Pūtaiao

MANAAKI WHENUA SCIENCE SUMMARY / ISSUE 3 / AUGUST 2020

COVID, carbon and regen ag

Research highlights from a changing world

Pūtaiao

Science for our land and our future

Tēnā koe and welcome to the third issue of *Pūtaiao* ('science' in te reo Māori), our quarterly publication showcasing the work of our scientists at Manaaki Whenua.

We are the Crown Research Institute for our land environment, biosecurity, and biodiversity, and our role and responsibility to New Zealand are clear: this land, and everything that shares it with us, is our future.

Each issue of Pūtaiao will share the benefits and impacts of our science in helping ensure a sustainable, productive future for New Zealand. In this issue many of the stories focus on science for our environment – one of our four science ambitions at Manaaki Whenua.

The work we do in this area is increasingly designed to support policymakers, Māori, business and community groups to make decisions on the future uses of our environment, locally, regionally and nationally. To make real progress in environmental management we need reliable data and indicators, decision-making processes that account for complexity and uncertainty, and practical action. We must also balance the needs of multiple stakeholders, including national and local government, the private sector, Māori, and local communities, in making these decisions.

If you wish to be included on the mailing list for *Pūtaiao*, or to find out more about any of the stories, contact Manaaki Whenua's Communications Manager Dan Park: parkdj@landcareresearch.co.nz

IISSN 2703-3864 (Print) ISSN 2703-3872 (Online)

Tracking climate change awareness among rural decision-makers

Over the coming decades, changes in climate are likely to have serious effects on New Zealand's productive land environments. The Intergovernmental Panel on Climate Change (IPCC) projects a 0.8°C increase in temperature by 2040 for New Zealand, as well as more extreme rainfall events and increased drought severity.

The results of the biennial Survey of Rural Decision Makers, run by scientists at Manaaki Whenua, show that farmers are more aware than ever of the risks of climate change on their activities.

With between 3,000 and 5,000 farmers, foresters, growers, and lifestyle block owners from Cape Reinga to Bluff taking part in each wave, the survey records current practice and future planning across the breadth of the primary sector.

Most respondents believe climate change is already affecting New Zealand, and roughly three-quarters anticipate that the frequency or intensity of drought, heat waves, flooding, and storms will increase in the future.

Encouragingly, most farmers, foresters, and growers stated that they had introduced management practices to mitigate climate change effects, such as changing stock rates, increasing feed reserves, changing stock breeds, investing in infrastructure to stop flooding, increasing water storage, and planting trees. Those who intend to plant trees in the near future disproportionately plan to plant native trees, often citing guardianship or kaitiakitangi as the primary reason.

In work linked to the survey, Manaaki Whenua's Pike Stahlmann-Brown, Pam Booth, and Patrick Walsh investigated the drivers behind this increased awareness of climate issues. Using experience of drought as an example of a climate change event, they also estimated how far back farmers draw on their experiences to plan for the future.

Not surprisingly, the team found that recent exposure to drought significantly increases expectations regarding future drought, and the greater the intensity of the drought, the more likely farmers are to think that drought will increase. Personal experience makes climate change feel more relevant and immediate, increasing the likelihood that individuals become concerned about it.

However, the researchers also showed that farmers most strongly refer to the past 5 to 10 years rather than the longer historical record when evaluating a drought's intensity. This may create future problems, because if, for example, an area experiences a few 'good' years amid a prolonged drought, people are less likely to adapt to the overall change. This is an important finding for effective policy-making: policies and guidance for farmers that rely on increasing perceptions of risk to spur them to act may overestimate how much risk farmers actually perceive.

Further work in this area by Stahlmann-Brown and Walsh (in press) has found that experiencing drought causes people to change their mind about the future risk of climate change, but only among people who don't already believe that drought will increase. Extreme weather is an impetus for people to start believing in climate change, but once people accept it, they tend to stick with their new belief.

This may be another encouraging sign: as New Zealand moves towards more frequent and more severe drought, farmers, foresters, and growers may increasingly agree with the scientific consensus, raising the likelihood of future farm-level and public action.

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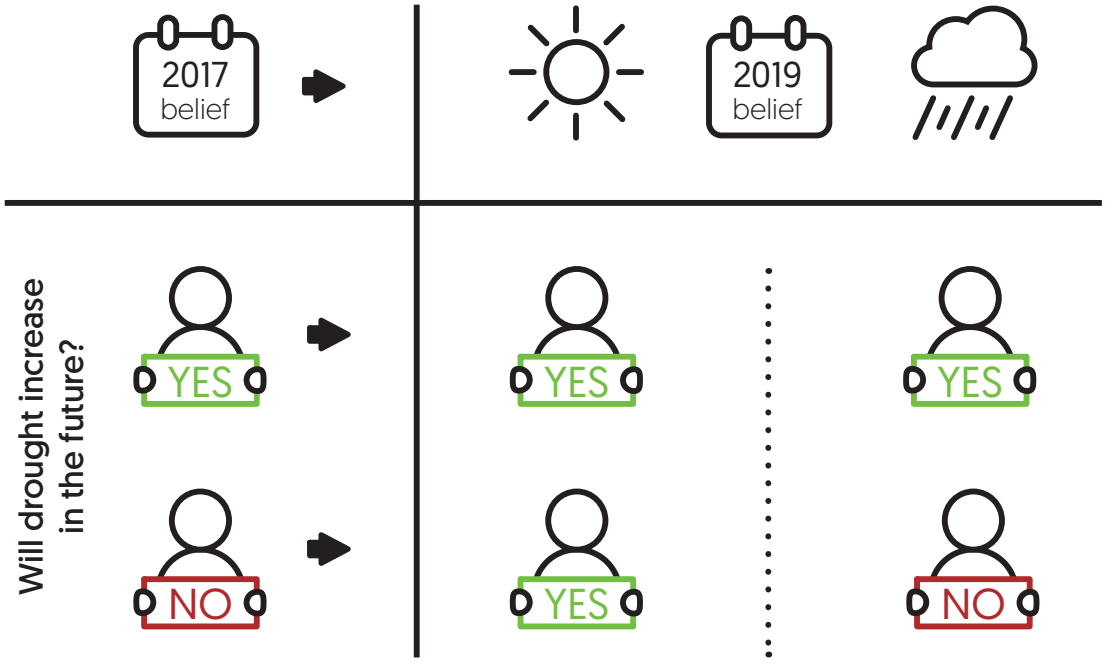

Changes in expectations of droughts increasing in the future is dependent on experiences of recent climate events

Regen ag: does the science stack up?

Regenerative agriculture, a term first coined in the 1970s, applies an adaptive ecological approach to agricultural landscape management, with a focus on ecosystem health.

Googling 'regenerative agriculture' reveals a colossal amount of information, including many claims about its environmental, economic, and social benefits. Yet, despite abundant anecdotal evidence, little academic research has been undertaken to show whether or how regen ag delivers these benefits, particularly in a New Zealand context.

To address this knowledge gap, Gwen Grelet, a soil ecologist from Manaaki Whenua, is leading a pilot project funded through MBIE's Strategic Science Investment Fund and MPI, baselining ecosystem performance of conventionally managed and regeneratively run farms in New Zealand, across roughly 20 indicators.

The project includes both dairy and drystock pastoral farms in the south of New Zealand. Here, flooding and cold temperatures create substantial challenges, especially for winter feeding, which is one of the motivations for transitioning to regenerative management.

The indicators include visual soil assessments, soil moisture and water infiltration, aggregate stability (how well the soil holds together), soil carbon and nitrogen stocks to a depth of 1 metre, and various indicators of ecosystem biodiversity, including plants, insects, soil invertebrates and soil microbes. Some farms have also agreed to participate in an assessment of economic metrics (profitability and business resilience).

> *"Regen ag emphasises management strategies that are constantly adapting and are context-specific."*

'Regenerative agriculture emphasises management strategies that are

Dr Kara Allen collecting topsoil samples

Dr Gwen Grelet and Ngaire Foster analyse soil cores in the lab

Closeup of a deep soil core

constantly adapting and are context-specific, not "one-size-fits-all",' says Gwen. 'Regenerative agriculture also aims to optimise the performance of the whole farm for multiple benefits simultaneously, so its impacts aren't easy to quantify using conventional methods.'

The pilot is a collaboration, including Kate Orwin, Paul Mudge and Nina Koele plus several other Manaaki Whenua scientists, as well as external collaborators such as Quorum Sense, BakerAg, 5thbusinessAgri, Plant & Food Research, and AgResearch.

Gwen is also leading or co-leading two other projects on regenerative agriculture. The first is a trans-Tasman project funded by the Australian Soil Cooperative Research Centres Program. This project takes a co-innovation approach, including researchers, farmers, agency representatives and extension practitioners, to understand the role of soil carbon in regenerative farming systems and how it might improve the performance of Australian soils across various soil types and climates.

The second, funded by Our Land and Water National Science Challenge and the NEXT Foundation, in partnership with MPI, is a survey of New Zealand farmers, industry, government and scientists. It will uncover any questions they have about regenerative agriculture, identify the main principles and objectives of regenerative farming systems in New Zealand (dairy, drystock, arable and viticulture/horticulture), and show how these differ from similar systems overseas.

The survey work will also develop a framework for building a scientific evidence base specific to regenerative agriculture in New Zealand across all priority environmental, economic and social outcomes, so that future research can quickly fill the evidence gaps.

The work is particularly timely given global and national uncertainties over the economic effects of COVID-19 and the need to enhance New Zealand's agricultural resilience in global marketplaces increasingly dominated by environmentally and ethically minded consumers.

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https://www.landcareresearch.co.nz/science/portfolios/realising-lands-potential/regenerative-agriculture-in-new-zealand

https://soilcrc.com.au/current-projects/#project_4_1_004

https://ourlandandwater.nz/news/what-do-we-know-about-regenerative-agriculture-in-new-zealand/

A new national soil carbon monitoring system for agricultural land

Every year, under the United Nations Framework Convention on Climate Change and the Paris Agreement, New Zealand is obliged to report its national human-produced (anthropogenic) greenhouse gas emissions and removals. With average soil carbon stocks in New Zealand's agricultural soils estimated at about 100 tonnes per hectare in the top 30 cm, changes in soil carbon could make a significant contribution to our national carbon footprint.

However, there are few direct measurements of soil carbon change available, and the data we have are largely based on historical soil survey sampling sites unrepresentative of agricultural land in New Zealand. National-scale changes in soil carbon are currently estimated using a statistical model that predicts changes in soil carbon associated with changes in land use between broad classes (e.g. forest to pasture).

To provide the necessary data, Manaaki Whenua has received funding from the New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC) and the Ministry for Primary Industries (MPI) to begin the first phase of a new nationwide baseline soil carbon measurement study.

Dr Paul Mudge driving in a soil core, Tarras, Central Otago

Monitoring changes in **SOIL CARBON** within

AT 500 SITES

The overall plan is to monitor changes in soil carbon at 500 sites across the country within each of five broad land-use classes: cropland, horticulture, dairy pasture, flat-rolling drystock pasture, and hill-country drystock pasture.

Baseline soil carbon measurements will be made at 110 sites each year for the next 4 years to take the total number of new sites to 440. Sixty sites in hill-country drystock pastures were

sampled in 2018 and make up the remainder of the 500 sites.

Sites will then be revisited on a 4-year rolling resampling to determine any change in soil carbon. The system is designed to be able to detect a change of about 2 tonnes of carbon per hectare within each of the five classes.

This national benchmarking is being complemented by work to enable farmers to determine soil carbon on their individual farms. Many farmers want to know how much carbon their own soils contain and how those stocks are changing. Interest from farmers is recognition of the importance of soil carbon for overall soil health and the potential for soil carbon to offset greenhouse gas emissions. Our scientists are currently working with consultants and farmers to create user-friendly, on-farm soil carbon measurement systems.

Working at these different scales – from single farms to national totals – our scientists are gradually building a clearer picture of how New Zealand's soil carbon measures up, and where farmers need to focus their attention to maintain or increase their own soil carbon stocks.

The national soil carbon monitoring project is a collaboration between Manaaki Whenua and the University of Waikato, and is funded by the NZAGRC and MPI. Funding for the initial statistical design phase came from MPI via the Global Research Alliance on Greenhouse Gases.

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Biotic interactions drive ecosystem responses to exotic plant invaders

Introductions of exotic plants are transforming ecosystems worldwide and altering the ways in which they cycle carbon, but the various mechanisms driving these changes are not well understood.

New research published in the journal *Science*, led by Lauren Waller at the Bio-Protection Research Centre, Lincoln University, and in collaboration with John Hunt, Nina Koele and Kate Orwin from Manaaki Whenua, shows that exotic plants can temporarily accelerate carbon loss from soils through their interactions with invertebrate herbivores and soil biota.

The paper is the culmination of 4 years of large-scale experiments, between 2016 and 2019, in which scientists from six international research organisations and universities, including Manaaki Whenua, AgResearch and Scion, created 160 experimental plant communities, each with one of 20 different 8-species combinations of native and exotic plants.

The researchers quantified how each plant community or 'mesocosm' interacted with insect herbivores and soil microorganisms, and measured indicators of carbon cycling. They conclude that novel biological interactions between invertebrates, soil biota and exotic plant species are a more important driver of ecosystem transformation than was previously thought.

The study also provides important insights for decision-making in ecosystem restoration. Fast-growing exotic plants may be suitable for plantings when the goal is to sequester carbon above ground, but may have more variable effects below ground than native plants.

https://science.sciencemag.org/content/368/6494/967

*Silver wattle (*Acacia dealbata*), one of the 20 exotic species studied in the trial*

Virtual reality experience showcases prehistoric, present and future New Zealand environments

Taking a virtual step back in time and experiencing untouched prehistoric, present and future New Zealand environments is soon going to be possible. A new, world-class virtual reality (VR) experience, beginning with likenesses of prehistoric Jurassic scenes, is being developed by Manaaki Whenua and Waxeye as a part of 'Karanga o Tāne Mahuta – the VR experience'.

'It is a virtual reality experience based on a blend of mātauranga Māori and Western science, broken down into three stages of prehistoric, present and future Aotearoa. It takes viewers on a journey through 2,000 years of Aotearoa's environmental landscape, flora and fauna,' says Kairangahau Lead Researcher Kiri Reihana.

The project, delivered in te reo Māori with English options, aims to help connect New Zealanders, and in particular Māori rangatahi and tamariki, with their environment through a real-life experience and reconstruction of unique taonga species, flora, and fauna to better understand the impact of our environmental changes.

'We wanted to reignite the desire of Māori and New Zealanders to learn more and foster a heart and passion for our amazing taonga – Au Warawara – in all its splendour of ecological, environmental and cultural significance,' says Reihana.

Virtual reality screenshots showing likenesses of prehistoric flora and fauna in pre-human Aotearoa

The core concepts in each stage are the result of engagement with rangatahi who helped develop a 2,000-year kaitaiaki plan for Au Warawara in conjunction with hapū, iwi and other partner organisations.

'Together we developed the stages based on what rangatahi wanted to see and understand across 2,000 years. These include a past section and te ao Māori pūrākau view of Aotearoa pre-human arrival, involving mātauranga Māori myths and legends, and uses the imagery of a giant eagle, flora, and many extinct taonga,' she explains.

'Then there's a present section, which is of post-human arrival to the present 20th century, and shows some significant changes to New Zealand's environment, including the milling of kauri, the decline in the health of forests and many native species that are iconic to Māori.

'And finally a future section of a glimpse into where we could be heading for future New Zealand in the next 2,000 years. This uses research predictions and shows pest and predator management options and a changing environment depending on what decisions are made and the impact of those,' says Reihana.

Karanga o Tāne Mahuta is a Curious Minds-funded project with support from Waxeye, Te Aho Tū Roa, Manaaki Whenua and the Warawara kaitiaki komiti.

The VR experience is expected to be released publicly in October 2020.

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Unite against COVID-19

Recovering from the pandemic: a view from the policy window

In 1984 the political scientist John Kingdon introduced the concept of a window of opportunity, or 'policy window', to describe how problems get included in the political agenda. Often what is needed to open a policy window is a focus event – sudden, visible and dramatic. New Zealand, along with the rest of the world, has recently had just such a focus event in the form of the COVID-19 pandemic.

We know that adverse effects of disasters fall disproportionately on vulnerable populations, including the poor, elderly, and indigenous and other ethnic groups. Adverse effects also tend to compound; low income is correlated with poor health, for example. To best help with disaster recovery and enhance long-term community resilience, it is essential to identify those areas facing potential compounding and cascading risk.

During the COVID lockdown period scientists at Manaaki Whenua used the Economic and Social Vulnerability Index (ESVI) as a proof of concept to map areas of likely multiple deprivation.

We looked at flooding risk as a compounding risk factor. Flooding is New Zealand's most frequent and costly natural hazard, and its incidence is predicted to increase with climate change. It therefore has the potential to magnify the economic, social, and health-related effects of other deprivations, including the COVID pandemic.

We mapped all of New Zealand and highlighted parts of Southland, the West Coast, Waikato and the Bay of Plenty to illustrate potential ESVI 'hot spots' and 'cold spots' around New Zealand. The maps show that many of the communities most affected by the COVID pandemic are also vulnerable to climate change and water-related hazards due to their location and proximity to rivers, coastal margins, and floodplains.

Identifying areas likely to be most affected by pandemic-induced social and economic impacts and facing flood hazards enables economic recovery to be better targeted. It may also be possible to 'build back better' in ways appropriate to the needs of the people who live there; for example, by using green infrastructure to reduce the volume of stormwater that flows into streams and rivers. We recommend that recovery investors in both government and the private sector consider similar approaches to maximise the wider social benefits of their investment.

The work, which formed the basis of a policy brief to government, was funded via Strategic Science Investment Funding provided by MBIE. Two national Science Challenges, Resilience to Nature's Challenges and the Deep South, contributed to some of the data layers.

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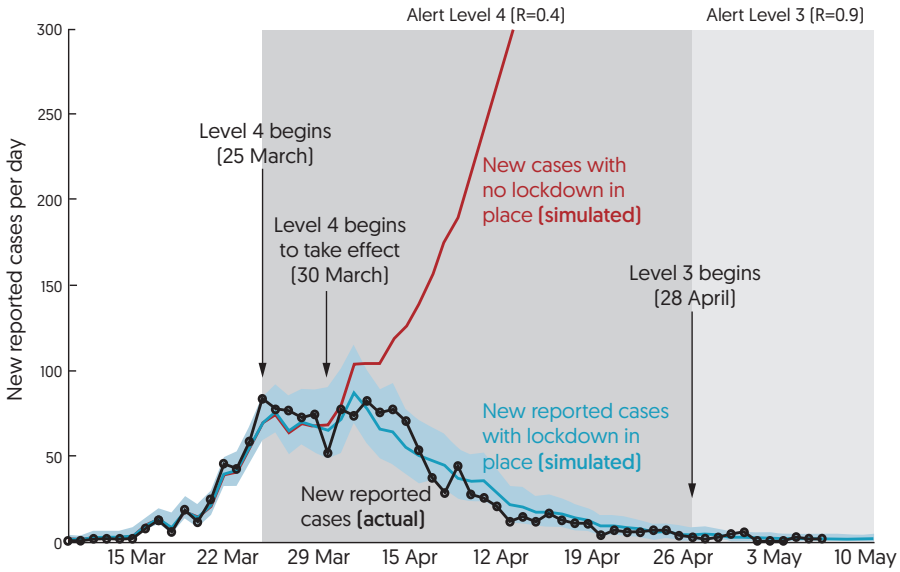
http://www.landcareresearch.co.nz/__data/assets/pdf_file/0015/216114/Policy-brief-25-Covid_flood-risk.pdf

Our COVID-19 research

A stochastic model for COVID-19 spread and the effects of Alert Level 4 in New Zealand

During the COVID-19 lockdown, Maanaki Whenua researchers Rachelle Binny and Audrey Lustig applied their predator-modelling skills to the spread of the disease, working with mathematicians and modellers at the University of Canterbury, the University of Auckland and Te Pūnaha Matatini: the Centre for Complex Systems and Networks, on a paper to understand the likely success of our Level 4 lockdown. The paper showed that the early Level 4 response had a significant effect on new case numbers, and that rapid case isolation, whether as a result of contact tracing, rapid testing, or otherwise, can lead to containment and possibly even elimination when combined with strong population-wide controls.



Simulations of the model suggest Alert Level 4 controls had a significant effect on new case numbers

https://www.tepunahamatatini.ac.nz/2020/04/09/a-stochastic-model-for-covid-19-spread-and-the-effects-of-alert-level-4-in-aotearoa-new-zealand/

The effect of large-scale anti-contagion policies on the COVID-19 pandemic

Manaaki Whenua economist Kenny Bell was a co-author on a major peer-reviewed study headed by researchers at the University of California, Berkeley, and published in *Nature Research*. Their work showed that policies deployed by governments in six countries to address the spread of COVID-19 (China, South Korea, Italy, Iran, France, and the United States) achieved large, beneficial, and measurable health outcomes. The study quickly compiled new data on 1,717 policies, and the authors concluded that across these six countries, interventions prevented or delayed around 62 million COVID-19 cases, averting roughly 530 million infections.

https://www.nature.com/articles/s41586-020-2404-8

Unite against COVID-19

The post-lockdown future of work

Richard Gordon – CEO

> *We see travel as one tool among many for effective collaboration.*

A constant in science is the need to interact with other scientists. New Zealand's scientists maintain their credibility and skills by working with other science leaders, nationally and globally, and this cannot be done by staying at home. However, the COVID-19 lockdown has challenged our thinking about travel.

During lockdown Manaaki Whenua sacrificed national and international travel and visits by overseas scientists, and replaced them with online events and workshops. This change will continue as we seek a change in travel culture, but it needs to be managed carefully so as not to put our scientists at a disadvantage.

For much of our work in the field there is no alternative to travel; for example, to conduct experiments in New Zealand's remote forests, the Pacific Islands, and Antarctica. But even here we are looking at new ways to observe the environment; for example, through remote sensing and satellite imagery.

While we expect that our future will include travel, just as it still includes fieldwork and making new connections, we see travel as one tool among many for effective collaboration. All of us have now experienced video conferencing as a suitable substitute for face-to-face meeting, and many have also benefited from the ability to dial into webinars, online tools, and training.

With our CRI colleagues in Science New Zealand we are promoting this change in travel culture to manage costs, emissions and personal well-being. This is an aspiration we want other New Zealand businesses and organisations to share, many of whom are members of our Toitū Envirocare carbon management programmes.

Our new normal will include ensuring that staff think carefully about the need to travel. We aim to sustain the reductions in our carbon emissions brought about by COVID-19, and to learn from the lessons of lockdown.

We are currently designing our 'future of work' with our people. In a workshop, our people identified some of the key challenges (red) and key opportunities (black) that they had experienced when working from home

Decision-making in freshwater management – a social learning approach

The Wairau Valley, Marlborough, one of two catchments where a social learning approach to freshwater management has been used

Scientists have long recognised that one of their biggest challenges is how to translate their recommendations into lasting management and behaviour changes among stakeholders. Individuals or people working in organisations may not be able to make changes easily, owing to a combination of norms and institutional routines that they work within. After initial enthusiasm for change, these people can quickly become disillusioned if they feel they are "going it alone" when community commitment to change is actually essential.

Social learning – a relatively new approach to this issue – aims to develop understanding and action to achieve change among groups of stakeholders. Working at the community or sectoral level rather than at the individual level, social learning co-creates knowledge through combined reflection and negotiation, building trust and enabling science to be more effectively translated into action. Good facilitation by a multi-disciplinary project team is vital, to support open conversations. Care must also be taken to ensure different knowledge systems are all appreciated and used within the wider process, including knowledge from science, local experience and matauranga.

Researchers at Manaaki Whenua and AgResearch recently published a paper on the power of social learning in freshwater management in two catchments, one in the Wairau Valley (Marlborough) and one in Mangatarere (Wairarapa). For both catchments, a representative collaborative group was formed, and then 4-5 facilitated workshops were led by a dedicated project team. The workshops allowed each group to understand the ways in which they value their river, to develop future water use scenarios and create useful indicator sets to assess progress in their agreed direction. The research aimed to discover how best to design social learning processes to enable community participation and to navigate issues related to institutional structures. The research was part of the Wheel of Water programme led by Aqualinc Research.

Andrew Fenemor, who led the Wairau case study, comments that this research, and ongoing work on collaborative and integrated decision-making, has been influential in the design of regional council planning processes for freshwater. For example, the Tākaka Fresh Water and Land Advisory Group (FLAG) used these approaches to recommend water allocation and water quality limits and land use policy to manage water bodies – including the renowned Te Waikoropupū Springs - in Tasman District. The research has also been influential in the government's Essential Freshwater 2019-20 work programme aiming to reverse the decline in lowland water quality nationally.

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https://link.springer.com/article/10.1007/s00267-020-01256-x

National environmental reporting – our science behind the headline reports

The recent increase in environmental regulations in New Zealand, including the National Policy Statement for Freshwater Management (2013, 2017, 2019) and the recent National Policy Statement for Highly Productive Land, is increasing demand for monitoring and assessing the impacts of land use on our resources. The Environmental Reporting Act 2015 also requires the Ministry for the Environment (MfE) to report on the state of New Zealand's environment once every 4 years, with domain reports for air, land, freshwater, marine and climate every 6 months.

Manaaki Whenua staff John Dymond and Anne-Gaelle Ausseil have worked closely with MfE as science leads for two major reports (*Environment Aotearoa 2015* and *Our Land 2018*), and provided ongoing scientific advice through a Senior Science Mātauranga Team (SSMT) for *Environment Aotearoa 2019*, *Our Freshwater 2020* and upcoming atmosphere and land domain reports. These reports combine the best environmental data and evidence from the scientific literature and mātauranga Māori (with added contributions in SSMT from Garth Harmsworth, Phil Lyver and Shaun Awatere) to reveal the state of, and trends in, our soils, native plants, animals, and ecosystems.

Our work has created foundational data sets for soil quality indicators, pre-human vegetation, soil erosion, biodiversity information including rare ecosystems, wetland mapping, and modelling of land-use pressures. Transparency, reproducibility, and traceability are the main principles required to produce indicators – all of which need robust supporting data.

Our wetland mapping has shown that New Zealand has lost 90% of its original wetland extent, providing a benchmark for the Environment Court. Our analysis of urbanisation and lifestyle block expansion showed that there is a risk of land being locked out of primary production for residential use, a finding that has led to the National Policy Statement on Highly Productive Land.

In partnership with MfE and the Prime Minister's Chief Science Advisor, we are providing a framework for measuring, reporting and monitoring of natural capital through indicators. This work is fundamental to Treasury's wellbeing framework and will aid with investment and budget priorities to assess their impacts and dependencies on our natural resources.

Other projects with MfE have included an improvement of land-use change information in the Land Use and Carbon Analysis System (LUCAS). LUCAS is a project to measure and monitor the carbon stocks of New Zealand's forests and soils. This information is required for New Zealand's reporting requirements under the Kyoto Protocol and the United Nations Framework Convention on Climate Change and has helped to improve the accuracy of our greenhouse gas emissions reporting.

Manaaki Whenua has also facilitated the inclusion of land indicators as Tier 1 Statistics NZ indicators for environmental reporting, contributed to the National Environmental Monitoring Standards on Soil Health and Trace Elements, and supported the future development of Land, Air, Water, Aotearoa to include land data and analyses.

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Celebrating our achievements

Researcher **Murray Dawson** became a Member of the New Zealand Order of Merit in the Queen's Birthday Honours 2020, a well-deserved recognition for Murray's long career and voluntary work supporting botany, horticulture, natural history, and public engagement.

Murray Dawson

Sandra Lavorel, leader of our Climate Change Adaptation and Mitigation portfolio, has been elected an international member of the National Academy of Sciences of the USA. This prestigious honour recognises her significant contributions to science. Sandra has collaborated widely during her research career, including extensively in the USA. She has authored a prodigious number of papers, and her number of citations put her in the top 1% globally for her discipline. Sandra was nominated by colleagues in the USA (membership is only through nomination), and her work with the Academy will include editing papers for their journal *Proceedings of the National Academy of Science*, one of the highest-ranked journals in the world. Sandra will be formally welcomed into the Academy at their next annual meeting, scheduled for April 2021.

Sandra Lavorel

Donna Giltrap, research priority area leader at Manaaki Whenua for Agricultural Greenhouse Gas Emissions and Mitigations, has been appointed by MPI as a member of the Overseer Science Advisory review panel. Overseer is a management tool that supports farmers and growers to improve performance and reduce losses to the environment through better use of nutrients on-farm. Utilising Donna's expertise in modelling, physics, and mathematics, the review panel will lead a technical review of Overseer's environmental modelling software to ensure it remains suitable as a tool for effective land management.

Donna Giltrap

Palaeoecologist **Janet Wilmshurst** was appointed a member of the Royal Society of New Zealand's Marsden Fund Council 2019–2021. The Council, appointed by the Minister of Research, Science and Innovation, makes decisions on Marsden funding, which aims to drive world-class research in New Zealand, supporting researchers to work on their best and boldest ideas and to connect internationally. The Council consists of 11 eminent researchers spanning a range of disciplines. Janet convenes the Ecology, Evolution, and Behaviour panel for Marsden Fund applicants.

Janet Wilmshurst

Listening to the voices of our environment

Alison Greenaway

Te Urewera is a remote, rugged area of hill country in the North Island, and is central to the wellbeing of Ngāi Tūhoe. From 1954 until 2014 much of Te Urewera was designated a National Park. At this point something extraordinary occurred: Te Urewera achieved legal personification under the Te Urewera Act 2014.

The Act established Te Urewera as an independent legal identity in perpetuity, designating protected status for its intrinsic worth, its distinctive natural and cultural values, the integrity of those values, and its national importance. As part of the process, in 2012 Te Kotahi a Tūhoe (TKAT) engaged Manaaki Whenua to hold a summit among non-Tūhoe stakeholder groups with connections to the National Park.

Building on this work, in September 2019 Manaaki Whenua's Holden Hohaia and Alison Greenaway were asked by Te Uru Taumatua, a governance board, to support them in preparation for a second Te Urewera summit. Members of 14 manuhiri groups were interviewed to review how the relationships have grown since 2012.

The second summit was held in January 2020 and attended by 40 people from the manuhiri groups, Te Urewera board members, and members of a Department of Conservation-appointed review panel. Discussion was wide-ranging, including whether future environmental management plans and current land management efforts in New Zealand should take a step in the same direction as has been achieved for Te Urewera.

Personification of nature forces people to think in new ways, opening up new possibilities for how 'manaaki whenua' or 'care for the land' might be understood, represented, enacted and researched, both in and beyond Aotearoa New Zealand. It reshapes our relationships with places, rebuilds the mana of those places, and enables stronger links between us and the environments we ultimately depend upon.

Getting outdoors and counting birds

The New Zealand Garden Bird Survey is one of New Zealand's longest running citizen science projects, engaging the public in biodiversity and conservation issues. This year we ran the survey from 27 June to 5 July, and over 7800 people took part across the country – a record result! Once analysed, the 2020 survey results will help us identify if certain key trends in common species are continuing, such as accelerating increases in kererū and slowing declines in tauhou.

New Zealand GARDEN BIRD SURVEY