects. The list is not exhaustive or exclusive. Our analysis was drawn from a larger list of specific drivers important to the future of land in Aotearoa New Zealand (see [table 1](#) in appendix 1)

Figure 1: Drivers of future land change

Drivers of future land change

Some drivers are local, others are global — all are interconnected.

DRIVERS OF CHANGE



Climate change
will have the most significant impact – increasing temperatures, changing rainfall patterns and raising sea levels.



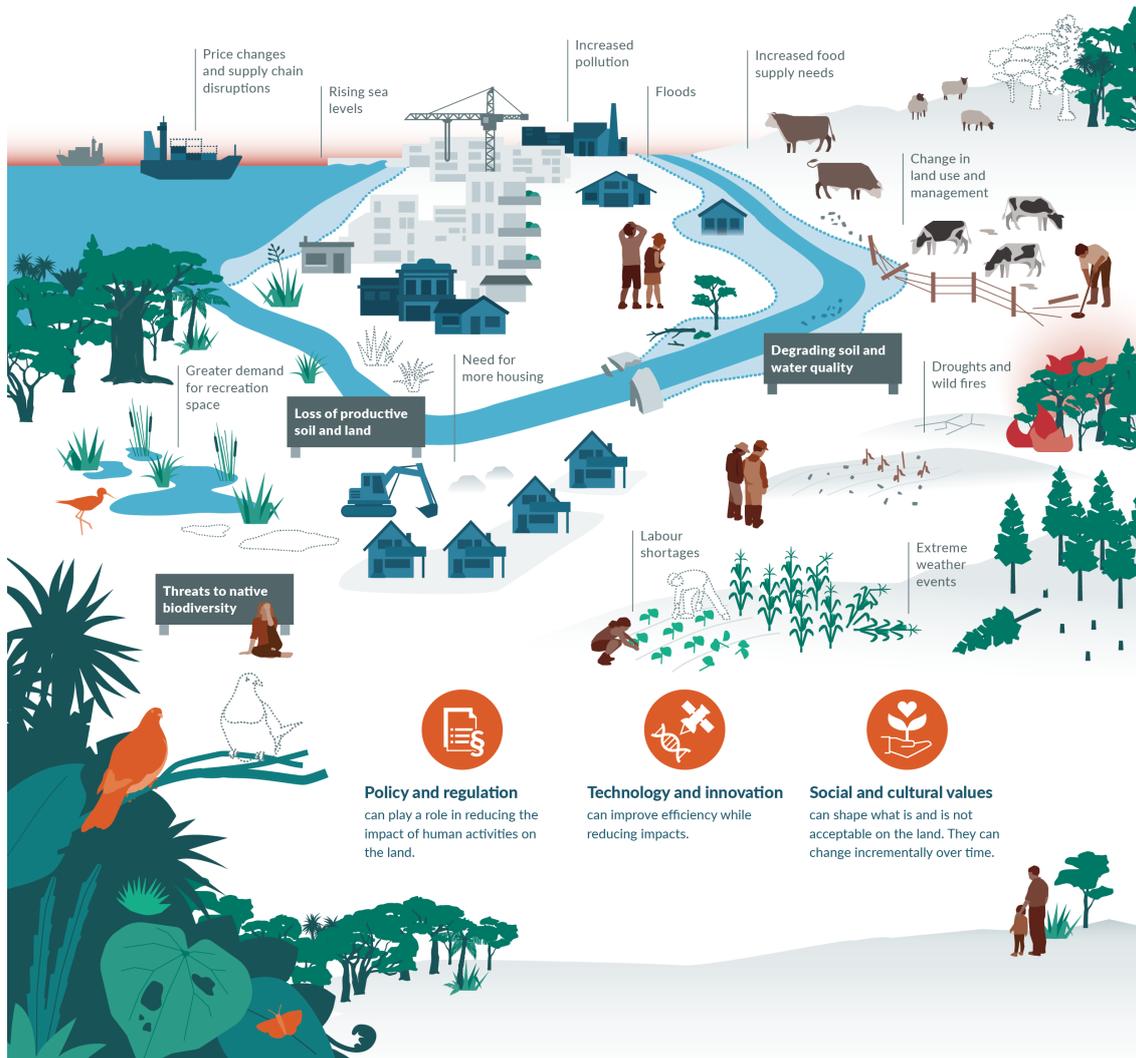
Population
is growing, with New Zealand projected to reach 6 million people by 2050 – affecting demand for housing, food and services.



Economic and consumer demands
for food, products and how they're made are a significant driver of land use.



Geopolitics and international dynamics
like conflicts, pandemics and economic conditions impact the local environment and people.



Climate change is raising temperatures and changing rainfall

The climate is warming at an unprecedented rate, and this will continue (IPCCa, 2022). Climate change has been identified as the most important factor influencing land use and the agri-food sectors in Aotearoa New Zealand (Driver et al, 2019). Climate change will also make many existing pressures worse – for example, increasing invasive pests and diseases (MPI, 2015). Climate change is already affecting Aotearoa New Zealand, through higher temperatures and

changing rainfall. The year 2022 was recorded as being New Zealand's warmest year on record (NIWA, 2022).

These changes have implications for the way land is used and managed. Climatic changes in some parts of the country may have benefits for agriculture, such as warming temperatures extending growing seasons (Ausseil et al, 2019b). However, any benefits will be far outweighed by negative effects, such as increased rainfall variability, droughts and water shortages, and heat stress to livestock (Ausseil et al, 2019b; Hendy et al, 2018). This will cause major losses to farming operations and negatively affect the wider environment (MfE, 2020a). If farmers want to position themselves more favourably, it would be beneficial for them to establish or maintain resilient land and soil ecosystems when responding to increasingly severe and frequent flood and drought events (Donovan et al, 2021).

Some land will no longer be suitable for its current use, due to flooding and sea-level rise (Ausseil et al, 2019b). Disruptions to ecosystems will give invasive species more opportunities to establish and spread, further harming native biodiversity (Macinnis-Ng et al, 2021; MfE, 2020a).

The direct effects of climate change and extreme weather will increase. Long-term plans will be needed to address rising sea levels, increased flooding and drought risks. Some land will become unsuitable for certain crops or for housing (Ausseil et al 2019b; Royal Society of New Zealand, 2016). Because of the high uncertainty over when and how extreme events will happen, planning needs to be flexible and adaptable (MfE and Stats NZ, 2020a). Water availability and security will be increasingly important for primary industries and the wellbeing of all New Zealanders.

The best chance of avoiding the worst effects of climate change is to limit global warming. The [emissions reduction plan](#) released in 2022 sets a direction to reduce Aotearoa New Zealand's emissions in line with international efforts to limit the global average temperature increase to 1.5 degrees Celsius (MfE, 2022d). This would require the average young person today to emit eight times less carbon dioxide than their grandparents (Hausfather, 2019).

While every bit of warming we avoid will reduce harm, current analysis shows the world is falling short of climate goals, and it is increasingly considered unlikely that global warming will stop at 1.5 degrees Celsius (Meinshausen et al, 2022; UNEP, 2022a; UNEP, 2022b). We will therefore need to adapt to the changes already happening. The [national adaptation plan](#) has policies and actions to adapt to the changing climate and its effects (MfE, 2022c). The emissions reduction plan lays out targets and actions across every part of government and the economy (MfE, 2022d). Investing in resilience and adaptive responses can also reduce some of the more challenging disruptions (MfE, 2022c).

Economics and consumer demand influence what New Zealanders make and use

An example of the interplay between drivers is the impact of the need to protect New Zealanders from the effects of climate change on the demand and supply of construction materials. Climate change and rising sea levels are going to put added pressure on rock supply for sea walls and their strengthening, riverbank protection and restoration. The construction of more renewable electricity generation such as wind, solar and geothermal will also require more use of aggregate and sand.

Demand for metals is also expected to increase. Many of the technologies required for the transition to low-carbon energy systems and infrastructure require more metal than their high-carbon equivalents. Demand for metals is expected to increase up to tenfold by 2050 (Hodgkinson and Smith, 2018). The extraction of the minerals and metals required to produce electric vehicle batteries, for example, can come at significantly high social and environmental costs. There is a need to take a systems approach, that is evidence-informed, when addressing the interconnections of drivers. This allows for more comprehensive, holistic responses to minimise or mitigate any intended or unintended perverse consequences.

Consumer demand for food products influences land use. Aotearoa New Zealand's export-driven agricultural sector is impacted by global trends: in 2018, 95 per cent of dairy and 74 per cent of beef and lamb were exported (Soliman and Greenhalgh, 2020). Consequently, international customers play an important role in determining what is produced and how (Saunders et al, 2016). It is likely producers will need to adapt in response to consumer demand for certain types of products or production methods (Leitzmann, 2014; Miller et al, 2014). Some consumer-demand changes will require incremental improvements and innovations, while others will bring more significant disruption.

Consumers are increasingly demanding more ethical and sustainable food products (Lees and Saunders, 2015; Saunders et al, 2016). The value of the organic sector in Aotearoa New Zealand grew by 20 per cent between 2017 and 2020 (OANZ, 2020). Consumer preferences for value over volume (Driver et al, 2022) have also led to greater interest in regenerative agriculture, which takes account of the diversity of farms in Aotearoa New Zealand (Grelet and Lang, 2021).

Alternative protein products could be one of multiple options with regards to concerns about the ethics and sustainability of intensive animal farming. While only a small portion of the global market – estimated at 2 per cent in 2020 – this is expected to rise to around 11 per cent by 2035, as price and taste become more comparable to traditional meat and dairy products (Morach et al, 2021). How Aotearoa New Zealand meat and dairy producers respond to these shifts can have a significant effect on farming land (Te Puna Whakaaronui, 2022).

With middle classes growing and emerging around the world, demand for Aotearoa New Zealand's primary sector products is likely to stay strong over the next decade and beyond (MPI, 2019a). Changes in dietary preferences and unequal crop-yield changes will also likely drive changes in commodity prices and trade policies, affecting the agricultural sector (MfE and Stats NZ, 2022). Land-use change might also be influenced by carbon prices, likely pushing towards a conversion of sheep and beef land into forestry (Ausseil et al, 2019a; Morgan and Daigneault, 2015; Timar, 2019).

Social and cultural values influence what is acceptable in Aotearoa New Zealand

As discussed in chapter 1, the value systems people use to think about the environment have a large role in shaping the land and people's relationship with it. For example, decisions on changes in land use in the primary sector have been influenced not only by economic pressures, but by societal factors such as age, gender, education, employment, attitudes and values (Journeaux et al, 2017). These values can shift over time. Beliefs and perspectives on issues such as climate change, waste, animal welfare and genetic modification continue to alter our practices and behaviour across generations.

Several examples can be found of changes in social and cultural values in Aotearoa New Zealand in recent years. The movement towards a circular economy is growing, where

resources are kept in use as long as possible and reused at the end of their lifecycle, so waste and pollution are minimised (MfE, 2022b). This has been championed at a grassroots level by individuals, community groups, iwi and Māori, and some businesses, as well as at a higher level by central and local government (MfE, 2021b).

This change can be seen in the increasing popularity of reusable containers and widespread public support for banning single-use plastic bags (MfE and Colmar Brunton, 2018; Stats NZ, 2019a). These behaviour changes have been influenced by shifts in values and businesses responding with sustainable alternatives as people become more aware of the environmental impacts of their choices.

Value shifts can be generational. Younger people are more likely to be convinced climate change is a result of human activities and be more worried about its effects. In 2019, the School Strike 4 Climate movement had an estimated 170,000 Aotearoa New Zealand members. Many participants were tamariki (children) and rangatahi (the younger generation), marching to demand further action on climate change (Handford and Maeder, 2020). As these younger people enter the workforce and progress into more influential positions in their communities, it is likely changes will result from these values. Value shifts can and do occur over time in discrete issue areas.

Global pathway scenarios to achieve sustainable futures are often associated with pro-environmental values and a recognition of the diverse values underpinning people's motivations and behaviour. Holding sustainability-aligned values may not be enough, though, with transformative change more likely to occur with empowering conditions for civil society and removal of barriers (IPBES, 2022b).

Population growth influences demand for and disposal of resources

The population of Aotearoa New Zealand is projected to reach 6 million by 2050 – an increase of around 900,000 from 2022 (Stats NZ, 2020). A growing population increases pressure on the land due to greater demand for food and fibre production, energy and clean water, infrastructure for waste recycling and disposal, space and materials for housing and public infrastructure, and recreation opportunities. Even if population growth is slower than projected, an ageing population is likely to increase housing demand through to 2050 (Hong, 2021). A growing population will affect different parts of the country in different ways, depending on where growth is concentrated and how fast it occurs. Decisions about how and where to build new homes and infrastructure will greatly shape impacts on the land.

To meet the needs of the growing population, demand for urban development will increase. A projected 265,000 new dwellings will be consented by the end of 2026 (MBIE, 2021a). To date, urban development has disproportionately encroached onto the best food-growing land in Aotearoa New Zealand (Curran-Cournane et al, 2021). There are increasing uncertainties surrounding our natural resources, such as water scarcity, climate change, war, and current and future global pandemics. This reinforces the need to consider drivers holistically when making decisions, some of which are irreversible, when it comes to ensuring the resilience and sustainability of food systems for every generation.

To reduce the area that would need to be converted to urban land and decrease pressure on the environment, urban density (rather than city expansion outwards) tends to increase. In the year to March 2022, for the first time in Aotearoa New Zealand's history, more multi-unit homes (25,475) were consented to be built than stand-alone homes (25,383) (Stats NZ, 2022b).

Policies are being implemented that have the potential to reduce effects on land around the edges of urban areas (MPI and MfE, 2019a; MfE, 2022f). However, deeper changes to consumption and lifestyle patterns will be needed to significantly reduce pressure on the land and environment stemming from increased demand for food, energy and housing and other needs.

Technology and innovation influence the way people live

Advances in technology can significantly reduce people's impacts on the land. In the agricultural sector, recent advances such as precision soil nutrient and irrigation delivery, genomics, data aggregation and sensors, and effluent treatments are letting farmers produce more with less environmental impact (Ekanayake and Hedley, 2018). Significant investments in agricultural technology are changing the sector and experts project this will continue, depending on adequate resourcing for research and implementation (MPI, 2021).

Lowering agricultural greenhouse gas emissions will be an essential part of meeting Aotearoa New Zealand's 2050 reduction targets (MfE, 2022i). Reducing methane emissions from sheep and cows is a high priority. Research on an effective vaccine or inhibitor that would suppress the growth of methane-producing microbes in livestock could help reduce methane emissions (NZAGRC, nd). While genetically modified crops are not currently cultivated in Aotearoa New Zealand, there is research into how the use of gene-editing technology could improve primary production (Caradus, 2022; Driver et al, 2022). Examples include gene-edited crops that could be more resilient to extreme weather, grow faster, require less water, and reduce cattle methane emissions (AgResearch, 2019; Caradus, 2022; Driver et al, 2022). Concerns include food safety linked to toxicity and allergenicity, environmental risks—associated potential changes to gene flow, as well as evolution resistance in weeds and insects, to name a few (Caradus, 2022).

For their first [Long-term Insights Briefing](#) the Department for Conservation and Toitū Te Whenua Land Information New Zealand (2022) are exploring how to help biodiversity to thrive through the innovative use of information and emerging technologies. This will help achieve the ambitious 2050 vision of [Te Mana o te Taiao – Aotearoa New Zealand Biodiversity Strategy 2020: Te mauri hikahika o te taiao – the life force of nature is vibrant and vigorous](#) (DOC, 2020).

Technological innovation will likely continue to improve efficient use of the land. Efficiency gains, however, do not automatically reduce pressures. When innovations increase production, pressures on the land and wider environment can remain the same or even increase (Hertel, 2012; Monaghan et al, 2021). The use of technology needs to be guided by evidence, values and policies that reduce pressure on the environment.

Policy and regulation influence how land is used

Governments can use laws and policies to directly influence how land is used. These include zoning and planning regulations that dictate the type and intensity of land use in specific areas. The Ministry for the Environment administers several regulations related to land.

Recent and proposed policy and legislative changes that aim to address challenges facing the land include:

- the [Resource Management System reform](#) (MfE, nda), which aims to provide for more sustainable use of land and better protection of Aotearoa New Zealand's indigenous

biodiversity, and to support the wellbeing of people and the environment for future generations

- the [National Policy Statement for Freshwater Management 2020](#) (MfE, 2020c), which aims to protect and enhance waterways, including managing activities that create pollution and excess sedimentation
- the [proposed National Policy Statement for Indigenous Biodiversity](#) (MfE and DOC, 2022), which aims to protect and restore native ecosystems
- the [National Policy Statement on Urban Development 2020](#) (MfE and MHUD, 2020), which sets out to ensure that there is sufficient development capacity to accommodate growth in the short, medium and long term
- the [National Policy Statement For Highly Productive Land 2022](#) (MfE, 2022f), which aims to protect versatile land by ensuring councils give greater consideration to where urban expansion and rural lifestyle living occurs and avoiding inappropriate subdivision
- the [National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health](#) (MfE, 2012), which sets out to ensure land affected by contaminants in soil is appropriately identified and assessed before it is developed and, if necessary, ensure that the land is remediated or the contaminants contained to make the land safe for human use
- the [National Environmental Standards for Plantation Forestry](#) (MfE and MPI, 2017), which aims to maintain or improve the environmental outcomes associated with plantation forestry activities, as well as increasing the efficiency and certainty of managing plantation forestry activities
- [Transforming Recycling](#), which is a set of policy proposals to improve waste collection and recycling by introducing a container-return scheme, improving household kerbside recycling, and separating business food waste (MfE, 2022b). Additionally, the Ministry's proposed Waste Strategy is intended to transform the waste system (MfE, 2021b). Among other things, it identifies what needs to be focused on over the next 10 to 30 years, to move towards a circular economy from a waste perspective
- the [Emissions Trading Scheme](#) (MfE, ndb) [emissions reduction plan](#) (MfE, 2022d), [national adaptation plan](#) (MfE, 2022c), and [He Waka Eke Noa](#) (MfE, 2022h) will influence how land use will be shaped by the policy and regulatory choices made to both mitigate and adapt to climate change. For example, the Emissions Trading Scheme and emissions reduction plan will influence the extent of planting of native and non-native forests, and potentially the financial incentives for investing in wetlands and other habitat types to sequester carbon. The He Waka Eke Noa Partnership delivered recommendations to the Government on a pricing system to measure, manage, and reduce on-farm agriculture greenhouse gas emissions and adapt to climate change, which the Government is currently consulting on, as part of progress toward implementation of an agricultural emissions-pricing system by 2025.

Government policies have a prominent role in reducing the direct effects of human activities on the whenua. Policy and legislative changes are, however, unlikely to be enough on their own, especially with a changing climate and dependencies on other socio-economic drivers. Multiple factors influence land managers' decisions, with research showing that policies and regulations alone are unlikely to result in a transition to more sustainable alternatives (Journeaux et al, 2017; Renwick et al, 2022).

The complexity of the challenges and the links between them will require a system-level approach. To achieve enduring, systemic change in an increasingly dynamic context, a wider set of tools will be needed.

Geopolitics and international dynamics influence the local environment

Because of the size of the primary export sector and Aotearoa New Zealand's reliance on global commodities, the wellbeing of the land here is connected to international dynamics. The past few years have highlighted how connected the country is to global events. The biosecurity risks related to, for example, the threats and spread of *Mycoplasma bovis*, myrtle rust and the Queensland fruit fly have had significant effects. This is in addition to the more general impacts of the COVID-19 pandemic, the war in Ukraine and global inflation.

International fuel and fertiliser price increases, labour shortages, supply-chain disruptions and grain shortages are directly affecting local horticulture, agriculture and forestry (Australia and New Zealand Banking Group Limited, 2022). Intensifying global concern for food security may increase pressure on production here, driving up prices and therefore affecting the wellbeing of the environment and Aotearoa New Zealand society (Te Puna Whakaaronui, 2022).

Aotearoa New Zealand's reliance on imports increases its vulnerability to global events. For example, phosphorus fertiliser is considered essential for growing crops. However, imports of rock phosphate needed to produce this fertiliser may be threatened by geopolitics, as well as difficulties along the shipping route (Powers et al, 2019; Wall, 2019). Alternatives are available that could enhance the country's resilience to these pressures, such as recovering phosphorus for fertiliser from waste products, but this would require large investments in technology and infrastructure (Ahuja et al, 2020; Powers et al, 2019).

Geopolitics and international dynamics have the potential to influence social and political values, as well as the physical and economic environment. For the first time, the IPCC has called out the impact of misinformation and politicisation of climate change science (IPCC, 2022b). The working group noted that in North America "vested interests have generated rhetoric and misinformation that undermines climate science and disregards risk and urgency" (p 2). This misinformation has resulted in public misperceptions about the risks of climate change and delayed action.

While differing political and media structures may have insulated Aotearoa New Zealand from some of the more extreme impacts, misinformation, disinformation and polarisation are increasingly impacting New Zealanders (De Coninck et al, 2021; Gluckman et al, 2021; Newlands, 2020). The [draft National Security Long-term Insights Briefing](#) explores the challenge of disinformation (and misinformation), noting that New Zealanders are particularly concerned about the impacts of disinformation (DPMC, 2022b). In recent years, the COVID-19 pandemic has demonstrated how easily beliefs based on misinformation or disinformation can spread around the globe, and how those beliefs have the power to lead to significant consequences at a local level (Clark, 2022; De Coninck et al, 2021; Hannah et al, 2022; Robie, 2022).

It is not possible to predict exactly what international pressures and shocks the country will face through to 2050. It is likely Aotearoa New Zealand will remain economically reliant on land use for global markets, as it has for the past century and a half. It is plausible that significant economic, geopolitical or biosecurity disruptions could force changes in the country's economic structure and land-use patterns (OECD, 2021).

Regardless of the drivers influencing land-use change, the impact of anthropogenic activity on the land has been a major contributor of biodiversity loss and environmental degradation (as summarised at the beginning of chapter 2). Under certain circumstances, the application of good management practices or diversification of land use within, for example, a farm will not be enough to achieve various outcomes such as freshwater quality, and alternative land uses will require consideration (McDowell et al, 2016; 2021).

We must respond to drivers of change to create a future that enhances the resilience of the land

The main drivers that shape the wellbeing of people and the use, management and care of land are complex and deeply interconnected. This makes it difficult to predict the likely state of the whenua in 2050. As the COVID-19 pandemic has shown, sudden shocks – whether political, economic or environmental in nature – can dramatically change domestic and international circumstances. However, our understanding of pressures on the land is continually improving, as are the main drivers of change that will be important over the coming decades.

Not everyone will be affected equally by whatever changes come. This therefore adds complexity to understanding the future and how we ought to respond to the drivers of change. People’s vulnerability to climate change differs substantially among and within regions (IPCC, 2022a). This is driven by patterns of socio-economic development and marginalisation, as well as historical and ongoing patterns of colonialism and inequity. It is increasingly being recognised that environmental stewardship and justice can only deliver if they are deeply embedded into societal norms. This may require significant shifts in the deep-seated values in society and the impacts on our relationship with the environment (IPCC, 2022a).

Without intervention, climate change will likely make existing inequities worse in Aotearoa New Zealand. Communities that are already vulnerable will probably face increased hardships. Māori will be particularly affected (MfE, 2020a). As tangata whenua, Māori are especially reliant on the environment for cultural, spiritual, social and economic value.

Increased inequities will adversely affect social cohesion, people’s sense of identity and belonging, and worsen physical and mental health issues (MfE, 2020a).

This brief outline suggests challenges ahead for the land and the aspects of people’s wellbeing which depend on it. To improve the state and resilience of the land, despite these increasing challenges, requires urgent and integrated meaningful action.

If the future impacts of people’s actions are not factored into decision-making, prospects for improving the wellbeing of people and the land are limited. As well as looking after the land today, we must all equally ensure it can provide for the wellbeing of future generations. Navigating the forces shaping the land and uncertainties of the future will be challenging. The next step is to work out where we as a country want to go and use that vision to guide us.

3 Aspirations for the future of the land

Introduction

Chapter 2 outlines the issues currently facing the land and the main drivers of change that will affect it into the future. If action is not taken now, and the current trajectory continues, people's wellbeing and that of generations to come will be affected.

These trends are not set in stone. By understanding how drivers of change interact, and the possible outcomes, we can proactively build the future we want. At the same time, it is important to improve the resilience of the land to help protect it from future shocks, both expected and unexpected.

This chapter outlines a possible future for the whenua in Aotearoa New Zealand. What do we as a country want the land, and our relationships with it, to look like in 2050 and beyond?

The aim is not to accurately predict what will happen, but to use a process known as 'futures thinking'. This is a "creative and exploratory process ... seeking many possible answers and acknowledging uncertainty" (DPMC, 2021b).

After identifying an aspirational future, chapter 4 looks backwards from this vision to the present day and outlines a path for how we could get there.

This is part of the Ministry's duty as an environmental steward: to look ahead and provide advice on future challenges and opportunities to move towards a more sustainable future. The Ministry also has a broader role to ensure stewardship for the environmental system as a whole, which is a duty of the Aotearoa New Zealand public service (DPMC, 2022a).

A vision for the future of land

This chapter aims to gain some insights into New Zealanders' aspirations for the future of land in Aotearoa New Zealand. To do this, we held workshops with rangatahi and the Ministry's executive leadership. We also conducted an online survey for members of the public to provide input. We then stress tested what materialised and sought final perspectives from a second round of public consultation (see 'Public consultation' below). It is acknowledged that the sample size involved in creating a vision for the future of the land is small and may be affected by bias towards those who share concerns about the environment.

Insights from these targeted engagements provide a vision oriented towards improving and balancing the wellbeing of people and the land. This is linked to outcomes that ground this vision in plausible changes to reduce environmental pressures and bring the wellbeing of people and land into alignment.

The groups we engaged with expressed overlapping visions for the future of the land. One thing that became clear is an emphasis on relational values. Many people see themselves as part of the environment, with a responsibility to give back to the land as much as it provides. While equal weight needs to be given to intrinsic and instrumental values (IPBES,

2022a) – which was emphasised in the second round of public consultation – a common theme in the engagement was a strong desire to have reciprocal connections with the land reflected in any decisions.

This view of environmental responsibility aligns in many ways with Māori understandings of te taiao. The following whakataukī (saying) sums up this connection:

Ko au te whenua, ko te whenua, ko au.

I am the land, and the land is me.

From these collective insights, five main challenges emerged that could reshape people's relationships with the land, and which have wider applications for the environment as a whole – that is, how might we:

- empower tangata whenua to more meaningfully exercise kaitiakitanga?
- protect, revitalise and make the land more resilient?
- enable action and responsibility for improving land?
- ensure all New Zealanders have opportunities to experience their connections with nature?
- embed an intergenerational perspective and live within environmental limits?

Overall, a desire exists to create a future that focuses on:

Deep environmental responsibility and reciprocity as a core uniting societal value in Aotearoa.

The following sections explore in more detail what the future could look like if these challenges are met, and we live up to our aspirations for the future of the land.

Empower tangata whenua to more meaningfully exercise kaitiakitanga

In the aspirational future, Te Tiriti o Waitangi is honoured, including its provision of kaitiakitanga and rangatiratanga for iwi, hapū and future generations. Mātauranga and tikanga Māori are authentically incorporated into the way all people in Aotearoa New Zealand interact with the whenua and te taiao. For Māori, mātauranga and tikanga Māori are inherently connected to the whenua and te taiao. This connection is crucial to iwi and hapū identity, sense of unique culture and ongoing ability to keep mātauranga, tikanga and mahinga kai practices alive.

Māori have led climate change adaptation action to sustain and grow their spiritual, cultural, and economic connections to the whenua. Māori exercise their rangatiratanga to protect the whenua. This challenge extends across all aspects of the environment.

Protect, revitalise, and make the land more resilient

Action has been taken to ensure the land is more resilient to the effects of climate change. This includes helping native species adapt when the changing climate creates new threats, such as new or more widespread invasive species.

Similarly, steps have been taken to limit human impacts on native ecosystems. Ecosystems have been revitalised and restored to be resilient to future change, to fulfil environmental functions and be valued by local communities. This includes restoring the conditions of native ecosystems in ways that support mauri, and understanding the whenua as a living entity that regenerates health and vitality to support life.

Urban sprawl has been limited, as has conversion of vulnerable areas to farmland or plantation forestry. Suitable land uses have been matched to the capability of the land, and non-productive land has been returned to nature while ensuring an equitable transition by supporting rural communities. Action has also been taken to protect and restore productive soil ecosystems, and efforts have been made to both protect highly productive land and prevent people's pollutant and contaminant impact on the land.

Enable action and responsibility for improving the land

Environmental impacts of people's choices are made clear in decision-making at all levels of society. At a systemic level, steps have been taken to shift the economy from one that is linear and extractive to one that is transparent, circular and sustainable. This involves moving away from a short-term, growth-oriented society to one where the ecological footprint has been minimised.

Agriculture, forestry and food systems continue to provide material and economic needs, supporting prosperous and vibrant rural communities, while simultaneously working to further restore and enhance the sustainability of land and soil ecosystems. These changes recognise that land can contribute in different ways to both the economy and identity of Aotearoa New Zealand and that sustaining the land into the future is essential for the physical, mental and economic wellbeing of every generation.

Proactive planning has made communities better able to deal with the already unavoidable effects of climate change, while allowing people to reduce their emissions in the future.

Ensure all New Zealanders have opportunities to experience their connections with nature

People's lives are more in tune with the environment and are on a path towards deeper environmental care. All communities are empowered to live sustainable lives that are affordable and promote health and wellbeing. People value their connections to the land and the responsibilities of kaitiakitanga that come with it.

Everyone in society, including people with disabilities, has ample access to nature in a way that improves their wellbeing. These enhanced connections to the land also contribute to its protection and restoration.

Embed an intergenerational perspective and live within environmental limits

Environmental education and learning opportunities are accessible to everyone, especially tamariki and rangatahi. This enhances awareness of society's impacts on the land to help build a future in which Aotearoa New Zealand lives within its environmental limits. A long-term, intergenerational perspective has been embedded into people's decision-making across

society, ensuring the demands of the present do not override the needs of future generations and the sustainability of the land.

Engagement perspectives

The groups we spoke with had strong commonalities in their visions for the future of the land. Some differences in areas of emphasis were expressed and are briefly summarised below.

Workshops with rangatahi

We intentionally undertook targeted engagement with different rangatahi, because we need to deliver more for young people and succeeding generations. The long-term state of the whenua will be a core part of their lived experience. Therefore, it is essential we understand young people's aspirations for building the future.

Our engagement with rangatahi was mostly in the form of workshops but also included less-formal hui and discussions. We held sessions with the following groups.

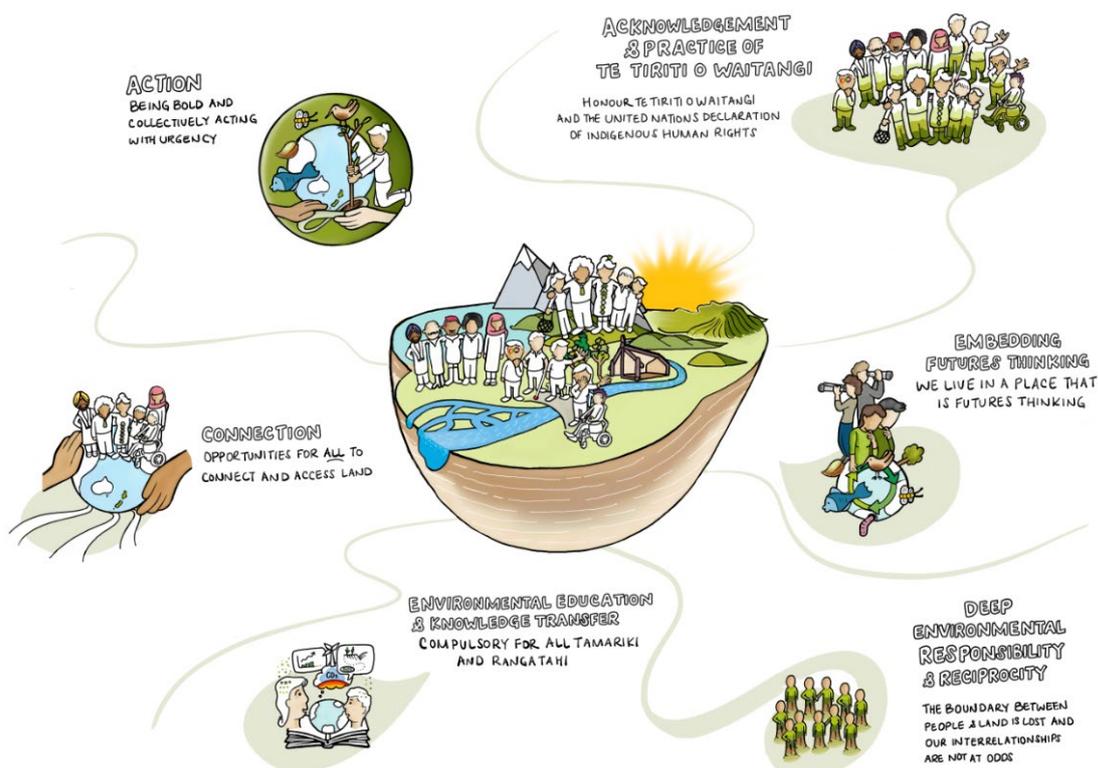
- I. Lead Youth with Disabilities
- Young people from ethnic communities, in collaboration with the Ministry for Ethnic Communities
- BLAKE Leader Alumni (young environmental leaders)
- The Hive (youth policy engagement group)
- Young Māori designers and strategic partners within Jasmax.

Six main themes emerged from the workshops (shown in figure 2).

1. **Action** – being bold and collectively acting with urgency.
2. **Connection** – opportunities for all to connect to and access land.
3. **Deep environmental responsibility and reciprocity** – the boundary between people and land is lost, and our interrelationships are not at odds.
4. **Environmental education and knowledge transfer** – environmental education is embedded into the curriculum for all tamariki and rangatahi.
5. **Acknowledgement and practice of Te Tiriti o Waitangi** – honour Te Tiriti and put into practice the [United Nations Declaration on the Rights of Indigenous Peoples](#).
6. **Embedding futures thinking** – we live in a place that is futures thinking.

Further details of the rangatahi engagement workshops are in [appendix 2](#).

Figure 2: Summary illustration of rangatahi aspirations for the future of whenua 2050³



Darren Yates, Pou Urungi at Jasmx, shared this reflection on changing our worldview:

I think the current environmental issues, crises, that we are seeing, are a manifestation of a worldview that sees humans at the centre of the universe and separate from their environment. ... Ānei te mate i te taiao, this is one of our main problems when it comes to any environmental issue. Nō reira he aha te rongoā? So what’s the remedy?

Mōku ake, I think the remedy is to focus on our own collective transformation. Focus on education programmes for our rangatahi, tamariki, that (in our context) normalise a te ao Māori worldview, one that’s underpinned by Māori philosophical assumptions about the universe and our position in our universe. A te ao Māori worldview is deep and long, deep in knowledge and understanding, but also long in understandings of time.

Thinking a thousand years into the past is normal, and therefore when planning, thinking a thousand years into the future is also normal. Knowing (through knowing your histories) how your tūrangawaewae was a thousand years ago, five hundred years ago, a hundred years ago, and then seeing it today and what has changed over that time, helps one see things from a much broader perspective. Knowing how things were, and how things could be, gives one a belief in what is possible. Koinei te mea matua, to me this is the main thing, transforming our worldview. We can’t help our taiao using the same thinking that is hurting her, we need to reconnect to her and start listening again.

³ An illustrator from Sketchability attended each workshop or hui with rangatahi to capture shared insights (appendix 2), before summarising the main themes that materialised, as shown in figure 2.

Ministry vision

The Ministry's role as an environmental steward gives it an active part in helping realise New Zealanders' aspirations for their relationships with the environment and moving towards a more sustainable future. The Ministry's vision for the future is captured in its strategic framework, which is premised on: "He taiao tōnui mō ngā reanga katoa | A flourishing environment for every generation". This was explored further through a workshop with members of Te Pūrengi, the Ministry's leadership team, and one-on-one engagement with the Secretary for the Environment.

The main themes that emerged from these engagements were:

- embedding environmental responsibility as a core social value
- enabling concrete actions to protect and restore the land
- taking responsibility for the benefits we draw from te taiao
- embarking on a path towards a deeper environmental stewardship role for all New Zealanders.

Public consultation

First round of public consultation

To gain the views of a broader range of New Zealanders, we ran a first round of public consultation (from 5 to 18 May 2022) seeking people's input on the future of the land. The consultation was in the form of an online survey and received 49 responses, consisting of both closed- and open-ended questions (MfE, 2022a). This is a small sample size and not representative of the Aotearoa New Zealand population.

Some main findings that emerged from the consultation were as follows.

- People acknowledge that the land supports their wellbeing in many ways, with physical and mental wellbeing most prominently mentioned.
- Respondents want the legacy of this generation to be an improved natural environment where native species are protected, with a condensed urban form and reduced pollution.
- Relational values were emphasised, with respondents feeling people should embrace the role of kaitiaki and be more in tune with nature.
- People feel that making sustainable choices should be made easier, with technology and infrastructure identified as the main barriers.

See the [LTIB consultation summary of submissions](#) for further details (MfE, 2022e).

Following the public consultation, the Ministry was contacted by Ngāi Tahu and Manaaki Whenua Landcare Research, wanting to learn more about the LTIB and offering incredibly helpful support as we prepared the draft. Various conversations and hui followed, with sharing of insights, which contributed to the preparing of this LTIB.

Second round of public consultation

We conducted a [second round of public consultation](#) (from 5 to 18 October 2022) to share the topic with the public and seek a range of perspectives. This second round of public

consultation generated over 25 submissions from around Aotearoa New Zealand. One-third were submitted by individuals, and the remainder were from central and local government, industry bodies, NGOs and academics.

Around 70 per cent of respondents said they either ‘agree’ or ‘strongly agree’ that the described future aligned with their own aspirations for the land and New Zealanders’ relationship with it.

We made some changes to the final briefing to incorporate or reinforce issues that resonated with respondents, and included some new suggestions (eg, a greater emphasis on supporting rural communities to prosper). There was an emphasis in submissions on the importance of environmental education and intergenerational perspectives, hence an additional ‘challenge’ was included (“to embed an intergenerational perspective and live within environmental limits”), to provide more recognition of these aspirations.

Te Rūnanga o Ngāi Tahu are currently developing their aspirations for Te Ao Turoa for 2050. They shared with us their Ngāi Tahu 2025 aspirations, which still resonate with them and some of which are reflected in challenge one (Ngāi Tahu, nd). Their aspirations have some close alignment with the defined function of Long-term Insights Briefings, focusing on the importance of instilling long-term thinking as a societal norm: “It is the responsibility of each age to learn the lessons of the past, to plan and prepare for the future”.

Limitations

It is noted that this is ‘an’ aspiration for the future of whenua by 2050 and does not represent all voices or visions of the people of Aotearoa New Zealand. The sample size from both rounds of public consultation and tailored workshops was small, albeit diverse, with a likely bias towards those who are already knowledgeable and concerned about the environment. Such a vision should be viewed in this context and cannot be extrapolated to the wider population, so we need to be mindful of this limitation. We can still draw from these shared insights. People already engaged with environmental issues are likely to have thought about potential futures.

Creating the future we want

The people we engaged with in our consultations shared a vision for the future of the land that involves enhanced roles for all New Zealanders. This includes an increased role for Māori as kaitiaki, for protection and revitalisation of the environment, and deeper connections with nature.

Many of these outcomes are in line with what is already being implemented by public sector agencies. For example, Te Mana o Te Taiao – Aotearoa New Zealand Biodiversity Strategy (DOC, 2020), Fit for a Better World (MPI, 2020), and the Ministry’s strategic priorities (MfE, 2020b). The outcomes also reflect a large body of evidence that highlights the need to move away from extractive and polluting activities to stay within a safe operating space for people and the planet (for example, Seaby Andersen et al, 2020).

However, to achieve the degree of change required, more concerted, strategic effort is needed across all levels of government and wider society. Chapter 4 identifies some of the main areas of change that can allow New Zealanders to come together and take practical steps to bring this future to life.

4 Transformational change

Introduction

Chapter 3 shared insights on an aspirational vision for the future of the land in Aotearoa New Zealand. In this future, through increased environmental responsibility, the whenua is rejuvenated and resilient, and the wellbeing of people is enhanced.

At present, many existing policy initiatives are addressing challenges facing the land, and technological innovation has the potential to reduce people's impacts. Individuals, community groups, and iwi, hapū and whānau throughout the motu (country) are working to protect and revitalise te taiao. These initiatives provide targeted solutions to specific challenges facing the land. Our current knowledge of the state of the land and drivers of change, however, suggests that these will not be enough. On our current path – given the pressures of climate change, population growth and consumption patterns – there is a significant risk the state of the land will continue to degrade (MfE and Stats NZ, 2021b; UNCCD, 2022).

An aspirational vision for the land highlights outcomes that could contribute to avoiding this risk: moving towards a circular economy and achieving a more sustainable relationship with the land, where people's wellbeing is enhanced while improving that of the land. This chapter identifies leverage points – important areas where changes can be made – that could advance us along this path. The land is wholly interconnected with the wider environment, as well as with all facets of society. An interdisciplinary and systems approach is therefore required when navigating towards a more aspirational future to ensure the resilience of land and bring about long-lasting change.

Navigating towards a better future

The vision outlined in chapter 3 gives us a destination. A next step is to work backwards to understand what is needed to get there. To achieve sustainable pathways, we need to identify the most important places in society where changes can be made. This can be through **levers**, such as incentives, laws, coordination and capacity-building. Information is also required to pinpoint where these interventions need to occur in the political and economic system. These are known as **leverage points**.

Levers can be applied at multiple leverage points and by various actors, including government, iwi, citizens, community and business (Chan et al, 2020). A wealth of research and international initiatives have focused on identifying leverage points to create sustainable pathways (Abson et al, 2017; Chan et al, 2020; Eliasson et al, 2022; Fischer and Riechers, 2019; IPBES, 2022a; United Nations, 2021a).

We used **backcasting** to help identify what potential leverage points might be needed to achieve transformational change. This is an analytical technique that works backwards from a desirable future to determine the actions and intervention points we need to focus on now (DPMC, 2021b; Inayatullah and Milojević, 2021). A backcasting workshop was held with more than a dozen subject-matter experts from across the Ministry ([appendix 3](#)). This included specialists in te ao Māori, land and soil science, food systems, climate change, economics, ecology, and political and behavioural science. From this process, we identified a set of leverage points of change ([figure 3](#)).

We refined these leverage points into nine high-level areas with the potential to move Aotearoa New Zealand towards an aspirational future. They may not be the only ones that will be needed. The complexity of the drivers, the pressures facing the land, and the scale of changes needed mean many pathways are possible. Most are not radical departures from the work already underway in Aotearoa New Zealand. They reflect our insights on important initiatives that need to be enhanced and coordinated to scale up change at the speed required to meet our goals.

With these leverage points, we hope to provoke discussion about how Aotearoa New Zealand can transition to a more sustainable relationship with the land.

Leverage points to influence change

Achieving meaningful change means confronting the root causes of the pressures facing land and the wider environment. Systemic issues span many domains, from the biophysical to the social, economic and legal factors that continue to harm the environment (Abson et al, 2017). As has been seen, these issues intersect with and influence one another and are compounded by future pressures and uncertainties. This increases the complexity of the challenge, but also provides many points of entry to change things.

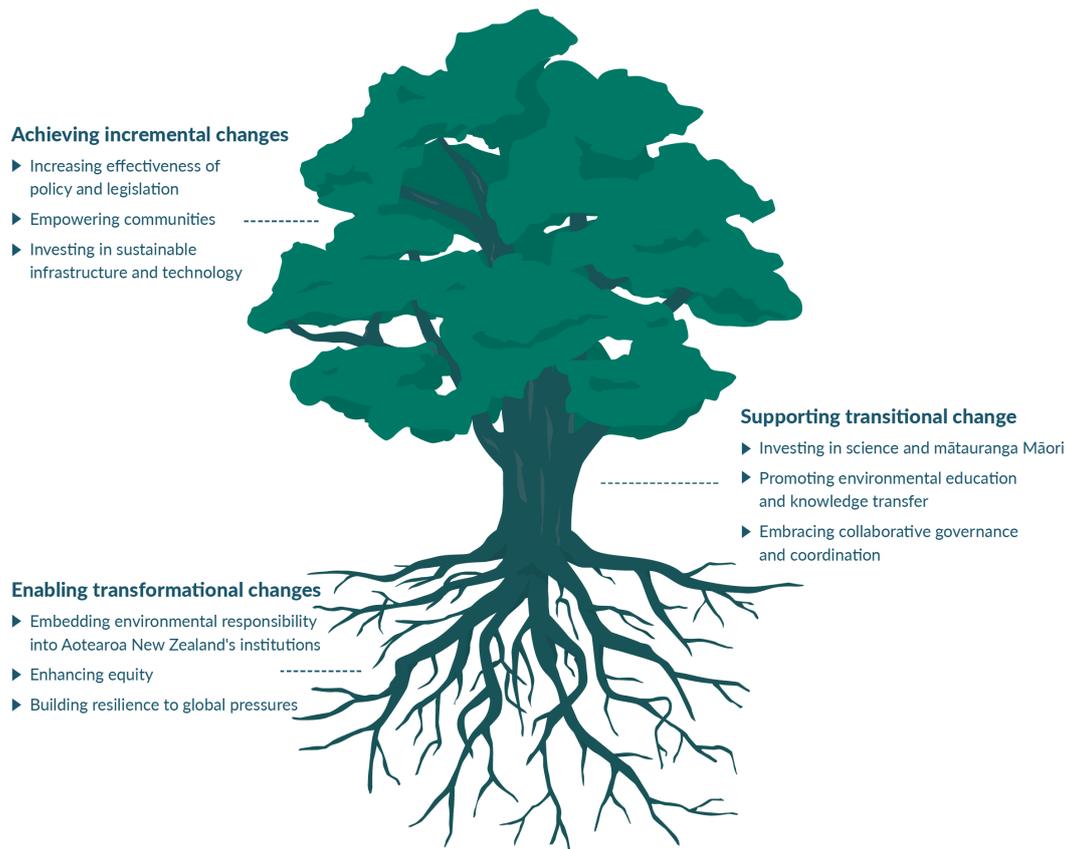
Three tiers of leverage points can be used to influence change (Abson et al, 2017; Betley et al, 2021; Koskimäki, 2021), as shown in the diagram of the tree (see figure 3).

- The top tier, represented by the leaves and branches, corresponds to interventions that could be most easily actioned **and help achieve incremental change**. These leverage points are effective at enhancing resilience and addressing specific events but have less impact on the system as a whole (Abson et al, 2017; Meadows, 1999).
- The middle tier, represented by the trunk, help achieve **transitional change**. These leverage points go deeper into the origins of environmental problems and help transition systems and institutions for more widespread change.
- The deepest tier, represented by the tree roots, help achieve **system transformational change**. These leverage points address the root causes of Aotearoa New Zealand's environmental issues. While more complex and challenging to implement, they have greater ability to bring about long-lasting change (Chan et al, 2020).

We identified three leverage points for each tier. Ultimately, the transformational potential of these leverage points lies in their holistic interaction. However, some points may involve deeper changes to society than others and can potentially apply to multiple tiers. We assigned leverage points at the tier where their influence can be greatest. Each of the nine leverage points is explored in more detail below.

Three case studies are included, to show some of the leverage points in operation on the ground and highlight how they could be applied in practice.

Figure 3: Identified leverage points for environmental change



Achieving incremental change

Increasing effectiveness of policy and legislation

Policy and legislation are important tools in protecting and ensuring the resilience of the land. Aotearoa New Zealand is well served by an active agenda of policies, strategies and legislation that are directly addressing the specific pressures on the land today (see chapter 2). Policy effectiveness can be enhanced through more robust monitoring and implementation, and by expanding the scope of existing tools to new areas.

Given the complexity and uncertainty of the challenges facing the land, it is critical that policymaking is transparent, accountable and evidence based. A robust policy-effectiveness monitoring system is needed to ensure laws and policies are doing what they are supposed to. This will provide evidence to show whether a policy is justified, or further shifts are needed to achieve the intended outcome.

Effectiveness monitoring – supported by robust collection of data, and independent monitoring and evaluation of outcomes – also provides an overview of whether different policies are working together, ensuring a holistic systems approach rather than isolated initiatives. Understanding the complex factors that influence decisions about land-use change is important when deciding which tools to use (Renwick et al, 2022).

In the future, policy and legislation will continue to directly address issues in how the land is managed. Additionally, further scope exists to apply policy tools more broadly to indirectly protect, rehabilitate and ensure the resilience of the land. Economic incentives, which include taxation, financing and trading schemes, are an important example. Economic incentives are

designed to affect the decisions of consumers and producers by offering additional benefits for desirable behaviour, or penalties for undesirable choices (Opschoor and Turner, 1994).

Aotearoa New Zealand already has significant experience using economic incentives in environmental policy. Prominent examples include the Emissions Trading Scheme and national waste disposal levy. Many areas exist where the use of economic incentives could be expanded. For example, long-standing analysis by the OECD has highlighted the potential of biodiversity incentives across 22 countries (OECD, 1999). Efforts are underway exploring the possible introduction of national biodiversity incentives in Aotearoa New Zealand, and markets for biodiversity have been proposed under the draft implementation plan for the National Policy Statement for Indigenous Biodiversity (MfE et al, 2022). The potential exists for these tools to further incentivise nature-based solutions.

Potentially, economic incentives could be used to speed up the transition to a circular economy. This could reduce extractive and waste-disposal pressures on the land, because a significant proportion of resources and materials would continually be reused (European Commission, 2020). Regulation of the planned obsolescence built into many contemporary objects could be targeted to expand the market for repairable and more durable products (Maitre-Ekern and Dalhammar, 2016). This could also extend to incentives for the development and uptake of new technologies, and penalties for continued use of polluting technologies (Karacaoglu, 2015).

International precedents exist for such policies. For example, as part of a broad effort to reduce material and energy waste from the automotive sector, China has implemented various subsidies for companies that collect and remanufacture automotive parts, while offering incentives to consumers who purchase these remanufactured parts. The incentives have helped reduce landfill usage, encouraged expansion of the secondary market in parts, and led to the emergence of the remanufactured industry as a strategic sector that is decoupled from resource use (Ellen MacArthur Foundation, 2022).

Policy and legislation will be important mechanisms for the government to use to support and roll out other leverage points for change.

Investing in sustainable infrastructure and technology

Integrating sustainable infrastructure and technology as they emerge is essential for reducing people's impacts on the land (Chan et al, 2020). Many existing infrastructure and technology systems are oriented towards unsustainable land use and environmental practices. With better regulation and planning, investment can be deployed in technology and infrastructure to reduce people's impacts on the land while retaining and enhancing resilient connections to it, including through sustainable economic utilisation.

Aotearoa New Zealand already faces a deficit in both infrastructure funding and investment in research and development (OECD, 2022a). Increasing spending in these areas is part of the solution but does not guarantee improved outcomes for people and the land. A more strategic and holistic approach towards research and development funding could facilitate long-term investments necessary for the development of transformative technologies.

It is also critical that government institutions incentivise investments that will lead the country towards a sustainable future, because the market will not do so unregulated (Chan et al, 2020). Similarly, it is important that increased public investment is guided by strong considerations of equity, including a focus on engaging with Māori aspirations, as well as the needs of regional communities.

A number of possibilities exist to ensure infrastructure and technology investment leads people in the right direction. One option to explore could be incentivising technologies that reduce the direct impacts of humans on the land from both food production and urban expansion (Karacaoglu, 2015). For example, the Riddet Institute, an Aotearoa New Zealand Centre of Research Excellence, is receiving funding to undertake a research programme on 'Future Foods in Harmony with Nature'. It is focusing on the deployment of emerging technologies to allow for a transformation of Aotearoa New Zealand's food system to be less carbon and resource intensive, while enhancing nutrition outcomes (Massey University, 2022).

A second option could be the development of accessible, active, affordable and low-impact transportation solutions which link increasingly urbanised populations with the whenua (Mandic et al, 2020).

A third option, convergent with the emphasis on evidence-based policymaking, is to pursue greater investment in environmental-monitoring technologies that leverage advances in digital and remote observation capabilities (DoC and Toitū Te Whenua, 2022; EPA, nd).

Empowering communities

People's interactions with the land start in their communities. Enabling actions at the local level is an effective tool for creating resilience to and changing the trajectory of pressures on the land over the long term. Community mobilisation could help Māori support the mauri of the whenua (Hond et al, 2019). How communities drive sustainable relationships with the land is ultimately determined by the communities themselves.

Improving access to long-term funding would support increased community action on environmental issues (Cawthron Institute, 2022). Investment in leadership, knowledge transfer, and capacity-building will also help build and sustain networks (as seen in the Thriving Southland case study [below](#)).

Supporting capacity development within Māori communities at both the iwi and hapū level could also enable more effective community responses (Williams et al, 2018). For example, guidance sought from Māori with expertise in mātauranga Māori can be valued by way of appropriate resourcing, supporting capability development, and affording time to meaningfully engage with distinctive Māori collectives.

Fundamentally, the Government could evaluate its role in creating a supportive environment that fosters community relationships with the whenua. That might involve being more receptive to community interests, helping communities to take a greater lead in stewardship of the land to which they are connected, and addressing regulatory and other barriers to communities taking on those responsibilities. This is also true for youth and volunteer environmental groups.

Research and feedback from community groups suggest several important tools that central government could deploy to support community mobilisation and action (Superu, 2015). One growing initiative involves Para Kore partnering with iwi and others to transform waste management in marae and Māori communities, with a vision of zero waste. The initiative aims to increase reuse, recycling and composting of materials, and is supported through the Waste Minimisation Fund (MFE, 2021b).

Farming communities an exemplar of collective action: Thriving Southland

Thriving Southland is a community-led group that brings farming communities together to identify challenges and solutions for farming businesses into the future. The group is an enabler of change, supporting farmers to learn new knowledge and skills together, resulting in practical changes on farms. Because they engage with future-focused projects, farmers are building resilience and gaining a more positive outlook.

The project highlights the value in investing in communities. Thriving Southland supports 32 local catchment groups, with 1,300 farmers and community members in the network making positive, lasting change on farms to meet the needs of the future. The project has received funding from the Productive and Sustainable Land Use Package and the Change and Innovation Project, administered by the Ministry for Primary Industries.

Facilitating the transfer of relevant knowledge is important. Many farming communities want to better understand and respond to environmental, economic, regulatory and consumer challenges. They are also keen to access new relevant science to help with informed decision-making. Robust science-driven data drives decisions as farmers respond to regulations and new policies.

Investment in science is delivered in highly engaging ways for farmers. As one catchment group member explained, science was a catalyst for “bringing a catchment together to find information and fix the issue”. Catchment groups are also creating stronger relationships: connecting with Māori to socialise iwi values, and working with scientists, local government, and other farmers helps embed sustainable change.

Thriving Southland’s support is targeted and responsive. It has resulted in catchment groups building farmer resilience, supporting wellbeing, and helping create a greater sense of community and shared purpose. Farmers see solutions emerge from collaboration: “a problem shared is a problem halved, and seeing farmers put their heads together and talk things out and collaborate.... is fantastic!” (Thriving Southland 2021 Annual Survey Respondent).

Thriving Southland discovered that a holistic approach is vital, because connections between farming, communities and the environment are highly complex. Changes in the environment are linked to animal welfare, the farming business model, and the people who live and work in farming communities.

Implementing these complex and interlinked changes in farming approaches takes time, and environmental outcomes may not be realised for 10 to 20 years. However, even in two years of Thriving Southland support, clear examples can be seen of how their help has inspired community action and enabled farmers to become active participants in creating a better and exciting farming future.

Thriving Southland is unique, acknowledging the need to look at all the pieces of the puzzle and work out the pathways forward, with the land user at the centre. Southland’s future is exciting, as the rural community engages in localised solutions to bring about change, simultaneously motivating collective actions and allowing people to learn from one another. Thriving Southland is inspiring the whole country.



Both images attributed to Thriving Southland

Supporting transitional change

Promoting environmental education and knowledge transfer

Education, and broader opportunities to share knowledge, ideas and skills, are essential for building environmental responsibility. Greater learning opportunities can help better prepare society for the challenges it faces through to 2050. The benefits of increased environmental knowledge can build up across generations. People's knowledge about their place within the environment and their effects on it help them make sustainable choices in line with environmental values, becoming better stewards of our finite natural environment.

Education is also important in enabling people to evaluate sources and navigate the volume of information they encounter. Misinformation is becoming more prevalent, and misinformation about the environment especially so (Classification Office, 2021). Providing people with the tools to better interrogate information has the potential to allow more informed personal choices, strengthen community cohesion and enhance public engagement.

Simply raising awareness through providing factual information, while necessary, is not enough to help people shift their behaviour in a more sustainable direction (Park, 2020). Information and education initiatives should tailor messaging to different population groups based on their respective barriers, motivators and preferred messengers or platforms. Along with raising awareness, initiatives should emphasise how people can take action in their own social context (Kollmuss and Agyeman, 2002).

Education initiatives work together with other leverage points, such as policy change. For example, dietary guidelines need to be reformed both nationally and internationally to align with both environmental and health targets (Springmann et al, 2020). The effectiveness of new guidelines will need to be supported by not only clear and consistent policy, but targeted promotion programmes to help better inform people's choices (Alexander et al, 2010).

In schools, embedding sustainability and environmental issues in the Aotearoa New Zealand Curriculum can be more effective when combined with participatory and action-oriented approaches to focus on changing long-term habits that will help empower students (MOE, 2019).

Education is not a one-way transfer of knowledge. More inclusive knowledge-building approaches through active learning can strengthen pride in a common environmental heritage across both urban and rural landscapes. This helps to build greater environmental responsibility (Sinner et al, 2022; Our Land and Water, 2019). Embracing mātauranga and kaupapa Māori values and approaches to stewardship of the land, without appropriation, is an important part of this.

Environmental education has focused on empowering young people as kaitiaki of the future (DOC et al, 2017; Williams, 2012). To embed a deeper sense of environmental responsibility across society, these efforts may need to expand in scale to reach all New Zealanders, while being adaptive to many different life situations. Efforts should focus on building capability to lift marginalised communities and enable them to take effective stewardship of their environment. Opportunities to influence and engage with the curriculum should be embraced (Te Kete Ipurangi, 2022).

Additionally, Aotearoa New Zealand's ageing demographic means older people are likely to represent an increasingly large segment of society (Stats NZ, 2020). Support through education could be provided for those in leadership positions in business, government and communities to make decisions that take into account the longer term.

Investing in science and mātauranga Māori

Aotearoa New Zealand has a unique opportunity to benefit from the insights of both science and mātauranga Māori to support the wellbeing of the land and all New Zealanders. Investment in research and the deployment of innovations could enable and empower New Zealanders to collectively adopt sustainable land- and resource-management approaches (Boston and Lawrence, 2018; CCE, 2022).

Mātauranga Māori offers a complementary approach to Western science and provides essential insights into the whenua of Aotearoa New Zealand. Investing in indigenous knowledge, practices, institutions and values in local communities enhances quality of life, and benefits society through nature conservation, restoration and sustainable use of resources (IPBES, 2019).

Development of innovations requires significant investment. Investment in research and development in Aotearoa New Zealand is low by international standards. Although increasing, this growth mostly comes from business, as public spending on research and development has stagnated over the past decade (MBIE, 2021b). Because innovations tend to have a high failure rate, businesses are likely to underinvest in them for collective benefits that have limited scope for profit. In 2021, only 15 per cent of research and development in the business sector was for the benefit of society (Stats NZ, 2021b).

Landowners and consumers must have confidence in the effectiveness of innovations before they will be used (McDowell et al, 2021). Increased investment in applied research and outreach could support land managers and guardians in adopting sustainable management practices, including those based on te ao Māori, mātauranga and tikanga. Such investments may need longer-term commitments to help overcome the fragmented, disconnected and incremental nature of the science system that is largely driven by short-term projects (Bardsley et al, 2020). This is particularly relevant to environmental research, collections and databases (PCE, 2020).

Increased public investment in science and mātauranga Māori, including applied science, would be beneficial (Koolen-Bourke and Peart, 2022). Equally important is the successful delivery and application of investment which, in many circumstances, requires robust long-term environmental monitoring to assess progress. The importance of monitoring should not be understated, as it helps us to understand whether investments, actions, policies and interventions are making a difference and are aligned with outcomes that need to be robustly ground-truthed, as reinforced by the PCE's more recent report (PCE, 2022).

Such comprehensive and coordinated monitoring programmes are also relevant to increasing the effectiveness of policy and legislation, outlined above. They are a cornerstone of stewardship, and are necessary for informing and shaping any incremental or transformational change initiative. Implementing effective monitoring will require working more meaningfully with local government, who are the custodians of extremely valuable but often underutilised data. Making data more useful through increased standardisation and consistency would provide a more comprehensive picture of how effectively various interventions are performing.

Co-investment funding between government and communities or businesses is one way to increase applied innovations in land management for the public good. Existing examples of this include [Sustainable Food and Fibre Futures funding](#) (MPI, 2022b) and the [innovation fund for sustainable marine activities](#) (Sustainable Seas National Science Challenge, 2022). The Ministry for Business, Innovation and Employment has also released a white paper, [Te Ara Paerangi – Future Pathways, that in its vision includes an RSI \(research, science and innovation\) system “that supports wellbeing for all current and future New Zealanders, a high-wage low emissions economy, and a thriving, protected environment through excellent and impactful research, science and innovation”](#) (MBIE, 2022a).

Opportunities exist to work collaboratively on environmental research and monitoring priorities. It is crucial for institutions and long-term funding to draw on transdisciplinary expertise that can support outcomes which holistically consider the whole system. This includes incorporating Māori worldviews and expectations. All of this can ultimately assist the government of the day when increasing the transparency and effectiveness of investment in the environment (PCE, 2022).

Embracing collaborative governance and coordination

The challenges facing the land are highly complex and have no simple solutions. Different people and groups may understand issues in conflicting ways, which can generate tensions and undermine long-term sustainable solutions (Dentoni et al, 2018; Head, 2022). Achieving enduring change that responds to the current context requires people to be actively engaged. Getting ownership of collective action means enabling a greater level of collaboration, and more participatory governance. Having an approach that lets everyone participate and ensures all voices are heard allows for a greater understanding of the complex and interconnected causes of environmental problems. It also allows for the development of more enduring solutions that work for the entire community (Ayala-Orozco et al, 2018; Butcher et al, 2019).

Many examples exist of successful collaborative governance in Aotearoa New Zealand (DPMC, 2021a). These could be scaled up. The role of government agencies is to make sure the systems, structures and resources are in place that allow the necessary networks and relationships to be built and maintained over time. These collaboration networks can be called upon to identify specific issues and navigate pathways for change.

Important areas of focus in building capacity for collaboration are:

- embedding an authentic treaty partnership model with Māori that upholds obligations under Te Tiriti o Waitangi and ensures te ao Māori and mātauranga Māori are included in the development of any response
- fostering youth leadership and the youth voice in decision-making (Krznicar, 2020; United Nations, 2021a)
- increasing coordination within and between government departments, particularly at the strategic decision-making level, to ensure agencies working across the environmental system are collaborating to create new solutions (Crowley et al, 2021; Scott and Gong, 2021). The new tool of interagency boards under the [Public Service Act 2020](#) could be explored further
- building public trust through increased engagement and participation in decision-making about the land (the focus of the [Public Service Commission’s LTIB](#) (Public Service Commission, 2022))

- building better relationships between central and local government, communities, and businesses, especially those in the primary sector and those directly affected by potential responses.

Aotearoa New Zealand’s largest harbour restoration programme a collaborative effort

The Kaipara Moana is the largest natural harbour in the southern hemisphere and one of global significance. It is home to rare and threatened species, including migratory birds from the northern hemisphere, and contains some of the rarest ecosystems in Aotearoa New Zealand, including sand dunes, sea grass, freshwater and estuarine wetland ecosystems.

The Kaipara Moana also has deep cultural and economic significance. The harbour is home to several iwi and hapū groups, with local taonga species providing food and medicine, underpinning cultural practices and connecting people to place. The Kaipara Moana is also the breeding ground for the country’s valuable snapper fishery.

However, decades of deforestation and land-use intensification have degraded the catchment. Today, less than 10 per cent of original native forest cover and 5 per cent of wetlands remain, leading to a seven-fold increase in soil erosion and associated sediment washing into rivers and the harbour.

On 9 November 2020, the Ministry for the Environment, Ngā Maunga Whakahii o Kaipara, Te Rūnanga o Ngāti Whātua, Te Uri o Hau, Northland Regional Council and Auckland Council signed a memorandum of understanding to establish Kaipara Moana Remediation (KMR) – the largest catchment restoration programme in Aotearoa New Zealand.

Less than two years later, efforts to revitalise the mauri of the Kaipara Moana are scaling up rapidly. During its first full year of operations, KMR worked with 285 land owners to deliver 205 new sediment reduction plans covering over 40,000 hectares of land and committing land owners to an additional 380,000 plants and 238 kilometres of fencing. This is more than the distance from Whangārei to Auckland. By 30 June 2022, 253 land owners were putting sediment reduction plans into action, with a focus on fencing land and planting native trees near waterways.

KMR has a dual focus on growing people into new ‘green economy’ jobs. Since November 2021, KMR has developed training courses to upskill over 50 local ‘KMR field advisors’, including tangata whenua, to work alongside land owners. KMR also accredited 17 nurseries and 22 local contractors, and generated more than 60,000 hours of work, bringing tangible benefits to local communities.

Crucial to KMR’s success has been its focus on enhancing both environmental and social outcomes. According to Pou Tātaki Justine Daw, “the KMR kaupapa is to invest in local people to develop and sustain meaningful, nature-based employment, and support people who whakapapa to the Kaipara returning home to work on the project”.

“KMR operates on a collaborative governance model to ensure that all of the founding parties’ views are understood and factored into decision-making,” says Justine Daw. “This inclusive approach helps ensure that KMR can effectively support community-led environmental action. Over a 6,000 square kilometre catchment, genuine partnership is key to achieving our goal of planting 20 million trees in the catchment over 10 years. By investing in communities, KMR is growing social equity and more sustainable, long-term relationships with the whenua.”



Image on the LHS attributed to Auckland Council and to the RHS attributed to Kaipara Moana Remediation staff member Griffin Hope.

Enabling transformational change

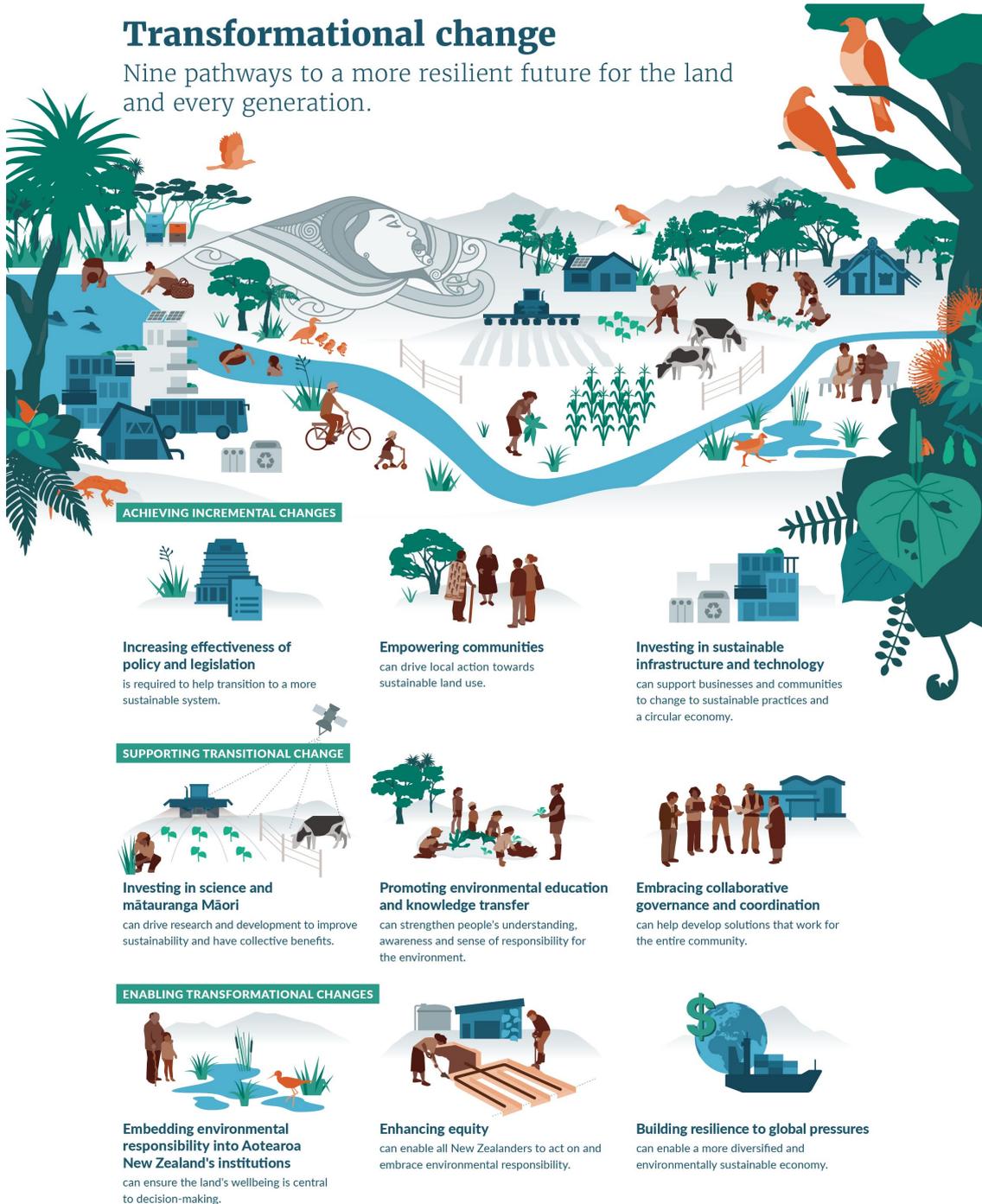
The six leverage points discussed so far could go a long way to improving the condition of the whenua and enhancing New Zealanders' wellbeing along with it. In themselves, however, the leverage points may not be enough to put the country on the path towards achieving the change that is needed to sustain a resilient future for the land and every generation. While making the changes above will result in incremental shifts, they are largely anchored within existing systems.

To get on the path to a sustainable future for the land, investigation may be needed on how to systematically transform our current structures, systems and institutions so that they better align with this goal (Abson et al, 2017; Atkinson, 2011; Chan et al, 2020; Lindblom, 1979). The aspirational vision for the environment shows people hold environmental values that cannot be delivered by the current way of doing things.

Organisations and research communities globally have identified the need for transformational change. The International Panel on Climate Change (2022) places a particular emphasis on transformation, defined as “change in the fundamental attributes of natural and human systems” to enable people to prevent the worst climate impacts and adapt to the already inevitable changes (p 7, note 16). Limiting global warming requires deep social changes related to practical, political and personal spheres (O'Brien, 2018). This is echoed in reports on the biodiversity crisis (DOC, 2020; IPBES, 2019, 2022a), the challenges facing the food system that also intersect with public health and ecological crises (Slater et al, 2022; The Aotearoa Circle, 2021; The Food and Land Use Coalition, 2021), and the failure to achieve the targets in the sustainable development goals (Naidoo and Fisher, 2020).

It is recognised that the pathway of perpetual growth cannot continue indefinitely on a finite planet that is already over-exploited (Carney, 2021; Rockstrom et al, 2009; Seaby Andersen et al, 2020; Steffen et al, 2015). Moving towards a more ecologically embedded circular economy and society (Daly, 2005) requires a deeper look at root-level opportunities to achieve social change (see figure 4). Such an approach may also provide further opportunities for Aotearoa New Zealand to lead the world in achieving a better relationship with nature, and with the land in particular.

Figure 4: Transformational change



Embedding environmental responsibility in Aotearoa New Zealand's institutions

To achieve the vision of enhanced connection with nature and taking responsibility for people's impacts requires a societal shift. Strengthening environmental responsibility requires rebalancing how economic and political systems value the land. Specifically, this could mean moving away from the dominance of an instrumental focus on land use within institutions, to a greater recognition of the intrinsic value of the land, and the value people draw from their relationship with it (Arias-Arévalo et al, 2018; IPBES, 2022a).

This builds on how New Zealanders already engage with the land. Our public engagement and other public opinion data show that New Zealanders hold strong environmental values (MfE and Colmar Brunton, 2018). Pro-environmental attitudes are a core part of Aotearoa New Zealand's national identity (Milfont et al, 2020), and a te ao Māori perspective has always recognised that humans and their environment are inseparable from one another.

Perceiving ourselves as custodians/guardians of the land rather than simply as property owners, and seeing the land as more than solely a commodity, could help reshape understanding of how land is used, invested in, and protected, while emphasising a future-focused relationship. This broader focus on values is needed, as the ability of the Government to regulate directly is often more constrained when it comes to land than in other parts of the environment, due to property rights. A strong foundation is in place to build on, and many examples exist of actions across different sectors, including the primary sector.

A core way of further enabling these values could be to enhance personal connections to the land. This would allow people to become more intimately aware of the effects that degradation of the land are having on the land itself, as well as on the relationships they hold with it (Hine et al, 2016; Knight, 2020). Regular interactions with the environment are associated with increased stewardship values and can raise people's willingness to take action to protect it (Allen and Ferrand, 1999; Pooley and O'Connor, 2000; Schultz, 2000).

Systematically increasing the personal connections of New Zealanders to the environment requires increasing accessibility and opportunity, making it easier for people to directly experience nature. This is especially needed for those with disabilities and lower-income households who are more likely than other New Zealanders to find it 'difficult' or 'very difficult' to get to their nearest park or greenspace (Stats NZ, 2019b). Urban planning and transportation policy may need to give higher priority to these considerations. Making environmental connections a central part of people's lived environments has the potential to transform their engagement with the land (Kruize et al, 2019). Providing people with other ways to connect, through investment platforms, education and active learning in nature, and access within urban communities could further strengthen these connections.

Fundamentally, the connection between environmental values and societal institutions needs to be supported. Embedding these values formally at the foundation of the legal, political, economic and education systems could help ensure the wellbeing of the land becomes a central element in governance and decision-making processes at all levels of society (IPBES, 2022a; Kauffman and Martin, 2021). Over time, this could see these values translate into stronger incentives, regulatory penalties, and transparency requirements enforced by the Government. For example, there may be opportunities to embed the Precautionary Principle more extensively into wider legislation and policy where human activities have the potential to significantly impact the integrity of the land.⁴ Doing so will build on progress already being made in embedding environmental responsibility.

The United Nations has identified several potential actions that could be taken by these different actors to address environmental and human wellbeing together: transform the food, water and energy system, and transform the economic and financial systems (United Nations, 2021a). For instance, budgetary decisions could properly reflect the value derived from the

⁴ As endorsed at 1992 United Nations Conference on Environment and Development, the Precautionary Principle states: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation" (Gollier and Treich, 2013).

environment and the effects of investment decisions as part of a process to increase transparency and accountability – a point raised by the Parliamentary Commissioner for the Environment (2021). A growing number of businesses are recognising the importance of informing their broader community of stakeholders about the environmental impacts and dependencies associated with their economic activity (World Economic Forum, 2020; Dasgupta, 2021). The Taskforce on Nature-Related Financial Disclosure (TNFD) is developing a risk management and disclosure framework for organisations to report and act on evolving nature-related risks as a first step towards nature-positive outcomes.

In Aotearoa New Zealand, one option might be to make decisions that are governed by respect for the rights of the land. This was first pioneered in the recognition of personhood of the Whanganui River and of Te Urewera (New Zealand Parliament, 2017), an approach that considers nature first. This acknowledges a shift in what these entities are seen as being, from “instrumental things to persons with which an ongoing relationship exists” (Geddis and Ruru, 2019).

While rights of nature policies are not common across the world, they are an example of how to incorporate diverse values of nature into local and national laws, and have promising potential to support transformation (IPBES, 2022a). Other transformative instruments representing diverse values could include the scaling up of collaborative governance regimes, such as those shown in the Kaipara Harbour case study. Further opportunities highlighted in international analysis include developing payments for ecosystem services and other area-based conservation measures (IPBES, 2022a). This could extend to the incorporation of “triple depreciation line” accounting methods that capture the use and degradation of natural resources as part of corporate accounting practices (Rambaud and Richard, 2015).

Waiora Mataatua: a paradigm shift in our connection with whenua and te taiao

Aotearoa New Zealand is leading a paradigm shift in the way we connect to whenua and, more broadly, te taiao. Innovations at the interface of Western science and mātauranga Māori are prioritising a holistic view of the environment and the interdependence of the environment and human wellbeing.

These transformational changes are being extended by **Waiora Mataatua**, a place-based, collaborative project in the Mataatua region, in the Bay of Plenty.

Toi Moana | Bay of Plenty Regional Council has initiated a rolling review of the Regional Natural Resources Plan (Land and Water) (RNRP), which includes implementing the National Policy Statement for Freshwater Management (NPS-FM) and reflecting te mana o te wai. Te mana o te wai is part of the NPS-FM and refers to ensuring the health and wellbeing of water first and the needs of people (such as drinking water) second – with a third priority to ensure people and communities’ social, economic and cultural wellbeing is protected, to provide for our wellbeing. A current gap in this process is a clear account of the collective vision, aspirations, priorities and opportunities of kaitiaki in the Mataatua region (Mataatua Kaitiaki).

Waiora Mataatua is a collaborative project led by Mataatua Kaitiaki – a networked alliance of whānau, marae, hapū and communities that each practice kaitiakitanga ‘on the ground’ in ways which reflect the distinctive identities of people and places in the Mataatua region. The project is guided by a Taumata Kaumātua: tohunga and kaumātua from across the Mataatua region.

Waiora Mataatua is distinctive in that it is framed by the integration of three significant, collective declarations of the nine confederated tribes of the Mataatua region: the Mataatua Declaration on Cultural and Intellectual Property Rights of Indigenous Peoples, the Mataatua Declaration on Water, and a declaration on health by Te Hono o Mataatua. Together, these declarations provide the base for a holistic wellbeing framework for the Mataatua region that places wairua (spirituality) and te taiao at the centre of the wellbeing of tāngata (communities).

Since its implementation, Waiora Mataatua has contributed insight and value for both Mataatua Kaitiaki and Toi Moana. It has captured practical insights and Mataatua tikanga and mātauranga specific to land use, waterways, wetlands, and marine life in the region. For example, kaitiaki have identified traditional indicators used to monitor te ora o te wai (the wellbeing of water) which, in turn, inform mātauranga Māori management practices.

Waiora Mataatua is also exploring systemic opportunities to transform environmental governance and management for the region in ways that embed equity. For example, through active dialogue with Toi Moana, Mataatua Kaitiaki are exploring how tikanga and mātauranga about kaitiaki whakapapa (genealogy) with wai Māori, in turn, provides for intellectual and cultural property rights, (including data sovereignty) relating to wai Māori. These rights and interests are all informed by, and distinctive to, the people and places of the Mataatua region – and had not previously been explored in depth during the RNRP review.



Waiora Mataatua Taumata Kaumātua, governance group – photo attributed to James Hudson

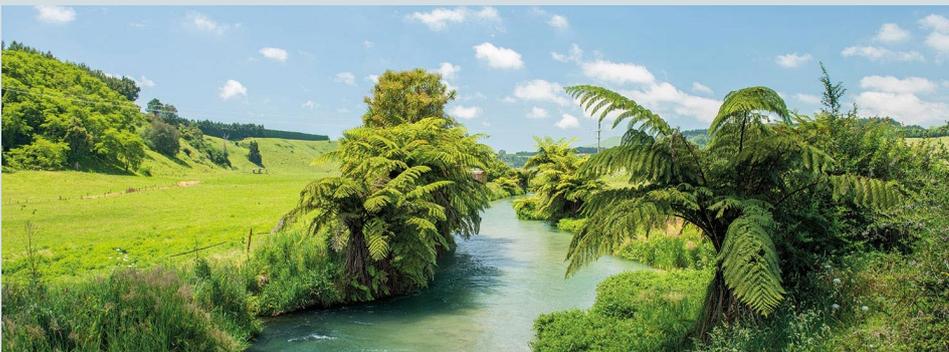


Photo credit: <https://www.boprc.govt.nz/environment/resource-consents/consent-forms-and-maps/water-take>

Enhancing equity

While many people hold environmental values, they often find it difficult to act on them, at least in the short term. Changes to the economic system may be needed to create the right incentives for acting in an environmentally responsible way that takes a long-term view. These could include prices that send appropriate signals to guide environmental decisions, better information around the long-term impacts of choices, and systems and infrastructure that reward being environmentally responsible. Achieving this holds major potential for meeting the country's environmental challenges.

New Zealanders already show commitment to living sustainably (Kantar and Sustainable Business Council, 2022). In people's day-to-day lives, however, environmental issues are often crowded out by other concerns, such as the COVID-19 pandemic or cost of living pressures (O'Shea, 2022). Lack of time and money constrain people's abilities to act in line with their underlying environmental values. Geography matters, too – for example, people in rural areas have less access to public transport (Seyfang and Paavola, 2008). Reducing inequality could create space for people to embrace more sustainable benefits (European Commission, 2020). Further, research suggests that inequality can affect the abilities of societies to be effective stewards of resources, while greater equality tends to support sustainable management of collective resources (Islam, 2015).

Businesses also face structural pressures that encourage unsustainable practices. While they cater to their customers' needs, they make choices as to how to use resources and produce their goods and services. These decisions have a flow-on effect by way of investment, technology and supply-chain choices. However, decisions about production and environmental impacts also influence how their products and services are viewed and embraced by consumers and the wider community.

It is also necessary to ensure that changes do not make already disadvantaged people worse off, which is why the focus on reducing inequity is so important. Growing disparities already exist for Aotearoa New Zealand's most vulnerable when it comes to accessing healthy food, and climate-friendly diets come with additional costs (Kidd et al, 2021; Mackay et al, 2018). Any move towards a more sustainable future must make sure no one gets left behind (United Nations, 2021b).

Māori experience barriers to progress from racism and systemic disadvantages in Aotearoa New Zealand (Pearson, 2011). Te Tiriti o Waitangi embodies partnership for Aotearoa New Zealand. It is therefore important that these systemic disadvantages continue to be redressed by, for example, the return of land, and ongoing efforts to enhance and empower Māori autonomy to lead in environmental stewardship and identify mātauranga Māori-based solutions to the challenges facing land.

Enhancing equity also concerns intergenerational equity and justice. This asks New Zealanders to forge a sense of care and responsibility for future people and prioritising long-term needs over short-term gains (Krznaric, 2020). As quoted in Krznaric (2020, p 63), Johan Rockström has summarised this challenge:

We are the first generation to know that we face unprecedented global environmental risks, but at the same time we are the last generation with a significant chance to do something about it.

An opportunity exists for people to work together to improve wellbeing, become more productive, increase resilience and reduce inequity. All New Zealanders can benefit from the

changes needed to transition to an economy that works for both the land and people. It is a chance to create new jobs through low-emissions industries, lower the cost of living and raise living standards (MfE, 2022d).

Specific actions to enhance equity include acting on trade agreements, eliminating perverse subsidies and taxes that promote harmful use of natural resources, and investing in urban green spaces (United Nations, 2021a).

Building resilience to global pressures

Aotearoa New Zealand's economy is likely to remain heavily reliant on primary sector exports. How people engage with the land in Aotearoa New Zealand is shaped by the country's position within the global food economy. Transforming people's relationships with the land towards sustainable production within environmental limits would create new opportunities, such as a shift towards higher-value products and the regeneration of natural capital (Burggraaf et al, 2021; Dalziel et al, 2018; Grelet and Lang, 2021).

The high volume of production needed for Aotearoa New Zealand's export markets has meant more intensive land use in order to remain profitable (Saunders et al, 2016). Opportunities may be available to shift the export sector's emphasis to value (and values) rather than volume and sell high-quality and sustainably produced products that reach consumers directly (Dalziel et al, 2018). This could enable primary producers to reduce their impact on the land while regenerating land and soil ecosystems (Grelet and Lang, 2021).

This transition could be helped by also building up other economic sectors, particularly in advanced manufacturing and global services. This would minimise economic disruption and achieve greater resilience in the economy to smooth the transition towards less-extractive economic activities (Greenaway-McGrevy et al, 2020). A value shift to a more circular economy is possible and could bolster local economic opportunities and reduce international supply-chain dependence, while improving environmental outcomes (Kuch, 2022). This would see changes across production sectors and continued development of innovative products (Wreford et al, 2019). Any transition of this type would have to be carefully managed to ensure social equity and inclusiveness.

The current economic structure does leave Aotearoa New Zealand exposed to global disruption. The high market concentration in key primary and service export sectors creates significant risks when trade with these markets is changed. A more diversified, less environmentally impactful export sector would bring greater resilience to the country's economic position (Islam, 2015; van Rensburg, 2019). Government has an important role in facilitating these changes. For example, MBIE is currently developing a draft advanced manufacturing industry development plan for the industry's contribution to a circular, diversified low-emissions economy (MBIE, 2022b). The [Fit for a Better World](#) strategy from the Ministry for Primary Industries also highlights essential action points to help build resilience in the primary sector (MPI, 2020).

Achieving transformational change will require choices about our priorities

Through the nine leverage points outlined earlier in the chapter, we have laid out various opportunities to transform people's relationships with the land.

If acted on, they will put the country on a course in line with ensuring the resilience and sustainability of land, not only for its own sake, but for the sake of every generation. This transition will have major benefits but will also involve costs. These costs will not be distributed equally, and will require difficult choices, as resources are reallocated and different economic sectors are prioritised. When making these choices, it is important to ensure that different values are considered in a balanced manner and long-term intergenerational benefits are factored in. Some considerations and choices are discussed below.

- Central government could consider how it allocates funding over multiple budget periods, to prioritise environmental investment. This is already becoming apparent in the required costs of climate change adaptation and mitigation (MfE, 2020a). At this stage, the Parliamentary Commissioner for the Environment has concluded that the budget process does not have a good way of accounting for the environment, including that the “process is insufficient to facilitate investment in environmental expenditure that is orientated towards intergenerational wellbeing” (PCE, 2021, p 43). Environmental data and knowledge are also lacking to make explicit the link between the environment and people’s wellbeing.
- Some parts of the economy are affected more than others through the various stages of change. Some businesses may face stronger regulatory limits on their activities and may have to make changes to the way they operate. This would result in costs to affected businesses, workers and consumers.
- Most New Zealanders understand and value the importance of the wellbeing of the land. Ensuring transformative change occurs, however, may require those values to be embedded in the foundations of communities, businesses and institutions (IPBES, 2022a). By building on the values New Zealanders have, momentum for change could be generated by bringing environmental responsibility into decision-making at all levels.
- As noted in chapter 1, people value the environment in multiple ways. In the future, it will be important to recognise and engage with these values and knowledge systems, and to embrace them in a constructive way. Uplifting and valuing mātauranga and te ao Māori will be particularly important in Aotearoa New Zealand.
- Impacts on the land are linked to consumption practices, and so are disproportionately driven by those with higher incomes (Islam, 2015). Those with the greatest impacts would have to do the most by way of reduction.
- Advancing these changes implies a more active role for government. Working towards environmental responsibility is ultimately empowering of individuals and communities in their relationship to the land. However, regulations would reduce the autonomy of some individuals and businesses in specific areas.
- Balancing private property rights where they may conflict with transitions to environmental sustainability will be a challenging but important consideration (Lähteenmäki-Uutela et al, 2021). Unlike other aspects of the environment, most land in Aotearoa New Zealand is ‘owned’ in some way – whether it is Crown land, Māori land, general or private land owned by individuals and corporations. Land ownership comes with rights, however, there is an opportunity to consider that “ownership” also confers responsibilities. It is likely to be more effective and enduring if people who hold land consider their responsibilities to the land and future generations. Any Government intervention to achieve this would be limited and arguably less effective over the long term. While there is much progress to be made in balancing this tension, Aotearoa New Zealand has taken some steps forward in better reflecting te ao Māori understandings of rights and interests in land, for example through the grant of legal personality to the

Principles for managing the transition

Several approaches can be used to help navigate complex issues, and research indicates key principles that can help manage this process (Chan et al, 2020; United Nations, 2021a).

Given the interconnectedness of the pressures the land is facing, it is important to provide an integrated and collaborative approach to tackle the complex social, economic and environmental dynamics that shape people's relationships with the land.

- **Integration** – Making sure different policies work together across multiple areas (for example, climate change mitigation and adaptation, and biodiversity loss) is needed to ensure sustainable use of the land and that multiple wellbeing priorities are being addressed in an integrated way (Karacaoglu, 2015; Scholes et al, 2018).
- **Transparency** – Increasing transparency will provide a view of both the harm being caused by current practices, and the choices required to achieve change (Campbell et al, 2010; Galafassi et al, 2017). Recommendations by the Parliamentary Commissioner for the Environment on the budgetary process will help increase visibility of impacts on the environment (PCE, 2021). Trade-offs are unavoidable and being clear about people's choices is necessary to enable different decisions (Daw et al, 2015).
- **Intergenerational focus** – Embedding a long-term and intergenerational focus in governance systems can help prioritise investment and prevent further degradation of the land (Upton, 2022). A better conceptualisation of the environment as a critical part of wellbeing for future generations is needed. Te ao Māori perspectives in this regard are more aligned with intergenerational views that look out for many generations ahead (PCE, 2021).
- **Inclusivity** – Creating spaces to allow marginalised voices to be heard will highlight the true impacts of the choices involved in transformation on those most affected. This will better enable a full range of costs and benefits to be considered (Galafassi et al, 2017; Hirsch and Brosius, 2013). In Aotearoa New Zealand, enhanced inclusion of tangata whenua will be vital. To date, youth voices in particular have been marginalised, yet youth are experiencing increasing climate anxiety, and will have to live with the long-term consequences of decisions made now (Wu et al, 2020). For central government, space must be made in legislation and policy development for marginalised voices to balance those of established and better-resourced stakeholders.
- **Connectivity** – Actively connecting all actors, including iwi, communities, and members of the public and private sectors will help identify ways forward. Other countries and organisations have started creating forums for discussion and communities of practice to share knowledge for futures thinking – for example, [Scotland's Futures Forum](#) (Scottish Parliament, 2022), and the OECD's [International Futures Programme](#) (OECD, 2022b).
- **Embracing innovation** – In the face of growing change and uncertainty, it is important Aotearoa New Zealand develops and promotes innovative responses to these challenges. Innovation is a significant enabler of competitive advantage and for achieving more sustainable outcomes (López-Cabarcos et al, 2021). Aotearoa New Zealand's pathway through this transition will need to be flexible and actively encourage developing and applying new ways of doing things. This means that people will have to be comfortable with a degree of uncertainty and risk in how specific opportunities are taken advantage of to advance this vision.

Conclusion

With the demands and pressures facing the land now and in the future, it is important that long-term thinking is instilled in people's decision-making.

To ensure the wellbeing of the land in Aotearoa New Zealand is resilient for generations to come, it is vital to think out to at least 2050. Longer-term thinking of 100 years or more would be beneficial. By thinking, planning and acting now, it is possible to better ensure the demands of the present do not outweigh the rights of the future and the sustainability of the land.

This LTIB is intended to stimulate conversation that will need to take place over the coming years and decades, through bringing to the fore the perspectives of future generations.

The LTIB has suggested some immediate ways Aotearoa New Zealand can start on the pathway towards transformational change. Achieving transformational change requires input, participation and collaboration from all areas of society, including institutions, iwi and hapū, businesses, communities and individuals.

The LTIB has been informed via two rounds of public consultation, multiple workshops and meetings and will not only be submitted to Parliament but is intended to influence the Ministry's upcoming work.

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Appendix 1. Driver mapping workshops

The list and description of drivers outlined in chapter two is not exhaustive or exclusive. Their inclusion was informed by a body of literature (eg, Abson et al, 2017; Chan et al, 2020; Driver et al, 2022; Meadows, 1999) and speaks to underlying drivers that materialised from two internal driver-mapping workshops held in May 2022. More than a dozen (combined) subject-matter experts from the Ministry for the Environment attended these interactive workshops spanning different perspectives, such as land and soil science, ecology, climate change, te ao Māori, economics, waste, and political and social science. Participants were asked to identify the main drivers they consider will influence the future of the land. The two workshops generated over 190 driver concepts that were then collated by themes into 24 underlying drivers (table 1).

Table 1: List of 24 underlying drivers identified as influencing the future of land

Derived underlying driver	Driver definition
Global primary sector investment and market trends	The extent of global consumer demand and investment for the products that the Aotearoa New Zealand primary sector specialises in
Balance of social and political values in Aotearoa New Zealand	The extent to which the mainstream of social and political values deviates from the individualist, anthropocentric status quo
Distribution of power and resources within Aotearoa New Zealand	The distribution of governance authority, as well as control over key resources (specifically land)
Patterns of primary sector land use	The scale and make up of Aotearoa New Zealand's primary sector, as shaped by the values and motivations for engaging with the land
Aotearoa New Zealand's engagement with Te Tiriti o Waitangi and te ao Māori	The extent to which Aotearoa New Zealand engages in a substantive and equal manner with Māori rangatiratanga, aspirations and worldview
Impacts of climate change	The nature, scale and distribution of impacts of a changing global climate on Aotearoa New Zealand, including biophysical, physical and socio-economic impacts
Aotearoa New Zealand consumer demand trends	The nature, scale and composition of Aotearoa New Zealand consumer demand for primary sector products
Aotearoa New Zealand's economic paradigm	The extent to which mainstream social and political values deviate from the neoliberal capitalist status quo
Aotearoa New Zealand's policy and legislative settings	The extent of changes from current policy settings and legislative frameworks
Responses to climate change	The nature, scale and pace of adaptation responses to climate change
Scarcity of natural resources	The scarcity, both globally and locally, of important natural resources, particularly as they pertain to the primary sector
Aotearoa New Zealand's economic dynamics	The trajectory of growth, inflation and employment in Aotearoa New Zealand

Derived underlying driver	Driver definition
State of food-system technologies	The level of practical deployment of technologies with systemic implications for global food production
Global geopolitical dynamics	The composition and severity of international geopolitical competition as it pertains to Aotearoa New Zealand's interests
Level and composition of migration and immigration	The level and composition of migration and immigration
Levels of education, cultural and technical knowledge	Levels of education, cultural and technical knowledge, with a particular focus on the primary sector
State of building and energy technologies	The level of practical deployment of technologies with systemic implications for urban construction and energy provision
State of transportation technologies	The level of practical deployment of technologies with systemic implications for transportation of people and resources within and beyond Aotearoa New Zealand
Social cohesion and stability	The level of social stability and cohesion relative to the current status quo
Population age structure	Population age structure
State of communication technologies and social media	The level of practical deployment of technologies with systemic implications for communications, with a particular focus on those enabling remote work and telecommuting
Health and biosecurity dynamics	The effect of primary product consumption on New Zealanders and the effect of overseas health threats to Aotearoa New Zealand's primary production
Patterns of urbanisation and population distribution	The extent and character of population distribution across the motu, including the balance of urban and rural development
Population size	Population size

Appendix 2. Overview of rangatahi workshops and material generated

The breakdown and details of the rangatahi workshops and discussions are listed below.

- I. Lead Youth with Disabilities (workshop: n=4 participants including facilitator – 31 May 2022)
- Young people from ethnic communities in collaboration with the Ministry for Ethnic Communities (workshop: n=9 including senior advisors from MEC – 31 May 2022)
- BLAKE Leader Alumni and The Hive (workshop: n=4 – 1 June 2022)
- Young Māori designers and strategic partners within Jasmax (discussion and correspondence: n=2 – 8 June 2022)

Three additional youth groups/audiences were invited to participate in workshops but never responded.

Individual workshops and discussions ran for 60–90 minutes. The same facilitator and representative from the Ministry were present for each engagement, along with the live illustrator to capture the narrative in sketch format. For each engagement, a series of questions was posed to rangatahi.

1. As stewards for the environment, what are your aspirations for the future of land?
2. What might our descendants, or future generations, thank us for when it comes to the stewardship of the land?
3. What might our descendants, or future generations, wish we had done better?
4. What would make it easier for us to be better stewards for land?

At the workshops, rangatahi had access to a mural board and responded to each question using virtual post-its. Any additional notes were taken by hand, as was the case for discussion engagement. Responses were analysed thematically across the questions and generated six themes, summarised below.

A selection of sketches, encompassing insights shared from mural board activities from each interactive workshop and discussion with rangatahi, are included further below.

Summary of six main themes generated from rangatahi sharing of aspirations for the future of land and legacies they want to create for their descendants or future generations

Action: Being bold and collectively acting with urgency

- We have fought for te taiao and were proactive with our action before it was too late.
- We have moved away from an emphasised extractive, capitalised society that values materialism to one where our ecological footprint has been minimised, allowing nature to be revived, preserved and sustained.

- A strong sense of social citizenship has ensued, with everyone playing their part, collaborating and unifying with a common goal of a thriving taiao. The rhetoric has changed, and caring for te taiao is now applauded, if not incentivised, and part of being human.
- Stronger and braver legislation stems from the top, with policy based on fact and science instead of perpetual economic-growth interests.
- The climate crises are no longer a worry for future generations, or the worst effects of the climate crises have been mitigated. More climate-friendly transport options are available. Pressure was placed on big polluters to act in favour of the environment, and fossil fuels industries have been shut down, transforming our energy systems. We are fully decarbonised before 2030.

Connection: Opportunities *for all* to connect and access land

- We have implemented indigenous methods allowing Māori to reconnect with the whenua.
- A stronger relationship between disabled rangatahi and government ensures that those with accessibility needs have better access and connection with the whenua, nature reserves and te taiao.
- Social inequities have reduced, resulting not only in better social systems (for example, health, housing, education), but also allowing people the time to care and connect with the whenua and te taiao.
- Better access, connection and relationships with the whenua, that equally meet nourishable needs, have prevailed.

Deep environmental responsibility and reciprocity: The boundary between people and land is lost, and our interrelationships are not at odds

- *“I am the environment and the environment is me”* – recognition that we are not separate from the environment, nor do we sit at centre stage of the universe. Tupu-ā-nuku is not a god of land, but she is the land and soil.
- The health of the whenua and te taiao, a marker of our health as people, has been defended with passion and vehemence.
- We care for land and are responsible for the biodiversity it sustains, ensuring indigenous species are thriving and no longer going extinct.
- With the adoption of entrenched systems thinking, the earth’s system is in natural balance, having listened to its previous signals.

Environmental education and knowledge transfer: Environmental education is compulsory *for all* tamariki and rangatahi

- Real-life, on-the-ground localised curriculum has ensued in the educational system, encompassing learning to grow vegetables and to respect and care for the whenua and te taiao – all of which have equal standing, with inclusion of merits, in terms of the wider curriculum.
- Through environmental education, a shared responsibility for looking after the planet has prevailed. This also includes acknowledging warnings from scientists and knowledge around predictions that people have for the land, as well as intergenerational passing of knowledge and skills.

- Honouring and normalising mātauranga and tikanga Māori is included in the environmental education curriculum.
- All are empowered to live a sustainable, affordable lifestyle that leads to a sustainable future.

Acknowledgement and practice of Te Tiriti: The actual Te Tiriti and the United Nations Declaration on the Rights of Indigenous Peoples are put into practice and honoured

- Colonisation and conflict over land has ended.
- Society is working authentically with Māori.

Embedding futures thinking: We live in a place that is futures thinking

- Intergenerational leadership has ensured that our descendants' health and voices are recognised in decisions allowing all people and all generations to be happy and healthy.
- Young people, including Māori, ethnic people and those with disabilities, are actively listened, to allowing an authentic voice to be heard.
- Leaders are being elected who prioritise better stewardship of the land.
- By standing back, listening and asking ourselves "If this is the best we can do to have a liveable planet", the creation of a new strategy unfolded that led to a transformational worldview change.



iLEAD
31 MAY 2022



FUTURE PROOF
FOR MANY YEARS



FULLY ACCESSIBLE
& CONSTANTLY ADAPTING
TO THE NEEDS OF PEOPLE
WITH DISABILITIES



REVIVE
NATURE
LANDS



TO BE THRIVING WITHOUT
NEED FOR EXCESS HUMAN
INTERVENTION



LEAVE A CLEAN
& GOOD ENVIRONMENT
FOR OUR CHILDREN
& GRANDCHILDREN

AS STEWARDS OF THE ENVIRONMENT,
WHAT ARE YOUR ASPIRATIONS FOR
THE FUTURE OF LAND?

The HIVE
BLAKE INSPIRE
1 JUNE 2022

CONSTRUCT MORE CLIMATE FRIENDLY TRANSPORT OPTIONS

LISTENING TO THE EARTH'S VITAL SIGNS

DECOLONISING

WORKING WITH MĀORI AUTHENTICALLY

SOMETHING YOU WISHED WE HAD DONE

HONOURING & NORMALISING MATAURANGA & TIKANGA MĀORI

PLANNED BETTER FOR CLIMATE ADAPTIONS

BEING KAITIAKI

LIVEABLE & UNPOLLUTED TAIAO

ENSURING HEALTH & VOICE IN DECISIONS

SAVING SPECIES

PLANET & PEOPLE FIRST

NOT OBSESSED WITH CAPITALISM & ECONOMIC GROWTH

ACKNOWLEDGING THE WORK OF SCIENTISTS

DECARBONISED BEFORE 2030

ADDRESSING CLIMATE CRISIS

PASSING OF INTERGENERATIONAL KNOWLEDGE

SOCIETAL PRESSURE & CAPITALISM

DECARBONISED BEFORE 2030

ADDRESSING CLIMATE CRISIS

ACKNOWLEDGING THE WORK OF SCIENTISTS

SAVING SPECIES

PLANET & PEOPLE FIRST

ENSURING HEALTH & VOICE IN DECISIONS



SOMETHING FUTURE GENERATIONS WOULD THANK US FOR



WHAT IS THE WHAKAPAPA OF THOUGHT THAT GOT YOU TO WHERE YOU ARE?



TE AO MĀORI WORLD VIEW

PAKEHA WORLD VIEW

“ DEEP IN KNOWLEDGE & UNDERSTANDING BUT ALSO LONG IN UNDERSTANDING OF TIME ”

WHENUA CONNECTS PEOPLE & PLACE

TUPU-A-NUKU IS NOT A GOD 'OF THE' BUT 'IS THE' LAND

7 GENERATIONS OF PETU RETURNED TO PEEL CONNECTED TO WHENUA

THINKING 1000 YEARS INTO THE PAST IS NORMAL... THEREFORE PLANNING 1000 YEARS INTO THE FUTURE IS ALSO NORMAL

The FUTURE? BETTER ACCESS TO KAI 'JUST WALK OUT THE DOOR'



AS STEWARDS OF THE ENVIRONMENT, WHAT ARE YOUR ASPIRATIONS FOR THE FUTURE OF LAND?

MAKE IT EASIER FOR US TO DO THE RIGHT THING



Appendix 3. Backcasting

Backcasting is a useful tool to help identify the transformation required to ensure a visionary future where:

Deep environmental responsibility and reciprocity is a core uniting societal value in Aotearoa (chapter 3).

We often underestimate the size of the changes required to achieve our aspirations. Backcasting allows us to identify a range of leverage points that can be cumulative and staggered from the present into the future.

Backcasting starts with an inventory of the present/now (Horizon 1). For this work, we assumed the 'now' to be the next five years. The policies, work programmes, and investment for this period are fundamentally set. The second step is to ensure a rich description of the preferred future (chapter 3). In this case, the future (Horizon 3) is 2050. The third step is to define the transformation that needs to occur in order for that future to be inevitable (Horizon 2).

To help identify what potential leverage points would be required to achieve the transformational change, a backcasting workshop was convened and was attended by over a dozen subject-matter experts from across the Ministry. It covered perspectives ranging from land and soil science, food systems, climate change, economics, ecology and te ao Māori, to political and behavioural science.

It was an interactive workshop using a mural board where an aspirational future (chapter 3) was shared with participants, who were asked to identify what needed to be achieved to reach the preferred future, with a focus on Horizon 2. Participants shared over 150 posts. These were thematically analysed, generating eight areas of leverage.

1. Changes to legislation
2. Education and knowledge transfer
3. Investment in science, research, mātauranga Māori and innovation
4. Investment in infrastructure and technology
5. Investment in community group resourcing
6. Collaboration
7. Social and cultural value change
8. Global drivers/dependence

Subsequent body of evidence investigation by the LTIB team resulted in these areas being honed to nine indicative (but not exhaustive) leverage points for change.

1. Increasing effectiveness of policy and legislation
2. Investing in sustainable infrastructure and technology
3. Empowering communities
4. Investing in science and mātauranga Māori
5. Promoting environmental education and knowledge transfer
6. Collaborative governance
7. Embedding environmental responsibility into Aotearoa New Zealand's institutions
8. Enhancing equity
9. Building resilience to global pressures