

**THE NATIONAL LAND RESOURCE CENTRE:
BUILDING CAPACITY AND PARTNERSHIP ACROSS ALL SECTORS
INTERESTED IN LAND RESOURCES**

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Abstract

Increasing attention is given to basing environmental management on innovative science and technological advancements. Such shifts in perception require not only enhanced capacity among all stakeholders but also ample time and effort to diffuse research results successfully to land managers, policy-makers, and practitioners. The National Land Resource Centre (NLRC), recently established by Landcare Research, aims to enable businesses, government, researchers, and the public to understand, use effectively, and enhance New Zealand's land resources. The NLRC provides access to information for a wide range of user interest groups; for example, assisting organisations to report on the state of the environment, plan development within environmental limits, and ultimately match land use to the capacity of land resources. The NLRC aims to develop communities of stakeholders with common interests, and over time work to produce information tailored to meet their specific needs. It also aims to help develop the capacity of those researching, governing, and managing land resources.

Introduction

Primary production from agriculture, horticulture, and forestry generates 64% of New Zealand's merchandise export earnings and contributes around 12% to GDP. Success in primary production is underpinned by successful, sustainable management of land resources. However, increasing demands on the availability of resources and intensification of farming practices increasingly challenge the quality of the environment. Water quality, erosion, nutrient, and sediment loss are high on the government environmental agenda but there remains considerable uncertainty on persistence and resilience of natural resource systems. Addressing these issues will require the application of new research and technologies and the adoption of a more inclusive approach (involving all stakeholders) to resource management.

Despite the explosive growth of science, knowledge gaps are widening between science and environmental management. Changing societal values and increasing demands on productive land challenge environmental management. Consequently, the research required to inform effective environmental management has increased in complexity, requiring greater scientific knowledge and more sophisticated technological tools.

New environmental regulations and the increased complexity of science, combined with the incomplete understanding of landowners, pose added challenges for complete and effective implementation of the best environmental practices. Increasingly, landowners are taking collective action on many land management issues. While some of the land management issues are significant to New Zealand as a whole, a path towards more sustainable land

management remains in the hands of individual landowners. However, many landowners struggle to access and consume land resource information and therefore find it difficult to keep up with the rapid changes in land-management regulations.

The discrepancy between the capacity of New Zealand's environmental agencies on paper and in practice has recently become a high priority on the central government agenda. The emphasis of the current government is to maintain a high level of land-based productivity while addressing key environmental issues (e.g. water quality) through improved environmental capacity and the integration of new tools and technologies. As a result, agendas and priorities for land resource management are developing quickly. Increasing attention is given to basing environmental management on innovative science and technological advancements. Such shifts in perception require not only enhanced capacity among environmental managers and landowners but also ample time and effort to diffuse research results successfully to land managers, policy-makers, and practitioners.

Translating science into practice

Science contributes to sustainable land management by translating scientific knowledge about the condition of the environment into practical tools with which land managers can assess the effectiveness of their land-management practices. Several models have been adopted to transfer science into practice. These models can be broken down into four main groups: 1) RDD (Research Development and Diffusion) models; 2) problem-solving models; 3) linkage models; and 4) societal interaction models. The RDD subscribe to a science push approach where the science producer is the central actor in the production and diffusion process. In contrast, in the problem-solving model the users are the principal initiators and remain responsible for gathering science from the researcher. The linkage models integrate the implementation of mechanisms to ensure formal linkages between the scientists and potential users; and the social interaction models emphasize collaboration between researchers and users.

Traditionally in New Zealand science information has been disseminated through the various Crown Research Institutes (CRIs). This type of system is much in line with the RDD model. While the Ministries have been central actors in identifying key research areas and the CRIs act as the science producers and diffusers of information, the current government is in the process of moving towards a more linkage-society interaction model. This has begun with the initiation of the National Science Challenges, which aimed to engage the public with science and the release of the CRI taskforce report. In the CRI taskforce report the government has identified CRIs as vital components of the overall science system but has recognized the need to improve the way in which science information is delivered on national priorities and responds to the needs of research users, particularly industry and business.

While science priorities may change for individual CRIs and the science sector at large, the need for stable and accessible land resource information will remain. The CRI taskforce recommends that government agencies take into account the need to maintain a secure supply of the services they use. They also highlight the need to find different ways to engage stakeholders and to create impact from science.

End-users often do not have the time or knowledge to navigate multiple, often complex, sometimes conflicting, and generally not "fit-for-purpose" research data sources. There is also a sense that end-users hold particular values and prejudices (based on previous experience) about data sourcing, which means they exclude or are unaware of data that could

play a part in their decision-making; add to this a new tranche of potential end-users who are aware of the need for information but have not identified sources to satisfy that need.

The need for capacity building

Central Government

In 1996 the government adopted the Sustainable Land Management Strategy, which established a committee that aimed to enhance the knowledge of landowners to manage their land resources better. The Environment 2010 Strategy identified land degradation and soil health as key areas posing environmental and long-term productive capacity risks for land use, and listed key actions required for better management of land resources. These actions included developing land-management skills.

Since then several joint initiatives between MAF (now MPI) and other key government departments addressed these actions. The initiatives included The New Zealand Land Management Strategy, the development of the National Science Strategy (NSS) for Sustainable Land Management (SLM), and the Sustainable Agricultural Facilitation Programme (MAF programme). The focal point of these strategies has been land users (i.e. farmers) and as a result at least 55 community-based groups have formed throughout the country to address local problems.

In 2010/11, under the stream of capacity-building initiatives, MPI worked with regional councils to develop targeted training packages on a regional basis to support knowledge and skill building for land sustainability officers (environmental practitioners). MPI provided free workshops for land managers around the North Island that were run with the support of regional councils. These workshops included erosion processes, Land Use Capacity, and catchment and farm systems management.

Since 2011 several new tools, online materials, and spatial data sets have been released, including S-Map, LCDB3, LUM (2008), Visual Soil Assessment, and SINDI. At present there are limited opportunities for environmental managers to gain training in the application of these new resources. As a result better land management decisions are being hampered through poor understanding of innovative science and technological advancements. A new approach is needed to build the knowledge and skills for land resource management. which in turn will help bridge the gap between science and practice.

Local Government

Over the last decade, New Zealand's institutional development for environmental policy and management has been considerably strengthened. Recent amendments to the Resource Management Act 1991 have also strengthened the institutional frame work for environmental decision making. However, although on paper the RMA 1991 foresees a high level of integration in environmental policy development and environmental decision making, in reality many regional and local councils are struggling with their responsibilities. Regional councils have been challenged by the scope and complexity of their tasks, insufficient resources and skills, and a lack of guidance on how to deal with cumulative environmental effects.

Environmental capacity is defined as society's ability to identify and solve environmental problems. Lack of ecological or technological knowledge can limit the success of those responsible for managing the land (e.g. Regional Councils) to implement solutions to

environmental problems. Regional Councils are currently making decisions about how best to ensure the economic development of their regions while simultaneously protecting environmental integrity – particularly of freshwater resources. This significant challenge requires access to robust and defensible information and the capacity to assess environmental conditions and changes. Specific challenges include identifying trade-offs between different ecosystem services, the value of natural capital, the extent of soil contamination and how to manage it, as well as improved soil and land-use information to support decision-making on setting and meeting limits (particularly for freshwater).

Business and landowners

Agendas and priorities around land resource management are developing quickly. Increasing attention is given to basing environmental management on innovative science and technological advancements. Such shifts in perception also require enhanced capacity among business and landowners. Capacity enhancement has been identified as a successful mechanism to translate knowledge into action; however, this depends on access to knowledge and includes providing tools and knowledge to initiate, guide, and support improved understanding of land resource information.

The need for land information is varied among a range of stakeholders within the business sector. Businesses dependent on land resource information include banking and financial services, energy suppliers, and those involved in primary production, including landowners. Although there is often good integration of land-resource information, and sometimes sophisticated in-house systems to consolidate land information within the primary sector, many business stakeholders have limited access to a full range of data and services. Much land data information is collected from a range of sources, and interpretation of data is reliant on the support of consultants or regional councils. Very few business stakeholders have the capacity to manipulate, interpret, and make independent, informed decisions.

Building environmental capacity across all sectors

At present, information on the land resource – and the capacity to commission, generate, interpret, and use it – is distributed across many organisations. The National Land Resource Centre (NLRC) is a collaborative initiative that operates beyond current institutional boundaries, communicates science without exclusivity of language or form, and provides the evidence and capacity from which to enhance and unlock the 'land economy'. It is designed to help set priorities for land-based research and create more impact from research undertaken across the science system.

The NLRC proposes an alternative method to the transfer of science into practice. It provides a central “one-stop shop” engagement process that accesses the best and current data – and internal within the collaboration itself. It delivers authoritative information from a variety of original sources across the land-based CRIs (and ultimately other partners) and presents information in a way that can be easily discovered, identified and explored – and provides opportunities to dig deeper as required. Data are also reported in a consumable fashion using techniques referred to as information graphics, information design, and data visualization. This is the practice of presenting information in a way that fosters efficient and effective understanding of complex science data. This, in combination with the development of new tools and technologies that present data spatially, will allow for easier and more efficient application of complex scientific ideas.

One of the key aims of the NLRC is to facilitate the transfer (from researchers to landowners) of the most up-to-date science knowledge and technology about the changing conditions of the environment. It aims to build capacity that will assist land managers' ability to respond to and mitigate environmental changes. The Centre builds on the foundation for a wider collaboration between council staff, scientists, farmers, and other stakeholders who regularly deliver a wide range of environmental outcomes. In time, there is the potential for more efficient knowledge transfer of science knowledge that will encourage the integrated management of natural resources to meet the need of a growing economy while protecting the environment.

The specific intent of the NLRC is to develop a capacity-enhancement strategy that promotes effective knowledge transfer from research providers to end users. At a strategic level the Centre identifies modes of partnership that provide mutual benefits between all land-resource stakeholders incorporated within a national research agenda for land resource science. It will also provide a framework and tools for on-going knowledge transfer and the development of capacity enhancement initiatives that will consider future regional-, national-, and sector-based priorities.

Capacity enhancement sits within the regional councils but needs an effective process to collect and consolidate it within a single capacity-enhancement strategy. Capacity enhancement is high on the national science agenda, and the NLRC will ensure it is more than just a tool for implementation of scientific research and also addresses the wider agenda to manage natural resources effectively for economic wellbeing.

One of the first steps is to identify potential actions that would nurture critical staff competencies that underpin effective knowledge transfer and improved environmental management. The NLRC aims to work with land managers to enhance their capacity to critique and use knowledge effectively to work out and use policy options in a dynamic environment. This can be achieved in two main phases. The first phase aims to enhance existing capacity by identifying researcher's capacity to transfer knowledge and in turn by identifying the capacity of land managers to critique and use this knowledge. The second phase aims to add value through partnerships. The NLRC will not only contribute ideas, expertise and networks to existing capacity enhancement initiatives but will also identify modes of partnerships and joint activities that build on comparative advantages and provide mutual benefits.

Conclusion/Summary

Today's environmental issues are increasingly challenging and interdisciplinary; meeting these challenges requires continuing communication between science providers, government, land-managers, landowners, and the public. While the need for research has never been greater, the changing need and composition of research users pose new challenges to research and science delivery. This change in management has led to ambiguity as to what new knowledge is needed, who needs it, and how it should best be delivered. Research organisations in New Zealand are recognizing that collaboration in management and research is essential for sustainable management.

Agendas and priorities for land management are developing quickly. There is increasing attention on how to promote economic development while maintaining natural systems. Such shifts in perception require new capacities among business, industry, researchers, and land managers and owners. Improved capacity and more effective transfer of scientific knowledge

will strengthen sustainable land management initiatives and empower landowners to deal better with changes in environmental regulation.

Recent institutional changes and a change of government have led New Zealand to re-evaluate its approach to the delivery of scientific information. Currently this is a shift away from a research development and diffusion model to a more inclusive linkage-societal-based model. Crown Research Institutes are becoming more aware of the needs of the end users of its scientific products and are working collaboratively with end users to develop scientific outputs that can be easily implemented. More specifically, the National Land Resource Centre has been established to enable the science sector to deliver authoritative fit-for-purpose land resource, management and sustainability data, information, tools, and services to government and business via a single “one-stop shop” entity. The Centre provides access to information for a wide range of user interest groups and aims to help develop the capacity of those researching, governing, and managing the land resource by focusing on capturing knowledge from those experts and developing ways in which to share this knowledge effectively with others. The Centre also facilitates engagement between stakeholder groups, and provides a neutral environment for stakeholders to discuss and develop new opportunities for better management of New Zealand’s greatest asset – land.