



# DISCOVERY

MARCH 2007 ISSUE 16

## CONTENTS

Exporters take note: where Tesco goes, others will follow	2
Researchers to probe climate change future	3
WASTED! – where the war on waste hits home	4
Enviro-Mark® NZ – still hitting the mark	5
Lucky lake a time-travel treasure trove	6
Scientists explore soil's capacity to deal with nutrients and contaminants	7
Landcare Research website gets extreme makeover	8

ISSN 1175-7329

## 2007 – into the mainstream

In my December editorial I described a “tipping point”...and in the space of just three months, climate change has been recognised as a mainstream business issue (see page 2).

In this regard it is heartening to see climate change and carbon management being viewed as a strategic opportunity. As Jack Welsh, former CE of General Electric, noted: “Only time will tell if climate change will be minor or catastrophic, but one thing is certain, companies should not wait to find out.”

Interest in our carbonZero<sup>Cert</sup>™ certification programme has grown enormously. In the Prime Minister's opening speech to Parliament, she announced that six government departments will be carbon neutral by 2012, with the rest expected to follow. Numerous companies are also working with us to measure, manage and mitigate their carbon emissions.

Climate change issues are complex and multifaceted. Further research, for which Landcare Research is well positioned, is needed to evaluate mitigation and adaptation options. Land management practices and land use options are important components of this work. One of our long-term studies is in the Waipaoa catchment, Gisborne (page 6); another is seeking ways to reduce nutrient runoff into waterways (page 7), thereby lowering total energy use in agricultural production.

As highlighted in this *Discovery* (page 5), there are many fronts on which we can progress towards practical and cost-effective sustainable development and improved environmental stewardship. The Enviro-Mark® NZ certification



process consistently produces significant financial benefits through reduced energy use and increased workplace productivity. The beauty of Enviro-Mark® NZ is that it supports step-by-step improvements and at a pace that enables gains to be locked in.

Waste management is another area where relatively easy gains in resource efficiency can be made through waste recycling and reuse, improved purchasing and better internal processes. Landcare Research was involved in production and research for TV3's WASTED! programme, and helped develop the show's eco-calculator. WASTED! demonstrates how household footprints can be sensibly reduced, without members compromising their quality of life (page 4). Collectively modest gains at household level contribute to nationally significant savings. Further, improved knowledge and practice at the household level will translate into more sustainable workplace and recreational activities.

We hope this new-look edition of *Discovery* challenges you personally and your organisation to consider what sustainability means to you. As always, we welcome feedback either to the contacts listed under each article or directly to me.

**Warren Parker**

**Chief Executive  
Landcare Research**



# Exporters take note: where Tesco goes, others will follow

New Zealand's exporters are being urged to plan ahead for the likelihood that other UK supermarket chains will follow Tesco's example and start labelling the origin or carbon intensiveness of goods.

Tesco has a £500 million plan to reduce its carbon emissions and encourage customers to buy environmentally friendly products. This involves complex labelling, outlining the carbon emitted during the production, transport and consumption of all goods it sells – in other words, revealing the carbon in the lifecycle of the goods. Enacting this may take years, so Tesco's initial step will be to put aeroplane symbols on all goods imported by air.

New Zealand exports a billion dollars worth of food goods to the UK each year (and total goods worth about \$1.5 billion). In terms of volume, only 0.25% is sent by air but this represents important business for producers of perishable goods such as strawberries and seafood. Lifecycle carbon costs of many food products shipped from New Zealand are expected to be competitive with those of goods produced in Britain and other countries.

But New Zealand producers cannot afford to be complacent, and should plan to prove how sustainably their goods are produced. Martin Fryer, former environmental manager for a major supplier to leading UK supermarkets, is now a senior advisor in Landcare Research's carboNZero<sup>Cert™</sup> programme. Martin says that with the market leader Tesco and also Marks & Spencer announcing they are taking action on their climate change impacts, other major retailers such as Sainsbury's and ASDA will likely follow suit.

"They'll first find out what their own emissions profiles are. Then, once these are reduced, they will turn to their supply chain. All the major supermarket chains have prescriptive standards for suppliers to meet. It is only a matter of time before these standards include the need for CO<sub>2</sub> emission profiles for specific products.

"Tesco sells more than just food, so its climate change initiatives will affect a large range of products. These chains also do business outside the UK, so exports of New Zealand goods to other countries will also be affected.

"It would pay New Zealand exporters to be proactive and get a carbon emissions profile produced and independently verified. They can then look at reducing their lifecycle carbon costs where possible. This way, when the supermarkets ask what the climate change implications are of sending products to them, the exporter can tell them."

Landcare Research's carboNZero<sup>Cert™</sup> programme can take businesses up to whichever stage in this process they choose. By having an emissions profile produced, they would understand the size of the issue and potential financial implications. Cost-benefit analysis would highlight if reduction opportunities were available and once these were exhausted then offsetting the remainder through the purchase of carbon credits is an option. They would need to know the potential costs before committing resources to becoming carbon neutral.

"If all the above stages are completed, they could be independently audited and carry the carboNZero<sup>Cert™</sup> label on their product, just as the New Zealand Wine Company's Grove Mill and Sanctuary labels do.

This is a powerful marketing tool in a new



Cissy Pan

■ *UK supermarkets are changing the rules for suppliers to meet sustainability goals.*

marketing environment where New Zealand will have to show that the long distances it transports its goods to export markets are not comparatively harmful."

Martin says along with exporters, freight companies are also part of the equation, and their emissions profiles also need to be addressed.

"No one has analysed the freight industry itself yet, but it needs to be done.

There may be opportunities for the industry to use different fuel types or transport methods, particularly now that the Government has set targets for biofuel use. Improving carbon profiles should not just be about offsetting carbon, but about finding ways to reduce emissions through improved energy and fuel efficiency."

**Contact:** Martin Fryer  
Landcare Research, Auckland  
(09) 574 4220  
FryerM@LandcareResearch.co.nz

# Researchers to explore climate change future

How will the increased greenhouse gas emissions affect our future climate? Can we identify “tipping points” beyond which damage caused by climate change becomes extreme or irreversible? Scientists at Landcare Research are starting new approaches, including long-term collection of data, which they say are crucial to the quest for answers.

Researchers have done much work to develop methods for inventorying New Zealand’s greenhouse gas emissions – as required for reporting and meeting emissions reductions targets set by the Kyoto Protocol for 2012. But predicting future risks beyond 2012 is much more challenging than reporting on the current position. What effects will climate change have on our environment and our land-based economy?

Landcare Research Global Change Processes science leader Dr David Whitehead says little is known about how key ‘feedback responses’ will affect ecosystems and net greenhouse gas emissions– both globally and locally.

“Within New Zealand, as average air temperatures rise, carbon loss from soil will be accelerated, and this will exacerbate emissions.

“We don’t yet understand the magnitude these responses will have,” David says. “That’s why we are developing baseline measurements and long-term data sets to help us record changes over time, and check the success of mitigation approaches where necessary.

“We know that with current climate change trends, generally the west of

the country will become wetter and the east will become drier,” David says. “Drought decreases the ability of trees and shrublands to take up carbon dioxide, and warmer temperatures increase carbon dioxide losses from soils. Our mature native forests are already very close to being carbon neutral. Will future changes in climate tip many of our major ecosystems to become net carbon sources rather than sinks?

“How do we know whether our ecosystems are more at risk than they were, say, a decade ago? How do we know that nitrification inhibitors are working, for example?”

On the plus side there will be economic opportunities, although these too come at a price.

“As temperatures increase, we may be able to grow a wider range of crops,” David says. “However, it takes time and money to convert land for a new use. Also, there will be increased risk of sudden and incremental flood damage as storm intensity and frequency increase.”

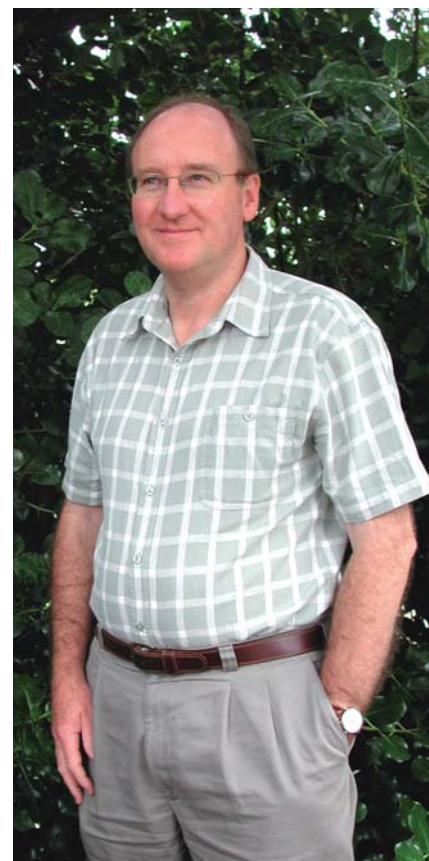
The questions needing answers are numerous and multi-dimensional. Landcare Research is focusing on improving methods for measuring greenhouse gas exchange, and verifying where emissions are changing. Researchers will pay close attention to offsetting emissions from regenerating forests and shrublands and new mitigation opportunities.

In addition, Landcare Research scientists are contributing to an integrated assessment to understand and model the economics and social implications of climate change impacts, adaptation and mitigation for New Zealand. Collaborators in this project are NIWA, AgResearch,

Geological and Nuclear Sciences, the Motu Economic and Public Policy Research Trust, and Infometrics. This project involves collaborative learning – demonstrating to communities how to do their part in reducing emissions, and what the benefits are.

“This is starting to take off already, with many people seeking to reduce reliance on fossil fuels by recycling, and thinking more about how they travel and use energy,” David says.

**Contact: David Whitehead**  
Landcare Research, Lincoln  
(03) 321 9862  
WhiteheadD@LandcareResearch.co.nz



David Whitehead investigates how our indigenous forests will perform in a future with increased greenhouse gases.

John Hunt

# WA\$TED! – where the war on waste hits home

It's a TV show that begins with some home truths of the most shocking kind... six months' worth of waste, dumped on the front lawn of the household that produced it. But to Landcare Research sustainability advisor Emma McConachy, the show's associate producer, the shock came more from the fact that householders were so shocked at the amount of their rubbish.

WA\$TED! is a new half-hour show that proves you don't have to be extreme to be green. Every week WA\$TED! takes a different household, audits their waste and resource usage, and confronts them with the truth about their long-term impact on the planet. The household footprint is calculated with a special eco calculator, developed for the show by the New Zealand Centre for Ecological Economics (NZCEE), a joint venture between Landcare Research and Massey University. The families, student flatters, and other various domestic dwellers are put on a green regime to clean up their act. Later, their household footprint is recalculated, and cash savings handed back to them.

Fumes TV and South Pacific Pictures, the producers of WA\$TED!, partnered with Landcare Research and EECA (the Energy Efficiency and Conservation Authority) to research the series.

Emma's less-than-glamorous duties included collecting a month's worth of each of the 10 WA\$TED! households' rubbish and auditing it to discover just what they were throwing away.

"Amongst all the stuff there were thousands of kilograms of food waste and

hundreds of nappies! Each household was using 7 to 85 times the productive space of the area of their home – in other words, they had a huge footprint.

"Every house in New Zealand is doing that. Don't overlook improvements you can make at home. There are 1.4 million homes in New Zealand, and if we all took steps to help, we could make a big difference."

Emma helped develop Greening the Screen, the TV and film industry's environmental toolkit. She also helped the show become green behind the scenes.

WA\$TED! participated in Landcare Research's CarboNZero<sup>Cert</sup>™ programme and actively reduced electricity and fuel consumption. What could not be reduced was offset. Hybrid cars were used, travel was minimised, and food waste, paper, plastic and cardboard was recycled. Staff were given travel mugs to replace the industry's ubiquitous paper cups.

Fumes TV producer Carthew Neal says the show is for people who may not have thought they were interested in the environment and is "jargon free".

"We chose households who may not have had much of an environmental conscience to start with but by using a few facts about the reality of their impact on the planet and our future, they were ready to start making changes to their behaviour."

"Everybody on the show went through a huge learning curve. We found that becoming aware of waste means you can never go back to your old habits."

All households had a tailored "eco plan" that made changes to their home and habits; this included things like: a "centameter" to monitor electricity, eco lightbulbs, "no junk mail" stickers, eco-cleaning products, hot water cylinder wraps and information.

And the fate of the rubbish on the lawn?

The food waste was composted and much of the rest was recycled.

**WA\$TED! airs on Tuesdays at 8pm on TV3.**  
[www.wastedtv.co.nz](http://www.wastedtv.co.nz)

**Contact: Emma McConachy**

Landcare Research, Auckland  
(09) 574 4222 Mob: 027 490 3053  
McConachyM@LandcareResearch.co.nz



■ Sometimes the truth stinks: the Crump family of Auckland is confronted with the output of a month's worth of food waste.

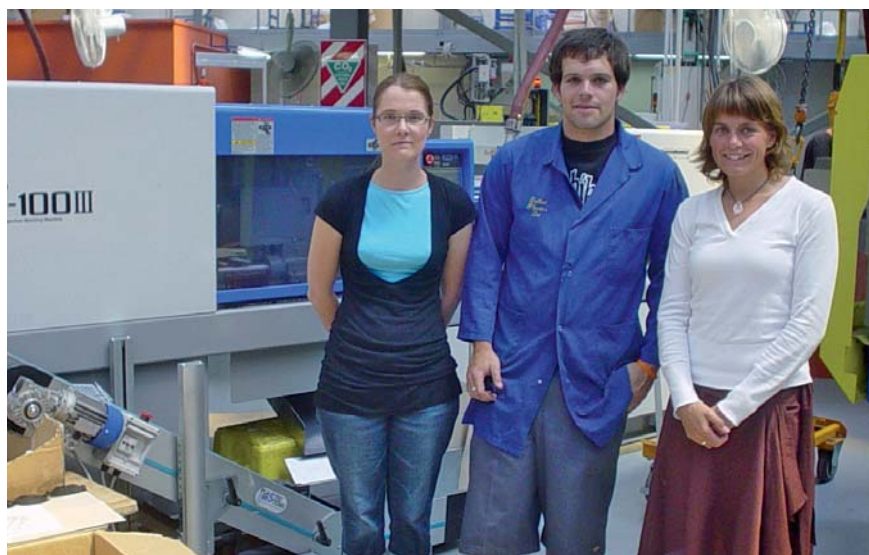
# Enviro-Mark® NZ – still hitting the mark

Six years ago when Landcare Research first introduced Enviro-Mark to New Zealand, business sustainability was a new concept for many. With sustainability now a market force in its own right and with growing numbers of customers seeking sustainably produced goods, Enviro-Mark® NZ is increasingly sought after.

Administered by Landcare Research, Enviro-Mark NZ helps businesses meet environmental standards and save money in the process. It covers energy efficiency, waste minimisation and resource use efficiency (raw materials).

About 150 organisations have taken up Enviro-Mark NZ so far, including Mercury Energy, Mighty River Power, and Fonterra. The system has five levels of certification. Bronze level covers compliance; silver involves developing environmental policy; gold is monitoring for continuous improvement; platinum is documenting procedures; and diamond is implementing an internal management and audit programme. Organisations can work through successive levels at their own pace, stopping at whichever is most appropriate for their needs. Each level asks businesses to take specific actions, based on size, activities, and potential adverse impact on the environment by either the business itself or its suppliers. The process and the results are externally audited.

Christchurch-based Talbot Plastics is a custom plastic injection moulder, tool and die maker with more than 100 staff, and has achieved Enviro-Mark's Diamond standard, the highest certification, when a company is also ready for an ISO14001 audit. It has slashed waste by more than 50% through reducing its consumption of



■ More sustainable business through Enviro-Mark NZ: Talbot Plastics staff Diane Philpot, Travis Peak and Sara Wallen with a new electric moulding machine.

energy, water and raw material. Any waste paper, cardboard, plastic bags, shrink wrap, strapping and scrap metal are recycled in separate collection areas.

Additionally, as part of its "cradle-to-grave" stewardship, Talbot Plastics recycles 80 to 100 tonnes annually of products that customers return. With the help of a grant from the Energy Efficiency Conservation Authority (EECA) it has replaced a hydraulic machine with a more energy-efficient, all-electric machine. Along with energy savings, this machine is less noisy and cleaner operating.

Another step was to set up an "energy committee" of staff from various management levels, to look at ways to reduce energy consumption.

Talbot Plastics' production assistant Diane Philpot says the changes made through Enviro-Mark NZ have had good feedback from both customers and suppliers.

"We've had a lot of comments. In the early days when Enviro-Mark's concepts were quite new to people, it took a while to get

people on-board. But now people at every stage of the manufacturing process are more aware of the environment."

Diane says she would recommend Enviro-Mark because its step-by-step process helps motivate staff to participate.

"Doing it in steps made it quite achievable, and you were rewarded for incremental progress. This way, any business can stop at the level that suits them best, and they still have something to show for it.

"And of course, it has saved us money."

Enviro-Mark NZ project leader Veronica McLeod agrees the step-by-step process is Enviro-Mark's point of difference." Also, we are now making the system even more user-friendly and supportive, through providing examples based on other companies' successful experiences, which new users can take and adapt to fit their own organisation."

■ **Contact: Veronica McLeod**  
Landcare Research, Lincoln  
0800 366 275  
McLeodV@LandcareResearch.co.nz

# Lucky lake a time-travel treasure trove

An intriguing lake from the past has been discovered at a key study site, adding to the treasure trove of information already found there. This long-lost lake is expected to yield important clues as to how New Zealand landscapes have responded to climate change in the past.

The East Coast's Waipaoa hill catchments contain evidence of the effects of past storms via the sediment stored in their valley systems. Sediment records reveal relationships between erosion rates, vegetation cover and climate. They are crucial for understanding how land uses today might respond to climate change scenarios predicted for New Zealand.

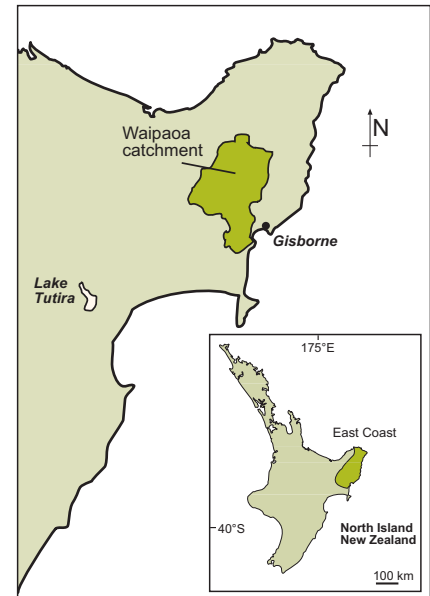
While on a routine sediment coring expedition in Waipaoa, Landcare Research scientist Dr Mike Marden made a chance discovery of an infilled lake. The lake was formed some time in the past 10,000 years, and lasted long enough for an 11-metre-thick pile of sediment to be preserved. It was probably formed when a major landslide blocked the river. The landslide-dammed lake is then thought to have drained when the river finally broke through.

"It's a lucky find – and an exciting one," Mike says. "Our aim is to understand what's happening in the entire Waipaoa sedimentary system, from mountains to sea. Now for the first time, we can use this lake record to make direct correlations between what was happening in the landscape with records of sediment accumulation on the ocean floor in Poverty Bay at the time the lake formed. We can ask oceanographers if they can detect changes in sediment accumulation

patterns in the Bay dating from the same time-frame."

As well as alternating layers of sediment, the lake bed deposits contain volcanic ash and organic material including wood and pollen. The organic material can be carbon-dated, to give researchers an indication of when the lake was formed. Using the pollen to deduce what vegetation was growing will also provide an indication of what the climate was like at the time the lake sediments were deposited.

"This research will help establish relationships between climate, vegetation and landscape response at the time the lake existed," Mike says. "These relationships can then be used to predict what might happen given a similar combination of factors in the future."



**Contact: Mike Marden**  
Landcare Research, Gisborne  
(06) 863 1354  
MardenM@LandcareResearch.co.nz



■ Mike Marden with a half-metre section of cored lake deposits. The sample contains wood and volcanic ash – useful for dating – and pollen, which will reveal vegetation cover at the time the lake existed.

# Scientists probe soil's capacity to deal with nutrients and contaminants

Nitrates, steroid hormones and veterinary antibiotics are increasingly leaching into our waterways. Landcare Research is leading studies that investigate little-known aspects of how soils buffer and filter, to better understand how they may prevent these substances polluting our water resources. Researchers also want to measure the saturation capacity of soil, and forecast when its buffering capacity is being reached.

The research is being undertaken by the Sustainable Land Use Resource Initiative (SLURI), a collaboration of scientists from Landcare Research, Crop & Food Research, HortResearch, and AgResearch. SLURI aims to sustain our soil and water resources, and predict the effects of land use change on soil quality. Soil is essential to life, and the services it provides are worth billions – for example, 17% of New Zealand's GDP depends on the top 15 cm of our soil.

## Nitrogen on farms

Nitrogen leakage from farms is a worldwide problem, no less so in New Zealand. Known sources include animal excreta, particularly cattle urine; and excessive nitrogen fertiliser use, which in New Zealand has risen from 50,000 tonnes in 1990 to more than 300,000 tonnes. However, little is known about whether soil can become saturated with nitrogen, whether we can enhance the filtering of nitrogen, and whether we can remove the pollution-causing, reactive form. Landcare Research soil scientist

Dr Roger Parfitt says researchers need to know what is happening in the soil root zone in particular.

"This is where contaminants and harmful microbes are filtered and buffered, undergoing chemical and biological reactions before water moves them to streams and rivers. Different soils have different filtering properties, and different chemical reactivity.

"We will investigate whether we can enhance filtering, and increase the soil's ability to remove the harmful forms of nitrogen. It may be possible to develop soil conditions that deactivate nitrates before they leach out."

Roger says researchers also have insufficient knowledge about the processes microbes go through in soil. "We still have much to learn about the fungal and bacterial decomposition pathways of the nitrogen cycle."

What about hormones and antibiotics? Steroid hormones are the most potent of all known endocrine disrupting chemicals, and are implicated in damage to wildlife around the world. Free steroid

hormones are mainly excreted in faeces, while conjugate forms are excreted by grazing animals in urine. Conjugated hormones are biologically less active than free steroids, but can be converted to free active forms by soil microbes. Meanwhile, 80-90% of antibiotics used on farm animals are excreted unchanged or as biologically active compounds in the faeces or urine.

Landcare Research scientist Dr Ajit Sarmah says researchers know little about the fate and behaviour of these contaminants after they are deposited onto the soil.

"Understanding the influence of soil properties on these contaminants is a crucial step to understanding how well soils can filter and buffer them."

### Contact: Roger Parfitt

Landcare Research, Plamerston North  
(06) 356 4946  
ParfittR@LandcareResearch.co.nz

### Contact: Ajit K Sarmah

Landcare Research, Hamilton  
(07) 859 3737  
SarmahA@LandcareResearch.co.nz



Suninder Saggar

■ The challenge: how to stop valuable nutrients and agricultural chemicals from entering our water resources.

# Landcare Research website gets extreme makeover

Landcare Research's website has been redeveloped, with a crisp new look and a user-friendly focus. It features extensive fresh content, much of it in response to user enquiries and feedback.

The design reflects the company's new structure, and is based around our two major research portfolios, Biological Systems and Environment and Society, each comprising five science teams.

Many more cross links are provided, so users can find their way to the information they want more easily. There are new introductory information pages on all areas of our research, an event calendar, and more details about our tools, products and services. More comprehensive biographical and contact details are given for Landcare Research staff.

Many pages on the new site have links to a contact person who can provide more information.

"The new website allows us to touch on all of our research," says Landcare Research's webmaster, Karen Scott. "As well as being easier to use, it offers much more comprehensive coverage of our science areas and current projects."

Karen and Landcare Research's graphics team incorporated more "white space" into

the site to create a clear and uncluttered look. This reduces the amount of ink used in printouts – a key environmental consideration. The site's new look ties in with Landcare Research publications, which have also had an image makeover – such as *Discovery*!

*Discovery* is available on the new website as a PDF file. We encourage you to help us save paper by subscribing to this online option. Please contact Diana Leufkens if you wish to be alerted when each new issue of *Discovery* goes online.

## Landcare Research:

www.landcareresearch.co.nz

## Discovery:

www.landcareresearch.co.nz/publications/newsletters/discovery

Contact: **Karen Scott**

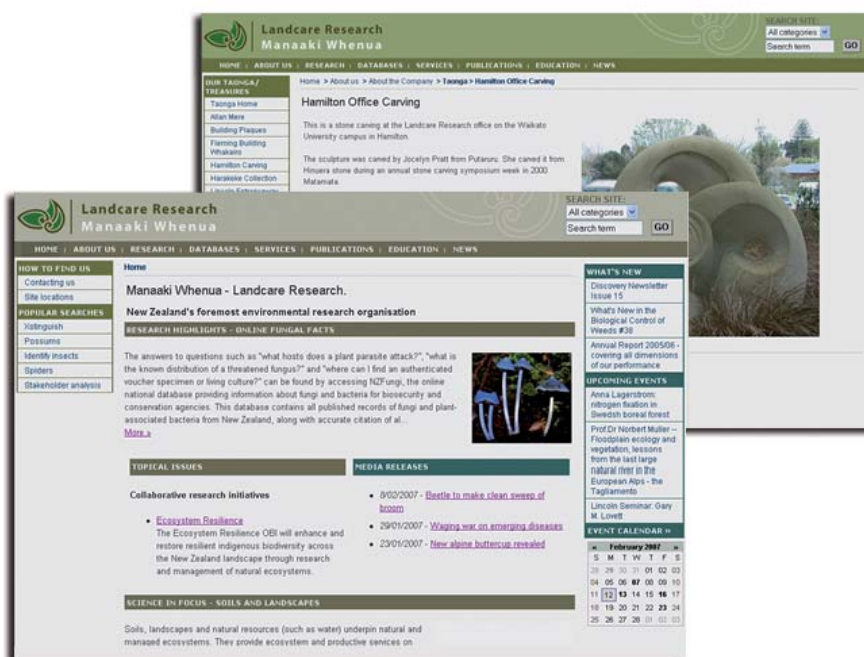
Landcare Research, Lincoln  
(03) 321 9719

ScottK@LandcareResearch.co.nz

Contact: **Diana Leufkens**

Landcare Research, Lincoln  
(03) 321 9719

LeufkensD@LandcareResearch.co.nz



Screen snaps of the home page (front) and a content page on our new website.

© Landcare Research New Zealand Ltd 2007. This information may be copied and distributed to others without limitation, provided Landcare Research New Zealand Limited is acknowledged as the source of the information. Under no circumstances may a charge be made for this information without the express permission of Landcare Research New Zealand Limited.

Editor: Diana Leufkens  
Design: Anouk Wanrooy  
Thanks to: Christine Bezar

Published by: Manaaki Whenua - Landcare Research  
PO Box 40  
Lincoln 7640, New Zealand  
Ph + 64 3 321 9999  
Fax + 64 3 321 9997



This newsletter is printed with vegetable inks on Ambassador 9 Lives Recycled Satin 150 gm

If you wish to be included on the mailing list for *Discovery*, contact Diana Leufkens, Landcare Research, Lincoln (03) 321 9719 LeufkensD@LandcareResearch.co.nz  
All photographs contributed by Landcare Research staff unless otherwise indicated.  
*Discovery* is also available online at www.LandcareResearch.co.nz/publications/discovery/



**Landcare Research**  
Manaaki Whenua