

Our Land and Water

Annual Report Summary



June 2018 – July 2019

The Our Land and Water National Science Challenge (Our Land and Water) has been operational for three years, since May 2016. Our Land and Water has 24 research projects either completed or due to be complete by the end of 2019.

Our Land and Water's second phase of work will roll out in 'waves'. The first wave consists of 5 research programmes. The second wave will roll out in 2020 with the commissioning of up to 7 think pieces, which will build an evidence base for the development of new research programmes or working groups.

In 2020 Our Land and Water will also launch a new fund for rural professionals, to enable food and fibre producers and entrepreneurs to rapidly test new, high-risk, innovative practices that may lead to significant improvements in farming systems.

A continuing focus for Our Land and Water is to embed Te Ao Māori at the heart of Our Land and Water science. This holistic approach acknowledges the interconnectedness and interrelationship of all living and non-living things, and seeks to understand the total system, deepening our understanding of connections, interdependencies, and long-term intergenerational outcomes.

Our objective

The Our Land and Water objective is to “enhance primary sector production and productivity while maintaining and improving our land and water quality for future generations”.

As we have developed an Our Land and Water theory of change, constructed a narrative that connects the main elements of Our Land and Water together in an integrated way, and placed increasing emphasis on a Māori world view as a central unifying Our Land and Water concept, we have found it helpful to reframe the objective.

These key influences drive an approach that sees our land and water not as an extractive resource, but as a part of the world to which we are fundamentally connected, and to which we give and receive benefits in a reciprocal way. Thus, it makes sense to frame our objective in a way that recognises that enhanced environmental outcomes are at the least corequisites for other well-beings, and that embraces a concept of value creation from agriculture that is much broader than growth in production or productivity.

Consequently, the objective that underpins our research strategy has been recast as:

“To maintain and improve our land and water quality for future generations, while enhancing the value of the primary sector to New Zealand.”



FUTURE LANDSCAPES

A study in the Manawatu indicated that there is scope to shift and **intensify 80,000 ha** of land that would cause 55% more leaching of nitrogen below the root zone but result in a 6% decrease in nitrogen load reaching the river due to hotspots of high denitrification in the catchment.

The faecal indicator bacteria test for Escherichia coli doesn't account for naturalised E. coli present in the soil and in water meaning that authorities could be reporting **false positives**.

We have estimated that had farmer practice not changed in the last 20 years phosphorus and nitrogen loads to our streams and rivers would have been **50 to 100% worse** than they are now.

We have estimated that with the implementation of all established and developing mitigation measures nitrogen, phosphorus and sediment could be reduced by 20, 30 and 60% respectively. This may not meet proposed policy and **require land use change**.

We have shown that about half to 80% of nutrient loads in our lakes come from **human actions**.

We have proved the concept of Land Use Suitability and are working with stakeholders to apply it at a range of scales. We have shown that redistributing land uses in catchments can allow for both improved productivity and reduced environmental impact.

Work undertaken by Next Generation Systems with Pamu (LandCorp) has been exploring the dimensions **of substantial land use change** in line with Pamu's transformation agenda for its land holdings, particularly in areas where current uses are unsustainable.

We have contributed to **national policy on freshwater management** in a number of areas including riparian management and stock exclusion from waterways. We demonstrated the impact that targeted interventions can have in terms of precision irrigation and the management of critical source areas.

We have provided guidance on the **most effective use of water quality mitigations**, taking into account factors such as rate of effectiveness and the characteristics of the receiving environment.

There is growing evidence that tools and frameworks developed from research in this theme are **finding application** among industry and government stakeholders, with Our Land and Water-generated information now incorporated in to policy and advisory documents.



INCENTIVES FOR CHANGE

We now have a much better understanding of the attributes of our primary products that different export markets are prepared to pay more for. This information is being used by producers, processors and exporters to develop appropriate strategies.

A study of 94 publications of consumer's willingness to pay a price premium for dairy and red meat products showed that consumers would pay **24-36% more** for low environmental footprint products.

Research using economic and environmental modelling on the cost-benefit of delivering higher product specifications on-farm, has demonstrated that it is possible to increase returns to the producer that **more than compensate** for increased production costs while delivering a lower environmental footprint.

We have been able to attribute increased awareness, farmers actions and stricter policy to why a substantial **improvement in national water quality** concentrations of phosphorus has occurred in the last 10 years, compared to the previous decade.

Our Land and Water science has directly informed NZ brand initiatives such as the beef and lamb industry's **Taste Pure Nature**, which launched in the US in March 2019.

We are advising industry bodies on ways they can best **enable value capture and reward producers**. Findings over the last year from the analysis of various value chain characteristics and configurations is providing us with a sound basis for working with other value chains to enhance returns and influence land use practice.

We have demonstrated that environmental footprinting/reporting can potentially be used to access markets and enhance product returns. The co-leader of this research is now **co-chair of the UNEP/SETAC Life Cycle Initiative** (responsible for developing global guidance and consensus on environmental indicators) on eutrophication. The team have been involved in preliminary testing of the European Product Environmental Footprinting for dairy and red meat products from NZ.



CAPACITY FOR TRANSITION

The Collaboration Lab found that in agricultural research projects, the stronger the practice of the **principles of co-innovation and transdisciplinarity**, the greater the probability that the project would achieve its desired long-term impact.

We have participated in capability programmes which are producing tangible results in terms of Māori student performance in STEM subjects and are **creating opportunities** for students and communities to participate in Our Land and Water projects.

An online tool for Māori agribusiness to measure access to working capital, pathways to market, capacity to overcome regulatory constraints and prioritise actions to access premium value chains is being used by 5 Maori land trusts and the refined tool used by DairyNZ and Beef + Lamb with **> 100 Maori Land Trusts**.

Residents in collaborative catchments perceive water management decision-making to be slightly more responsive to their concerns, but do not perceive decision-making as any more effective or fairer than residents in non-collaborative catchments. This is potentially due to communities being unaware of **collaborative processes** in their catchment.

Methods have been developed to calculate **increases in social capital** in catchment communities, using NZ census data to derive statistics relating to dependency ratios, volunteering, unemployment rate, and industry diversity.

Mauri Whenua Ora has looked at the way multi-sector diversification can create a **comprehensive economic platform** for regional Māori representative groups. It has also developed the Pā to Plate cultural economy model that connects farmers, produce, ancestral lands and marae with descendant consumers.

An examination of kaitiakitanga values and practices in the Māori agrifood sector has shown that holistic, systems-based approaches to farming and food can **create an 'upward spiral'** of connected outcomes, such as oranga (well being), tatai hononga (building social capital), tiaki taiao (maintaining and enhancing natural capital), and ōhanga (growing prosperity, economic capital).

The Collaboration Lab generated increased understanding of **how to undertake research for impact** (with implications for Our Land and Water as a whole), how to build collaborative capacity, when to use (and when not to use) collaborative processes in policy development, and the application of Māori models of engagement to collaborative practice.

Scientific quality

37 articles were published in journals

7 books or book chapters were produced

23 additional articles were submitted to high-impact journals

6 international conferences invited Our Land and Water researchers to give keynote presentations

1 of our researchers was elected as a Fellow of the Royal Society of New Zealand

Caroline Saunders from our science leadership team was appointed president of the international Agricultural Economics Society

20+ presentations were given to industry groups and organisations

58 conference presentations were given, mostly to audiences of 300+

7 technical reports were co-developed with stakeholders

20% of journal articles were produced with stakeholders (down slightly on the 24% last year) indicating that while there is evidence of capability building among stakeholders, there is some way to go, reinforcing the importance of the more targeted approach to co-innovation signalled for phase 2.

Research teams

Using “best teams” to grapple with complex multi-dimensional problems is a key strategic approach to our research. Our Land and Water uses stakeholder-inclusive, cross-institutional and cross-disciplinary processes to ensure that the most appropriate capabilities work together. The number of collaborating organisations per programme has increased year on year. There has been a shift in research team composition from senior to include more mid- or early-career researchers over the last 12 months.

6.6 collaborating organisations per contracted programme (up from 5.3 in 2018 and 3.5 in 2017)

66 provider organisations (up from 37 last year)

12 post-graduate students (similar to 2017/18)

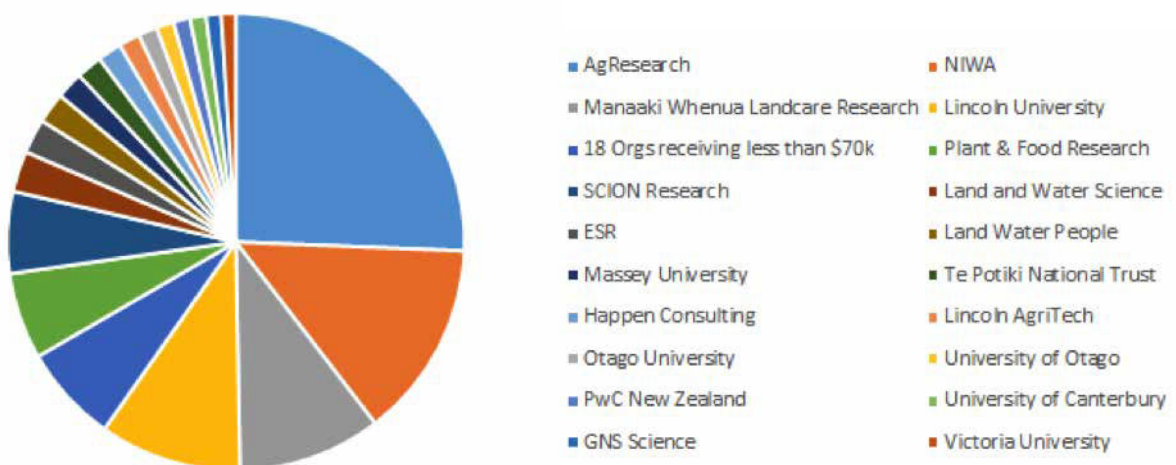
5 post docs (two in 2017/18)

10% of project team FTE are early career scientists (up from 5%)

229 individual researchers and collaborators across Our Land and Water. **39** are Māori. **49** are in steering groups or advisory roles

OLW Research Funding Distribution 2018/19

\$7,968,607



Aligned funding

Aligned funding processes gives Our Land and Water the potential to have significant influence over the shape and direction of related research, including the opportunity to drive efficiencies. Evidence that Our Land and Water is seen as the hub of land and water research in NZ includes:

AgResearch has a new Science Plan that is now highly aligned to the objective and themes of the Challenge. They have aligned \$5M of SSIF funding to current and signalled work including visualising future landscapes.

Plant and Food Research have reinvested \$1.2M in work aligned to Land Use Suitability. Proposed work in this area will also see \$1M of co-funding by MPI.

Researchers have sought clarification that their ideas are aligned to Our Land and Water before submitting proposals to MBIE for funding. Of the aggregated value of aligned funding for 2018-2019 (\$27,950,429), \$15M is in the form of aligned MBIE-funded programmes.

Co-funding of Challenge research (\$13M) was similar to the previous year and up on 2016/17 (\$11M).

Stakeholder engagement

Engagement with stakeholders and end-users underpins the transformational change required to achieve the Our Land and Water mission and is therefore essential to our success. Some examples of research being co-created or taken up by stakeholders in 2018-19 included:

Sources and Flows programme engaged with stakeholders at DairyNZ, Environment Southland and Waikato Regional Council to guide planning and activity associated with the programme's case study catchments and 'legacy and lags' journal article.

Land Use Suitability (LUS) programme convened three co-development workshops with stakeholders in Wellington, Invercargill and Hamilton, to identify prospective applications of LUS assessments in decision making, and to check that any tools developed by the programme will be widely used and valued. Participants were primarily from regional councils, MPI and MfE. The participants identified several applications and recommended further R&D of the LUS tools.

Incentivising Value Chains programme engaged with many stakeholders including key industry leadership networks, Te Hono and the Primary Sector Council, to discuss research outputs and share relevant material. Lead researchers in this programme were then engaged to produce a situational analysis of the New Zealand primary sector for the Primary Sector Council.

The Indicators Working Group (IWG) project researchers participated in The Treasury's Wellbeing Group, which is sharing information among public sector agencies about the indicators being developed around wellbeing, sustainability and resilience by The Treasury and Stats NZ. In addition to this, MPI has been guided by the results of the IWG for its Rural Proofing policy and the new resilient communities directorate.

The tool developed by the Whenua Life Values project is being tested by five Māori land trusts that will provide feedback on its efficacy and to identify ways to improve its function. The final refined product will then be tested across 100 Māori land trusts/incorporations by Hemi Dawson from Dairy NZ, and across a group of Māori landowners by Beef + Lamb NZ.

Next Generation Systems programme held weekly meetings with Pāmu to develop the Pou Marama workshop, which was a critical part of the transformation that Pāmu is seeking to create sustainable futures for their Canterbury dairy farms.

Mātauranga

From a Māori customary perspective, productivity is premised and influenced by te mana o te whenua. Māori as kaitiakitanga understand that people cannot flourish unless Papatuanuku (earth mother) and her relationship with Ranginui (sky father) is flourishing.

Our Land and Water continues to make steady progress in framing problems through a Māori lens. This will grow the value of Our Land and Water science in helping Māori achieve combined (NZ-wide) and unique wellbeings and outcomes.

Several mechanisms exist within Our Land and Water to ensure meaningful progress in our engagement with Māori researchers, entities, and businesses. In the 18/19 period the following updates apply:

Our Land and Water Strategy

A collaborative process was undertaken to co-develop the 2019–24 Our Land and Water Strategy document. The commitment to co-innovation was re-affirmed as the key principle to inform future operational decisions to ensure the genuine embedding and resourcing of a Te Ao Māori world view across Our Land and Water.

Our Land and Water Structure

Late in Phase 1 the governance arrangement was reviewed and agreed to merge the Kāhui and Board to become a single governance entity that will operate under a single chair. This represents a significant step forward that ensures Māori cultural and social operating environments are entrenched in Our Land and Water thinking. The Board approved the appointment of a senior Māori position, to be appointed in 2019-20, an excellent example of Our Land and Water's commitment to ensuring that a Te Ao Māori world view is at the centre of its operations and radiates out through its science.

Our Land and Water Science and Partnership

The first wave of investment for Phase 2 signalled a strong commitment to embedding Māori knowledge by requiring a Māori lead position within each of the programmes. As part of the co-innovation process the Kahui engaged with programme leaders in a hui to encourage them to think about how their programmes might be relevant for Māori and how to build Māori research capability through engaging emerging scientists or PhD/Post-Docs.

Governance

Our Land and Water governance recognises that success in achieving the objective is dependent on continually reinforcing a new way of working. Our Land and Water governance has continued to demonstrate strong leadership, with a focus on shaping both the direction of our research and the culture within which it is conducted. This is demonstrated by:

Its interest in seeking strategic advice to ensure Our Land and Water research has impact and remains focussed on solutions that are suitable for rapid uptake.

Both Board and Kāhui have engaged closely with advisory groups such as the Science Advisory Panel, which places particular emphasis on community engagement and uptake of science learnings.

The Board sent strong messages to the research community about critical pre-requisites for research programmes such as co-design and meaningful engagement with Māori. Programmes that are weak on or both elements are not funded.

Over the year, the Kāhui met with the leads of future research programmes and provided advice directly on how to incorporate a genuine Māori world view into their research.

Governance interest in risk management of the research and preparedness to intervene to ensure alignment between research activities and the objective.

Single Governance Group

Over the year the Board and Kāhui reflected deeply on what an authentic relationship with Māori might bring to Our Land and Water and started the process of merging the two entities into a single governance group. There are two complementary drivers for this shift:

1. The Kāhui role evolved from an initial focus on the provision of advice in relation to the delivery of Vision Mātauranga obligations, to more of a strategic partnership, in which the Kāhui have become actively involved across a range of governance activities.
2. Given the recognition by Our Land and Water of the central importance of Te Ao Māori and Māori knowledge systems in achieving its objective, it is appropriate that this commitment is reflected in the structure and function of Our Land and Water governance.

Challenge Parties Group

The Challenge Parties Group of collaborating partners increased by two in 2018/19, bringing the total membership to 16.

Public outreach

Public communication and outreach are central to Our Land and Water, with effective outreach regarded as a key to success and a critical component of the Challenge. One of our key objectives to encourage public participation in the Challenge is to make Challenge information available to the general public and interested communities.

In 2018-19 our researchers recorded 16 public participation events related to their research. One example is a Science Symposium held by Environment Southland in Invercargill in September 2018. Southland staff presented a wide range of the science activities that have been carried out over the last 4 years, which included some projects to which the Sources and Flows, and Land Use Suitability research programmes have contributed. The Symposium was also attended by researchers leading other projects.

New website

A major project for Our Land and Water in 2018-19 was to develop a new website to be used as the central channel for all Our Land and Water material. The new website launched in April 2019. Comparing Q4 2018 analytics with Q4 2019, the number of users increased by 75%, average session duration increased by 53%, the number of pageviews increased by 68%, and the average time spent on a page increased 59%.

Te Taiao Nature at Te Papa

Our Land and Water is an exhibition partner for the Te Taiao Nature exhibition that opened at Te Papa in May 2019. The previous nature zone received 18.5 million visitors. As part of Our Land and Water's sponsorship of the fresh water section of the exhibit, we were consulted on the science and sponsored 4 interactive exhibits:

A fridge containing water bottles, asking visitors to choose which water they think is clean and which is dirty, using Māori terms for water purity.

A large, wall-based water cycle machine which allows children to interact with the water cycle by moving levers, channelling balls (representing water) down particular paths.

A large land-use graphic giving an overview of the major land-use causes of pollution, with a link to mitigations.

AVs of everyday environmental heroes making a difference to improve waterway health through land-use choices and other actions.

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