

## From the editor

### Past, present and future sustainability challenges for farming

New Zealand is founded on the production of meat, dairy, wool, fruit, vegetables, timber and other primary products. Agriculture has shaped much of the ecology and landscapes we see around us, and the nature of our society and economy. It has long been regarded as “the backbone of our nation”.

Our ever-intensifying agricultural industry brings economic prosperity, but it also creates environmental challenges – in regards to water quality and allocation, soil erosion and climate change. These challenges must be addressed to ensure the economic, environmental and social sustainability of agriculture in New Zealand.

The articles in this edition of *RM Update* reflect on the history of agriculture in New Zealand, changing land use and the current environmental issues facing the sector, as well as pointing towards future directions for sustainable land management.

They raise the question: What changes in thinking and behaviour by farmers, land managers, local government and central government are required in order to secure a bright future for New Zealand's land-based sectors?

**Amber Duncalfe, Editor**

## Pasture, present and future – A brief history of pastoralism in New Zealand

Surprisingly little has been written about the history of pastoralism in New Zealand, despite its huge economic importance. Professor Tom Brooking, from Otago University, explores the development of pastoralism in New Zealand.

Sales of meat, wool, hides, butter, cheese and tallow earned 93 percent of New Zealand's export income at their peak in the early 1920s. These products along with venison and fish still constitute our biggest export earners, outstripping the unpredictable tourist industry in most years. Yet much of this fundamentally important story is described only in very outdated material, scattered through local and family histories,

hidden in university theses across a range of disciplines including history, geography, sociology, anthropology, agricultural science and ecology, or locked up in official reports which are hard for most to decipher.

The outlines of the development of pastoral farming are, however, clear. Six main chronological phases can be readily identified even if there is a degree of overlap between them.

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*News and analysis  
about sustainable  
resource management  
in agriculture,  
horticulture and  
forestry*

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## Early experimentation

First, a long experimental phase lasted from about 1845 to 1882, during which wool production outstripped wheat farming as the key engine of the colonial economy. Wealthy settlers opened up the southern North Island for sheep farming from the late 1840s before moving into the South Island in the early 1850s. By the time gold production peaked around 1865, New Zealand had become something of a giant sheep run, carrying more than nine million animals.

This first phase involved dramatic ecological modification of New Zealand's landscape. Firing the high country tussock and running sheep where ruminants had never grazed before brought about a rapid ecological transformation. The complex under-story of plants and the unseen microbial community experienced massive disruption and biological carrying capacity fell. Chronic rabbit infestation from the 1870s exacerbated soil erosion. Despite such difficulties, farmers adjusted their practice to cope with very different environmental conditions from those of Britain and Australia.

Māori meantime, who had become successful grain farmers by developing their long-established gardening skills, struggled with unfamiliar stock animals, under-capitalisation and land loss.

## The advent of refrigeration and the first grasslands revolution

Refrigeration revolutionised New Zealand farming as settlers converted New Zealand into Britain's specialist grassland farm. Initially, this transition proved difficult because cumbersome technology made exporting frozen meat and butter difficult and expensive. The great majority of settlers lacked the capital and expertise to convert bush, swamp and tussock into pasture. Most had to learn from scratch how to become dairy farmers. Low prices for wool, meat and butter persisted until 1896 and compounded their problems, until falling shipping costs and the rising standard of living of the British working classes came to their rescue.

In the 1880s, the New Zealand Government helped struggling settlers make the transition to modern farming by bringing in Danish, Scottish and Canadian experts on dairy farming. The Department of Agriculture, set up in 1892, provided further advice and instituted rigorous quality control regimes.



Taranaki dairy farm, c. 1900

Part of Pascoe, John Dobree 1908-1972: Photographic albums, prints and negatives (PAColl-0783)  
Photographic Archive: Alexander Turnbull Library, Wellington, New Zealand

From 1894, the Liberal Government offered cheap loans under the Advances to Settlers scheme, and worked with big business to subdivide greater estates into middle-sized family farms.

## Refrigeration revolutionised New Zealand farming as settlers converted New Zealand into Britain's specialist grassland farm.

The Government, farmers and seed merchants also worked hard to lay down artificial English pastures (mainly rye grass, cocksfoot and white and red clover). By 1920 about 18 million acres in New Zealand had been covered in the green swards of England. Remarkably, this area was greater than the entire pasture lands of England itself. Some historians have labelled this achievement the "first grasslands revolution".

Once the land was cleared, the major problem for farmers proved to be declining soil fertility. Farmers and agricultural scientists struggled to find a single, cheap and easy to use artificial fertiliser. Waste from the rapidly increasing number of freezing works proved more effective and cheaper than Chilean guano and safer than blood and bone from India (which sometimes contained anthrax) – but such fertiliser had to be augmented by slag from German factories.

When the slag dried up during the First World War, the search was stepped up for alternatives.

## The second grasslands revolution, consolidation and the Depression

Acquiring cheap phosphate supplies from Nauru in 1920 ushered in the so-called "second grasslands revolution" and confirmed New Zealand as Britain's specialist, far-distant stock farm.

Britain had learned during the First World War that food from its colonies proved critical in the defeat of Germany. British officials and scientists came to New Zealand to help increase agricultural productivity. In the case of grassland farming, New Zealand led Britain rather than the other way around. Famed agrostologist (agricultural botanist) Sir George Reginald Stapledon, who visited in 1926, became a follower of the powerful agricultural scientist and bureaucrat, Bruce Levy. Under Levy's influence British farming came to rely much more heavily on rye grass after Stapledon's visit.

This third period of development saw an entrenching of earlier patterns and the centralising of dairy factories, made possible by motor transport. But farmers struggled between the wars, despite increases in productivity resulting from improved technology

and agricultural science (which came with the establishment of the Department of Scientific and Industrial Research in 1926 and Massey Agricultural College in 1927, along with an upgrading of Lincoln, founded in 1878). Prices plummeted in the early 1920s and again in the Great Depression of the 1930s.

As a result, the overall cultivated area declined somewhat as marginal farms reverted to so-called “scrub” and erosion ravaged the east coast of the North Island in 1938. Inflated land prices, induced by the high prices paid for wool, butter, cheese and meat under the commandeer system during the First World War, bequeathed hefty debts to many returned soldiers who became settlers. About a third of these men failed (meaning, of course, that two-thirds succeeded or got by). This failure, although exaggerated by mythology, proved the greatest in New Zealand’s relatively short farming history.

In the 1940s, the Labour Government determined that farming would be given much more assistance in adjusting to the traumas of post-war conditions than had been the case in the 1920s. World War Two induced high prices, but also ran down the industry to a considerable extent. What turned it around – especially in the South Island, which had reached its environmental limits as early as 1900 – was a better means of delivering super phosphate to the high country; that is, aerial topdressing.

### The third grasslands revolution and the golden age of pastoral farming

The Korean War wool boom also helped revive farming and a record number of farms were in operation by the late 1950s. Sheep numbers soared from 32 million in 1949 to 70 million by 1980, and cattle numbers from four to nearly eight million.

Farm amalgamation accompanied the resurgence in sheep farming and South Island farmers closed the gap on the larger North Island flock. Beef cattle numbers also increased significantly.

Britain’s negotiations with the European Economic Community, and the collapse of commodity prices from 1967, forced further efficiencies. Many smaller dairy farms disappeared along with scores of local dairy factories. Early attempts at diversification occurred from the late 1960s, including farm forestry, the domestication of deer for

venison production and growing kiwifruit.

### Challenges of the neo-liberal era, 1984–2000

The grasslands revolutions and high productivity could not overcome difficulties in marketing produce, especially at a time of collapsing prices and escalating labour and fuel costs.

The then Minister of Finance, Roger Douglas, forced further efficiencies by completely removing

### New Zealand’s stock farmers... defied the experience of other western farming industries by surviving without subsidies.

farm subsidies. Douglas disagreed with earlier views that New Zealand could expand its animal production exponentially, and instead hoped that stock farming would become a “sunset” industry.

Sheep numbers fell substantially to under 50 million and machinery began to replace labour. Farmer confidence and rural communities shuddered and shed even more population.

New Zealand’s stock farmers, apart from those with very high debt levels, defied the experience of other western farming industries by surviving without subsidies. Meantime new markets were slowly opening up in Asia and Europe for increasingly sophisticated products.



Two women crutching sheep, 1940s  
Part of Original photographic prints and postcards from file print collection, Box 12 (PAColl-6348)

### The dairy boom, 1995 to the present

Since 1995, dairy farming has boomed while deer farming has struggled. Sheep farming revived rather spectacularly around 2000. Dairying, assisted by irrigation, has once again moved into traditional sheep farming areas such as North Otago and Canterbury. Herd sizes have expanded dramatically, with some operating several thousand animals on large farms. High commodity prices encouraged this development, which has placed a strain on New Zealand’s water resources and created new challenges in protecting lowland water quality.

Questions now loom as to the sustainability of farming in the face of rising fuel costs, reliance on imported oil and dependence on expensive inputs such as fertiliser. Yet New Zealand stock farmers have overcome many challenges before. Provided they can continue to move towards more sustainable farming methods and keep marketing their products with skill, they should succeed in a hungry world.

Professor Tom Brooking  
Otago University

Professor Tom Brooking has a personal chair in History at Otago University, and is a part of the university’s Sustainable Agriculture Research Cluster. Professor Brooking has expertise in the history of rural society, land use and environmental change. He is the author of six books and numerous articles including a biography of Liberal Party land reformer Jock McKenzie, an environmental history of New Zealand and a book on the making of rural New Zealand society.







# Growing for good – Cultivating discussions on the future of farming

Farming underpins our economy and quality of life, but it also places intense pressure on our environment and natural capital. Dr Morgan Williams, Parliamentary Commissioner for the Environment, comments on the debate about the future of farming in New Zealand.

My report *Growing for good: Intensive farming, sustainability and New Zealand's environment* was released in November 2004. Since that time there has been a considerable amount of constructive debate and discussion about the issues it raised.

We undertook the study for three main reasons. Firstly, farming generates around 60 percent of New Zealand's foreign exchange and underpins the quality of life of all New Zealanders. Secondly, farming's productivity depends critically on our natural capital – our rivers, lakes, aquifers, soils, biodiversity and atmosphere. And thirdly, factors ranging from the decline in lowland water quality to the marked reduction in soil science research suggest that this natural capital is under intense pressure.

The report called for a dialogue around the issues facing New Zealand farming and for a substantive redesign of systems, drawing on current and emerging innovations. We analysed key trends across several farming sectors including horticulture, sheep and beef, arable, and viticulture as well as dairying, focusing on those sectors that are more intensive in terms of nitrogen fertiliser and irrigation inputs. We chose four regions – Waikato, Hawkes Bay, Canterbury, and Southland – because they represent this range of sectors. We researched progress on environmental sustainability in agriculture in the UK, the Netherlands and Australia, and changes to the European Union's Common Agricultural Policies. Also, we

commissioned in-depth economic research into a selection of New Zealand farms.

Our aim was to put New Zealand farming in context, to look at the big picture and to understand those key drivers that shape our farming system.

Unfortunately, New Zealand does not have a well-developed set of indicators with which to examine trends in farming and its environmental impacts, so the report gathered and presented the best available information from a wide number of reputable sources (including Statistics New Zealand, regional councils, crown research institutes, ministries and refereed journals). In addition to analysing trends in the UK and in Europe, the report draws on over 150 interviews with New Zealand farmers, agribusiness leaders, researchers, environmentalists, councils, bankers and others.

Our aim was to put New Zealand farming in context, to look at the big picture and to understand those key drivers that shape our farming system.

## Impacts of intensive farming

The impacts of more intensive farming can be seen across New Zealand, not just

in the four regions mentioned. A recent comprehensive NIWA study of lowland river water quality at 338 mainly rural sites in New Zealand found similar levels of poor water quality at both pastoral and urban locations. *E. coli* guidelines were exceeded at 96 percent and 100 percent of sites respectively, and ammonia guidelines were exceeded at 78 percent and 83 percent of sites respectively. It is estimated that farming contributes 53 percent of the nitrogen entering Lake Rotorua, a factor in the frequent toxic algal blooms affecting Rotorua lakes such as Rotoiti.

Many of the pressures on a farm's natural capital come from beyond the farmgate, but two on-farm factors are particularly important: increased irrigation, a key component of expanding farm production, and the rapidly expanding use of nitrogen-based synthetic fertilisers to support increased stocking rates. In examining irrigation and added nutrients, we are not questioning their use. Both are fundamental to farming productivity. However, we are concerned with the way that they are being used.

In 2004 MAF estimated that irrigation contributed \$920 million at the farmgate to New Zealand's GDP for the 2002/03 year. Although this contribution came from just 3.9 percent of New Zealand's farmland in terms of area, it comprised 11 percent of the total farmgate contribution to GDP, which is estimated to be \$8.1 billion. Not only does irrigation play a key part in farm

productivity now, it will increasingly do so as future productivity gains rely more on it – particularly in those eastern regions predicted to become hotter and drier due to the impacts of climate change.

A second key input is nitrogen fertiliser. Its growing use has, in part, been driven by its decreasing cost relative to the prices farmers have been receiving for their products. It has been very cost effective in increasing productivity, enabling higher stocking rates and improved nutrition. However, the world is heading into a future of higher energy costs. As oil and gas prices increase globally, the price of nitrogen fertiliser will also increase. As farming systems become more dependent on nitrogen fertiliser, they become more vulnerable to its higher cost as well as its environmental impacts.

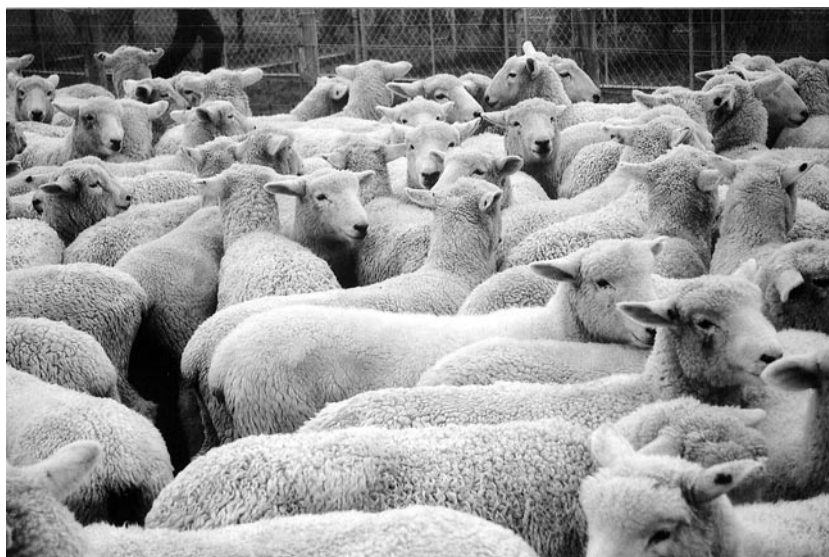
### Positive initiatives

Many positive initiatives from around New Zealand are highlighted in Chapter 6 of *Growing for good*, which focuses on emerging trends in farming that contribute to sustainable land management. These initiatives include:

- nutrient budgeting (particularly the OVERSEER model);
- the nitrification inhibitor Eco-n;
- advanced pond systems (APS) and anaerobic digester technology to treat dairy shed effluent;
- LandWISE's minimum tillage programme in Hawkes Bay;
- HortResearch's Soil Plant Atmosphere System Model (SPASMO) to deliver good science to farmers;
- Canterbury's Pencarrow Farm and its environmental award-winning practices;
- the Whatawhata Sustainable Land Management Project in the Waikato;
- the work of the Soil Foodweb Institute;
- the KiwiGreen programme for integrated pest management;
- the Dairying and Clean Streams Accord;
- Project Green, which involves 50 predominantly sheep and beef farmers from the North Island;
- Integrated Catchment Management initiatives such as Best Practice Dairying Catchments for Sustainable Growth, the Taieri Trust, the Whaingaroa Environment Catchment Plan, and Protecting Lake Taupo.

### A call for a dialogue and leadership

Since *Growing for good* was released in November 2004, I have spoken to farming groups and others about it the length and breadth of New Zealand. In fact, we ran eight workshops on it around the country early last year, attended by over 750 people – 46 percent of them farmers – to get a dialogue underway.



One unfortunate claim often repeated about *Growing for good* is that it calls for more regulation. This is not correct. In the preface and concluding recommendations, the report called for dialogue and leadership in the sector, with that to come from a pan-sector institution, collectively owned by the whole farming sector, and outside of local and central government, but partnered with it. This is a call for the sector to show some leadership, to engage with the rest of New Zealand and to act themselves.

*Growing for good's* main conclusion is that changes are needed if the natural capital of New Zealand farms is to be maintained – using the same production systems we

cannot simply keep growing more and more food from the same areas of land. To help promote that change, I recommend a redesign of the farming/food system for more sustainable outcomes and making greater use of the innovations of some current farming leaders and researchers.

This includes the call for strategic leadership and vision from within the farming sector, and the further development of more

sustainable farming systems and integrated catchment management approaches. I also highlight the need for an immediate focus on improving nutrient management and management of faecal contamination from animals. Finally, the report concludes by making several recommendations, including that the Minister of Agriculture and Forestry “take the lead on developing and implementing a programme of indicators for sustainable farming” (p 187). This would help to identify early trends in the health of the environment and potential threats to natural capital.

Dr Morgan Williams  
Parliamentary Commissioner for the Environment

Dr Morgan Williams is now in his ninth year as Parliamentary Commissioner for the Environment, a role which involves acting as an independent parliamentary watchdog, reviewing and reporting on environmental policies, management systems and issues. He has degrees in biology and ecology, and extensive experience in agricultural, environmental, pest and ecological research and policy, particularly as they relate to sustainable land use. He worked for MAF for 20 years.



Photos accompanying this article are courtesy of the Parliamentary Commissioner for the Environment.





# Sustainable land management – Piecing together the jigsaw

Hayden Montgomery, a MAF Policy Analyst, takes stock of the development and future of sustainable land management policy in New Zealand. Hayden argues that we have all the pieces of the jigsaw, but wonders if we are putting them together.

When the Resource Management Act 1991 was passed, back in 1991, it was a groundbreaking piece of legislation. The Act integrated the management of soil, water, air, land use and the built environment into a single piece of legislation, replacing numerous overlapping and outdated statutes.

The RMA enshrined the concept of “sustainable management” in New Zealand law for the first time, providing a framework for decentralised, local, participatory management of resources and the environment.

The relationship between central and local government has emerged as critical in the pursuit of sustainability, as has the relationship between land owners or managers and local government.

Shortly after the RMA was passed, the then Ministry of Agriculture and Fisheries (now Agriculture and Forestry) began work on what sustainable management might mean for agriculture. MAF's own

approach, outlined in its *Position Paper on Sustainable Agriculture* (1993), views sustainable management not as an end in itself but a process to secure multiple goals. The paper stated that MAF's role in all this is to “...act as an advocate for sustainable management practices in the agricultural sector and to help facilitate changes that are needed by building on a philosophy of ‘landcare’.”

More than 10 years on, it is time to take stock, and to note the developments that have taken place, the ongoing challenges, and the opportunities and obstacles for Government policy on sustainable land management.

## Key relationships

The relationship between central and local government has emerged as critical in the pursuit of sustainability, as has the relationship between land owners or managers and local government. Under the RMA and the Local Government Act 2002, regional councils and territorial authorities have primary responsibility for the environmental effects of land management. In turn, central government has a range of mechanisms to influence local government policy-making – such as national policy statements or national environmental standards.

There is a need to ensure greater coherence

between the different levels of government in regards to resource management. A good example is the management of our freshwater resources. The consultation on the Government's Sustainable Water Programme of Action, launched in 2004, confirmed that some regional councils are making good progress towards addressing water quality and allocation issues, but others are struggling due to lack of resources, information and national guidance. There was wide support for greater central government support in areas such as providing good practice guidance on strategic water planning and raising awareness on water issues.

To date, there is no clear framework for central government to determine if and when to engage with different business sectors and councils regarding sustainable land management.

It also remains unclear just how central government should support specific initiatives such as the Horizons Regional Council's proposed One Plan (a combined Regional Policy Statement and Regional Plan dealing with all matters that Horizons is responsible for under the RMA). Nor is there any process to determine how such initiatives might be linked to the array of other existing measures that are in place.

As policy makers, land users and managers we have all of the pieces of the jigsaw, we simply need to check the box-lid occasionally

to make sure we are putting the pieces together in the right order.

## Sustainable management initiatives

Many useful initiatives involving different levels of government, land managers, scientists and community groups have been underway for a number of years. For example, there are about 400 Landcare groups throughout the country administered through the Landcare Trust that address sustainable farming and environmental issues.

Fertiliser sector initiatives include codes of practice on fertiliser use, certified fertiliser spreading utilising global positioning systems and geographic information systems technology and the development of nitrification inhibitors.

Numerous institutions and community bodies are involved in MAF's Sustainable Farming Fund projects, where funding from central government is used to help the land-based sectors improve their financial and environmental performance.

MAF recognises the need for a thorough stock-take of its central government activities with respect to sustainable land management, but it doesn't seek to reinvent the wheel. Any future programmes should work alongside existing programmes and those efforts by industry and regional councils, and build

on existing central government initiatives, including the East Coast Forestry Project, the Sustainable Farming Fund and, of course, other complementary programmes such as the Sustainable Water Programme of Action, the Climate Change Programme, biodiversity and conservation policies, and the Flood Risk Management Review.

## A framework for the future

Over the next few months MAF will be "re-examining the box-top" – doing a stock-take with the intention of setting out a framework for sustainable land management. The framework will build on previous and current policies and initiatives such as those described in this article. It will, however, aim to go further, by "putting together the pieces", to provide a strategic focus for the

Government in regards to sustainable land management.

As policy makers, land users and managers we have all of the pieces of the jigsaw, we simply need to check the box-lid occasionally to make sure we are putting the pieces together in the right order.

Hayden Montgomery  
Ministry of Agriculture and Forestry

Hayden Montgomery is a policy analyst in the Natural Resources Group at the Ministry of Agriculture and Forestry. Hayden has an undergraduate degree in Geography and a Post Graduate Diploma of Science in Geography from the University of Auckland. Hayden also worked at the university's School of Geography and Environmental Science, focusing on agriculture, sustainable land use and impacts of government restructuring on agriculture. He maintains close links with his family dairy farm near Dargaville in Northland.



# The Sustainable Farming Fund

Funding projects that help rural communities help themselves.

The Sustainable Farming Fund aims to help the land-based sectors solve problems and take up opportunities to overcome barriers to economic, social and environmental viability.

The Fund works to:

- provide ongoing opportunities to adopt new and improved farming/growing practices;
- overcome production problems;
- overcome resource management problems and improve environmental performance;
- take advantage of market opportunities;
- support projects that can be readily applied throughout New Zealand.

Each year the Fund provides up to \$9.5 million in grants for projects that contribute to the ongoing economic, environmental and social well-being of the country's primary producers.

To find out more about the Sustainable Farming Fund, visit: [www.maf.govt.nz/sff](http://www.maf.govt.nz/sff).





# Policy for the paddock – Sustainable land management on the farm

Are farmers aware of sustainable land management issues? Yes, they are, says Dr Willie Smith, from the University of Auckland. Dr Smith provides an interesting counterpoint to the previous two articles by examining farmers' perspectives about sustainable land management.

*Growing for good* (Parliamentary Commissioner for the Environment, 2004) has sparked an active, at times even acrimonious, debate among policy makers, farmers and other industry representatives about trends in the sustainability of agriculture. Many of the trends in the report certainly give cause for concern whether in terms of water consumption, inputs applied or rates of intensification in land use. It can all seem a bit discouraging.

Against this it is interesting to examine some of the empirical evidence of change in farmers' thinking and behaviour, as evident in the paddock. *Impediments to optimising the economic and environmental performance of agriculture: A study of issues affecting North Island hill country farmers* (MAF Technical Paper 2000/17) and a subsequent paper building on this by Montgomery, Smith and Rhodes (in press) provide a useful counterpoint.

## Awareness

Most farmers were found to be well aware of problems associated with soil degradation on their properties, but fewer farmers believed they had water quality problems. Thistles were identified as the major weed problem, while gorse, blackberry, kanuka and manuka were also listed.

Most farmers identified pests as a major problem. Possums were repeatedly noted as the prime source of concern, although

rabbits, hare and porina were also frequently mentioned.

Other environmental concerns identified included the need to conserve native bush, and to maintain and improve the aesthetic appearance of their properties.

That farmers have a high level of appreciation of environmental issues is to be expected. After all, they live close to the land and depend on it for their income. Moreover, the last few decades have seen a massive increase in popular awareness and understanding of environmental concerns. There is no reason to believe farm households have been isolated from this trend. Central government policies, a range of regional government initiatives and increasing pressure from the market place, often in the form of quality assurance programmes, have all undoubtedly played their part. For example, MAF's Sustainable Farming Fund has funded over 300 projects in its first five years, linking producers and scientists to develop and promote more sustainable practices.

## Action

Increased awareness and understanding does not always lead to action. Consequently, what is striking in the report is the large number of farmers who have implemented some land use or land management strategy designed to meet environmental needs.

In the period 1995–99 strategies to

improve soil stability, retire land from cultivation and improve stock management, and initiatives to improve water quality and manage weeds without chemical controls were adopted by a large proportion of farmers. Close to two-thirds of farmers changed their stocking practices and over one-third implemented policies to stabilise slopes or otherwise manage degraded soils. About a quarter identified plans to make further adjustments to their land or water management practices within the next five years. In addition, close to one-third had fenced-off areas of native vegetation for conservation.

That farmers have a high level of appreciation of environmental issues is to be expected. After all, they live close to the land and depend on it for their income.

The extent to which farmers have fenced-off areas of native bush reflects a proactive stance and one where farmers, by withholding land from production, consciously impose a cost on themselves. In many cases the farmers also paid the full cost of fencing the land. These costs,



borne at the level of the individual farm, are accepted in order to maintain a community asset. It is true that some such areas have limited productive value for agriculture, but this is not always the case. Whatever the potential of the land, the costs imposed by fencing are often substantial. No relationship was identified between the profitability of individual farms and the farmers' willingness or action to implement environmental management strategies.

On the specific matter of conserving native bush, farmers appeared more driven by environmental ethics than anything else. While financial support for some proportion of fencing costs was certainly welcomed, farmers themselves noted that the availability of funding was not of itself sufficient to



ensure action. Understandably this is less true for farmers under serious financial stress, but the risk of failure, particularly with respect to tree planting and efforts to raise soil fertility, were also noted as constraints.

"Area of bush conserved" provides an intriguing indicator of farmers' commitment to sustainability. Most farmers when questioned exhibited a high level of aesthetic appreciation for their land. Perhaps less surprisingly, they frequently found this difficult to articulate.

Farmers who planted trees to beautify their properties or to conserve areas of bush were primarily doing so to meet non-economic objectives. No farmer expected such initiatives to be reflected in the value of their property, although some thought that their conservation initiatives might generate a quicker sale. For some, conservation of native bush was motivated by a conscious belief in its ecological value. More often it occurred without such explicit beliefs, but it was supported by the traditional stewardship

ideals that many farmers view as intrinsic to their role as land managers.

Although stewardship ideals and aesthetic considerations are important drivers, many efforts by farmers to improve their environment are plainly in response to perceived problems – soil erosion and the like – and such actions are supported by substantial research and scientific information. If, while addressing such problems, farmers can improve the appearance of the landscape or gain some environmental benefit they will often do so.

### Scepticism

However, the overall message is that while farmers are generally willing to accept evidence of erosion or wind damage, for example, and to respond accordingly, they

remain sceptical of the scientific basis on which long-term conservation strategies depend. Physical evidence backed by established agricultural science promotes a response and has credibility among farmers that the ecological sciences lack. Consequently, too often sustainable land management is still viewed by farmers as something apart from science, and environmental concerns remain a tag-on

rather than an intrinsic component of good land management decisions.

Just as *Growing for good* identifies the need for an improved dialogue as a useful starting point to increase sustainability, *Impediments to optimising the economic and environmental performance of agriculture* also confirms that it is farmers' values, not economics, that are the primary driver behind a shift to more sustainable practices. On a range of economic, environmental and social issues inherent to sustainability including animal

welfare, community involvement, aesthetics and soil and water management, farmers evidenced a significant level of awareness. Many had already implemented strategies to increase their level of activity and had plans for further action.

Attempts to promote a sustainability dialogue are taking place on several fronts, involving participants in Sustainable Farming Fund projects, scientists in the crown research institutes and in the university community. Crop and Food and the University of Auckland, for example, are currently involved in a project to improve dialogue and promote improvements in cropping practices under a range of different systems in the North and South Island.

The changes in management practices and the adoption of the new skills required to achieve sustainable agriculture are difficult to achieve. But despite often depressing tales, the empirical evidence suggests that many New Zealand farmers are making the transition to more sustainable practices. This doesn't refute evidence of continued resource depletion and the need for system redesign, but it does suggest that our policies are working and that there is some glimmer of hope.

Although stewardship ideals and aesthetic considerations are important drivers, many efforts by farmers to improve their environment are plainly in response to perceived problems.

Dr Willie Smith  
University of Auckland

Dr Willie Smith is Associate Professor and Director at the University of Auckland's School of Geography and Environmental Science. He has a background in geography and public policy. He worked previously as a Science Adviser at the Science Council of Canada, in Ottawa. His research focuses on rural land use and the role of science in public policy.



# Integrated catchment management – A way forward for sustainable land management?

The sustainable management of our natural resources requires input from a wide range of people and professions. Dr Chris Phillips and Andrew Fenemor, from Landcare Research, explain how the Motueka River Integrated Catchment Management programme is bringing people together to achieve a common goal.

The programme's goal is to undertake research to help improve the management of land, freshwater and near-coastal environments in catchments with multiple, interacting and potentially conflicting land and water uses.

Over the past two decades, the challenges facing landowners, resource managers and scientists have multiplied. Where once our rural environments were viewed simply as productive landscapes dominated by single sectors (such as dairy, horticulture, forestry), many new players have emerged to voice their views on issues such as landscape, recreation, conservation and tourism.

This is particularly true for Integrated Catchment Management (ICM) initiatives where there are many players involved, many perspectives of resource management, and where science and other information is subject to diverse and contested interpretations. To work in these areas, ICM practitioners are seeking approaches that accommodate multiple perspectives and draw on multiple sources of information.

## A collective approach

The Motueka ICM research programme is a collaborative, holistic approach to large-scale, regional environmental issues. The Motueka ICM research programme was founded in 2000, after extensive consultation with end-users and stakeholders and input from two internationally recognised experts.

The seeds of the Motueka ICM research programme were sown during a top-of-the-South Island stakeholders' workshop. The workshop identified the holistic and sustainable management of land, river and coastal resources – a “ridge tops to the sea” perspective – as a top priority.

Organisations participating in the programme include Landcare Research, the Tasman District Council, the Cawthron Institute (a science provider), Scion (formerly Forest Research), NIWA, the Institute of Geological and Nuclear Sciences and Otago University. The organisations are working with a range of stakeholders from the community and industry.

## Our goal

The programme's goal is to undertake research to help improve the management of land, freshwater and near-coastal environments in catchments with multiple, interacting and potentially conflicting land and water uses.

This ambitious goal is being accomplished through an innovative combination of historical research, biophysical experimentation, simulation modelling and social learning that began in July 2000. The addition of social learning to the research mix was specifically designed to improve interactions between science providers and community stakeholders, and to maximise the use of new knowledge and tools developed from scientific research.

## Understanding integration

So, more than five years on, how are we doing? Apart from the many obvious gains in our understanding about biophysical processes within the catchment and the coastal environments (what's there and how it works), perhaps one of the most significant areas of development has been in our understanding of “integration”. While it seems simple enough, and is central to what we are doing, it has also been one of the hardest things to define because it means different things to different people.

On reflection, we can think about integration as it relates to:

- linking science with those who manage, live in or use the catchment;
- research which involves multiple agencies and draws on multiple academic disciplines;
- research and management that crosses different geographical scales;
- people working alongside each other.

Linking science with catchment players is about science being relevant and accessible



to those who have the biggest stake in achieving sustainable land management within a particular catchment. The primary audience for our research is regional councils (especially Tasman District Council for the Motueka). Sector stakeholders such as forestry companies and Fish & Game rank highly too, followed by community groups and landowners.

Some of the ways in which we have been linking science to catchment managers, land users and the community include:

- A community reference group – a sounding-board group of lay people, not representing any particular sector, from across the catchment.
- A collaborative learning group on fine sediment issues – a selected group of scientists, the Tasman District Council, Fish & Game and sector people such as forestry representatives. The group shares their perspectives on the impacts of fine sediment movement (soil erosion and siltation of water bodies), the risks, management options and the research that would assist in sediment management.
- Annual meetings in the catchment – while mainly a traditional technology transfer approach, these meetings have proved useful in keeping people informed and providing opportunities to get feedback on our research.
- Art-science collaboration – this has been one of the broadest forms of connection with people in the catchment. We have been able to build trust and create more dialogue by taking an interest in people's lives, history and anecdotes, then linking these to snippets of our science.

Key learning has included the need to listen and value people's own ethics of care and identify how science can build on and inform those ethics. We've also recognised that people's sense of place and belonging creates the conditions for sustainability. This raises the question of how science can harness and strengthen that sense of place.

Multi-agency and interdisciplinary integration is all about breaking down institutional barriers, principally among research institutions but also with resource managers from different sectors. Examples include projects where scientists and agency people have carried out joint investigations with the support of local landowners. The results of those investigations have contributed to changes in either policy or behaviour on the land.

## Multi-agency and interdisciplinary integration is all about breaking down institutional barriers

These include:

- linking our in-catchment sediment research with coastal sediment circulation and impacts;
- looking at the economics of water augmentation alongside cost-benefit analysis of instream values;
- researching impacts on aquatic life of groundwater upwellings and losses from river-aquifer systems;
- examining the role of cows and river crossings;
- working with iwi on spatial information systems;
- using information technology systems to manage administration and communication both within the programme and with its stakeholders.

A particular challenge to achieving integration comes from the different scales of interest or influence of those involved. For example, the whole-district management focus of the Tasman District Council contrasts greatly with the focus on individual properties held by many landholders. There is also the problem of scaling scientific findings to match different environmental contexts. Scaling up knowledge of catchment hydrological processes from small catchment studies to large catchment scale doesn't work well. In the ICM programme, there are several examples of research at different scales.

### Building trust

Perhaps the key indicator of integration is building trust, building relationships and walking alongside others on the journey towards sustainable land and water management. It is important to recognise that

we need new tools and processes to manage these interactions. The role of champions and enthusiasts can't be underestimated. Multi-pronged communication including using the internet, direct personal contact (especially with land owners) and mediated modelling (stakeholders taking the lead on modelling needs and being involved in design) are all necessary. These tools all have their place and must be tailored to the attributes, working style and needs of the target audience.

The role our social science colleagues have played in the research programme and in the way we interact with our stakeholders should not be underestimated. They have provided ways for us, and the users of our research, to think about the way in which we do research and make management decisions that many of us do not usually take the time to think about. They have provided ongoing facilitation which has kept us on the pathway forward, as well as opportunities to reflect on what we are doing, and where we are heading. Enabling us to think outside of our normal science or management areas has broadened our views. We have acquired a real appreciation of the importance of experienced facilitators and social learning as a significant contributor to sustainable land management.

The approaches we have used in our ICM research, such as multi-stakeholder participatory processes, and the integration of different types of knowledge, allow us to develop strategies and ideas to meet problems as they arise. The creation of knowledge to help further sustainable land management in the Motueka catchment and wider New Zealand requires that we make increasing efforts to engage local groups. "Small is beautiful", the title of E. M. Schumacher's influential book, seems an appropriate motto for the locally based practices of ICM.

Dr Chris Phillips and Andrew Fenemor  
Landcare Research

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# Further information

For more information on sustainable land management and agricultural issues referred to in this *RM Update*, check out:

- *Environmental Histories of New Zealand*, edited by Tom Brooking (Oxford University Press, 2002)
- The website of the Parliamentary Commissioner for the Environment: [www.pce.govt.nz](http://www.pce.govt.nz)
- MAF's *Position Paper on Sustainable Agriculture* (1993), available on the MAF website: [www.maf.govt.nz](http://www.maf.govt.nz) (type "sustainable agriculture" into the search box).
- The website of MAF's Sustainable Farming Fund: [www.maf.govt.nz/sff](http://www.maf.govt.nz/sff)
- The website of the Sustainable Water Programme of Action: [www.mfe.govt.nz/issues/water/prog-action/index.html](http://www.mfe.govt.nz/issues/water/prog-action/index.html)
- The website of the Motueka River Integrated Catchment Management programme: [icm.landcareresearch.co.nz](http://icm.landcareresearch.co.nz)
- Landcare Research's work on rural land use, available on Landcare's website: [www.landcareresearch.co.nz/research/rurallanduse/](http://www.landcareresearch.co.nz/research/rurallanduse/)

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