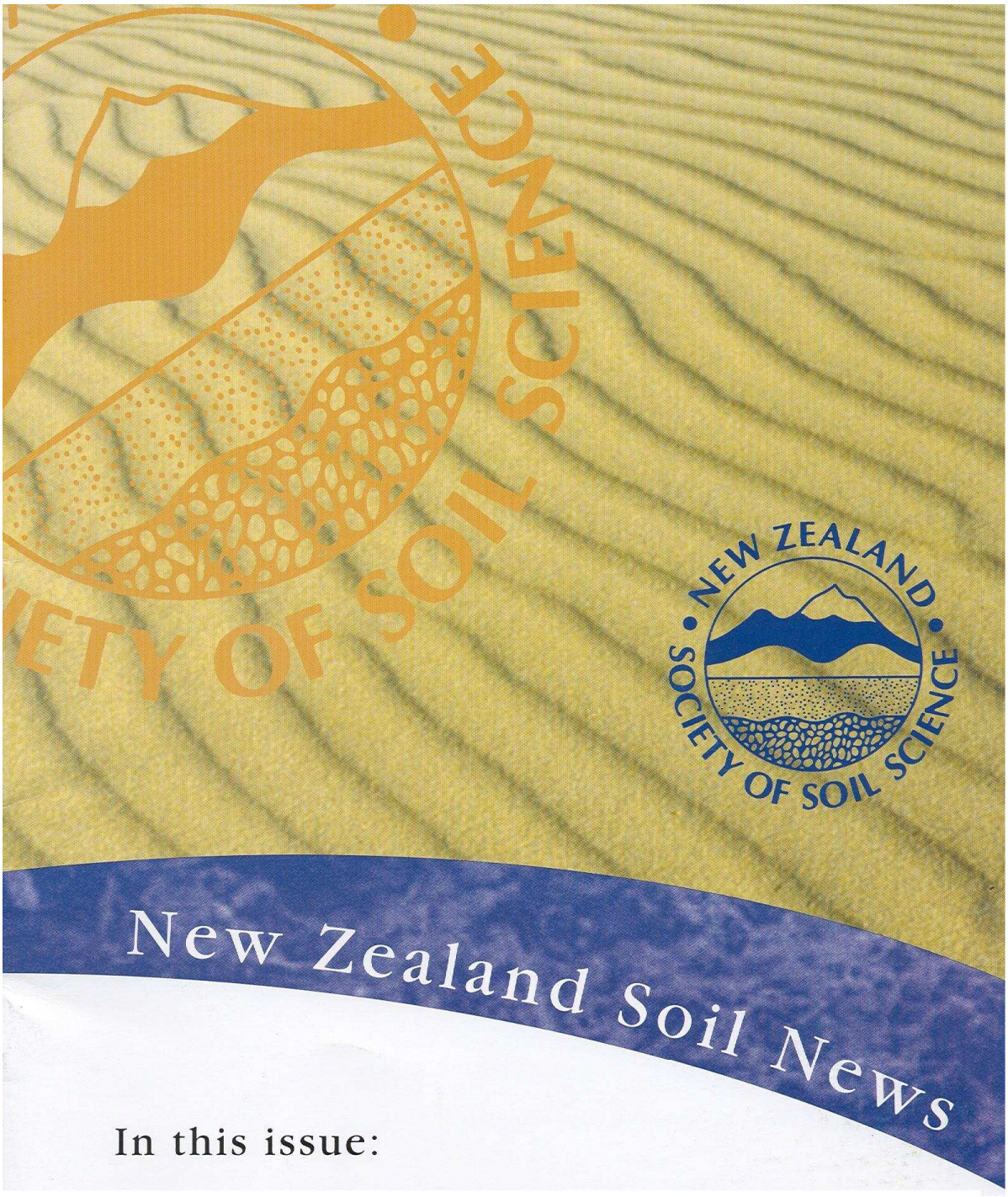

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New Zealand Soil News

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New Zealand Soil News is your newsletter.

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Deadline..... for the October issue of Soil News is
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New Zealand Soil News

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editorial

by Alistair Campbell

Another election is looming, polls are showing that there is little between the two major parties, and university staff have been striking. Could there be a connection between these two events?

A few weeks ago, comments from the retiring head of a CRI appeared in my newspaper. Landcare scientists were praised, for the number, merit and citability of their publications. Their pay, he admitted, was 'crap'. Well said, but these were not observations that surfaced in the last few weeks before his departure. He must have been well aware of them for some time. Why did he not speak out earlier, while still leading his institute? Our university vice chancellors must also be aware of the eroding salaries being paid to their staff. They have remained unwilling or unable to address this situation.

University staff have one Helen Clark to thank for their present salaries. When she was Minister of Labour in an earlier Labour government, she removed university salaries from determination by the higher salaries commission. Her reasoning, given at the time, was that academic staff would be much better off bargaining directly with their employers. Fortunately for our politicians, she was smart enough, not to submit them to a similar scenario. Lucky politicians. Before our Helen intervened, the salaries of backbench MPs were traditionally aligned with a particular step in the career-grade, senior lecturer scale. Today, the politicians are $32,872 (or 42.6%) ahead of their one-time academic equivalents, according to figures given in an article written by the National President of the Association of University Staff, that appeared in *The Press*, Christchurch, on the 12th of August. The same article claims that base rates for academic staff in New Zealand are now 20% behind Australia and 47% behind the United Kingdom.

University staff eventually reached the stage where they were willing to take strike action, with staff at seven universities taking part in a one day strike. I joined my former colleagues on the picket line, as did other recently retired staff. Further action followed including lightning two hour strikes, and threats were made to withhold examination marks, or even refuse to submit examination papers to registries. The editorial in the Press on the 5th of August claimed that 'If the union aim is to put pressure on their employers, or indeed the government as the ultimate funder of universities, it is not likely to have had much real effect'. University staff do have problems if they strike. Unlike nurses, nobody may die if they walk off the job. Unlike primary school teachers, no mum or dad may have to remain home from work to look after the children. In other words, university staff have little real clout unless they are willing to hurt their students, which is something they have traditionally been unwilling to do.

University salaries have now eroded so much that it is likely that the only solution is to have an independent body determine what a fair salary should be. That decision, however palatable, would need to be binding on the staff, the vice chancellors and the government. The first useful sign was the agreement of the government to the setting up of a high-level, tripartite group to consider, and more importantly resolve, the salary issues facing the university sector. This opportunity should not be wasted. A suitable name for the group could be the 'Not quite so higher salaries commission'.

In the last three days, sufficient progress has been made in negotiations between staff and vice-chancellors that staff have called off further strike action that was to have occurred on the 19th or 29th of August.

The Press editorial, referred to above, concluded by saying that 'The promise of interest-free loans to students is another wild misspending of money. The hundreds of millions, if not billions, that would cost would be far better spent on helping to create high-quality institutions with appropriately rewarded academic staff'. I doubt if the government or the students would agree. I wonder if this promise would have been made had Labour not suddenly dipped below National in the polls. There are far more students (and their relatives) than there are academics. The government is well aware that

there are more student votes than staff votes available.

The erosion of university salaries has also affected recently retired staff. My income from the government superannuation fund (GSF) would probably have been much larger had Helen not attempted to ensure we did 'even better' and left university staff at the mercy of the Higher Salaries Commission. However, if I view the whole of my working life, it is clear that sometimes I won, and sometimes I lost. I was lucky to have started work in 1959. At that time, vice chancellors were not so concerned about bums on seats or with keeping the government at arms length. The problem then was finding bodies to stand in front of classes. Student numbers were rising, and suitable staff were almost impossible to find. Many graduate students at Lincoln had to suspend their studies and teach classes instead. I was supposed to train to be a secondary teacher in Christchurch, but was temporarily drafted to Lincoln for a year to teach chemistry. That temporary position lasted more than 44 years.

In the early years, promotion was rapid. We applied for other jobs, were offered them, and then asked our employer if he would match them. Usually they did. My innocent 'What is the story for next year?', meaning 'Can I stay?' at the end of my first year on the job, was met with a rise from the bottom of the assistant lecturer scale, to (I think) the third step of the lecturer scale.

By the late 1960s, inflation was rising rapidly. My wife and I had taken out three mortgages to buy a house, and our monthly expenditure exceeded our income. Thanks to inflation, our income increased rapidly in relation to our mortgage, and the latter was repaid in a mere 12 years.

There were no fees to pay when I was a student, and we survived without the likes of cellphones, ipods and cars. I was able to join the GSF at 20, and buy back my first two years of university study at a very reasonable rate. Once the mortgage was paid off, extra provision for retirement was possible. That superannuation now provides a reasonably comfortable retirement.

Graduates who enter the workforce today, be it in tertiary education, in soil science or in some other branch of science, are unlikely to be able to make the provision for their retirement that my generation could. Our above average start is perhaps more than enough compensation for the recent effects on our pensions of Helen's folly.

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articles

An article published in '*The Press*' on 24 June 2005.

Soils offer chance to 'farm the atmosphere' for carbon credits

by Professor Kuan Goh
Professor of Soil Science, Lincoln University

It's easy to understand the 'surprise' of the Minister of Science Pete Hodgson at the '$1 billion botch-up in the estimates' of greenhouse gas emissions, as reported in *The Press* of 17 June. 'Surprise' must be an understatement!

As a result of the 'botch-up' officials have now been asked to come up with drastic 'new measures' to reduce New Zealand's carbon emissions. To use an old cliché, perhaps the answer is in the soil!

Many scientists believe that using the soil to store carbon from human and animal induced sources is the most cost-effective mitigating option for bridging us into the future.

The soil can buy us time as a buffer until alternative energy options are developed in the next 15 to 20 years in response to the drastic reductions in greenhouse gases required under the obligations of the

Kyoto Protocol, for those who are signatories, or under the expectations of 'responsible global citizenship' for those who are not.

Global estimates of soil's ability to sequester or 'capture and hold' carbon are of the same order as that for forest trees and are between one-third to two-thirds of the annual increase in atmospheric carbon dioxide levels.

Given this, our farmers and land users should be offered financial incentives to use practices which enhance carbon sequestration in soils as a direct means of reducing greenhouse gas emissions in the atmosphere and also as carbon credits to offsets the carbon tax.

As a full signatory to the Kyoto Protocol, which came into force on 16 February 2005, New Zealand is required to stabilise its greenhouse gas emissions at the 1990 levels, over the commitment period of 2008–2012. The new carbon tax is designed as a part of our commitment to the Protocol. Agriculture, being the major contributor to the New Zealand economy, is also the main contributor to New Zealand's greenhouse gas emissions. Unlike other countries, 55 per cent of our emissions are as methane and nitrous oxide from the agricultural sector. However, the new carbon tax specifically excludes agricultural emissions. This has important implications as the agricultural sector can be made to earn carbon credits and buffers if appropriate techniques are developed to mitigate greenhouse gas emissions.

One of these mitigations which has been studied extensively recently overseas is to use soils to enhance the storage of carbon known as 'soil carbon sequestration'. This is often hidden from our sight and few people are aware that the secret to reduce the greenhouse gas emissions may rest in the very soil beneath our feet. Soils contain about three times more carbon than that in the vegetation and twice that in the atmosphere. Direct sequestration of carbon occurs when plants photosynthesize atmospheric carbon dioxide into plant biomass carbon. This biomass carbon is subsequently sequestered in the soil when plant roots and residues are decomposed by soil micro-organisms and part of this is stored or buried in the soil as soil organic carbon or soil organic matter. Thus the carbon is fixed in the soil into medium and long-lived (15–100 or more years) carbon pools, depending on the soil type, climatic conditions and soil management practices.

A variety of techniques such as conservation tillage, erosion controls, incorporation of crop residues, composts and sewage sludge, establishing and improving pastures and forests, growing cover crops, planting of trees in agricultural land (agroforestry) and hedges, and the growing of biofuel crops are considered to be some of the effective methods. Appropriate practices differ between soil, climate and plant or crop requirements. Integrated combinations of practices are found to be more effective than a single practice. A site specific approach should be adopted in selecting the appropriate practices to meet local needs including environmental and social implications by considering all inputs and benefits associated in implementing each input.

By adopting these techniques farmers can literally 'farm the atmosphere' or engage in 'carbon farming' and earn carbon credits. This means farmers who store carbon in their soils will be rewarded with credits that they can save or sell to the industry. Industries will need these credits to continue emitting greenhouse gasses. This biospheric sink of carbon in soils is included in Article 3.4 of the Protocol under land use and land management changes relating to improved management of agricultural soils (Marraketch Accords). Many countries overseas are developing methods to determine an inventory of the land to assess the present soil carbon levels and the present rates of carbon sequestration under different land use and management practices.

For example, in the United States it has been estimated that the total carbon sequestration and fossil fuel offset potential of U.S. cropland is 154 million metric tons of carbon per year, equivalent to 133 per cent of the total emissions of greenhouse gases by agricultural activities in the U.S. Similar estimates for New Zealand are not available at present. However, our research at Lincoln University has shown that in the early phases of pasture establishment in the long-term irrigated pasture trials at Winchmore, Canterbury, significant accumulation of soil organic carbon occurred for at least 15 to 16 years before it reached a steady state.

In addition, enhancing soil carbon storage also brings in a number of 'co-benefits'. This is often regarded as a 'win-win' strategy. Increasing soil carbon directly increases soil organic matter which in turn enhances agricultural and forest production, reduces soil erosion and improves soil quality, air quality, water quality, crop health and vigour and biodiversity. These co-benefits are the key elements of not only sustainable agriculture but also environmental quality.

John McCraw awarded Companion of the Royal Society of New Zealand (CRSNZ)

Cam Nelson
Earth Sciences, University of Waikato

It is my great pleasure to record that in June 2005 John McCraw, Emeritus Professor of the Department of Earth Sciences at The University of Waikato, and retired since 1988, was elected by the Council of the Royal Society of New Zealand as a Companion of the Royal Society of New Zealand (CRSNZ). John joins a small but elite group of about 20 others who have received this award which recognises 'achievement at a high level of eminence in the promotion and encouragement of science and technology'. The formative statement for the award when first established in 1999 noted that 'By recognising the achievements of people who have worked, often for long periods, for the promotion and encouragement of science and technology, the Society will bring together a group of dedicated people who can contribute regionally and nationally to its activities and to the advancement of public awareness and understanding of scientific issues.'

John obtained an MSc in Geology from the University of New Zealand (Otago) in 1948, and over the following twenty years worked as a pedologist for DSIR Soil Bureau. In 1968 he received the DSc degree from Victoria University for his major contributions to New Zealand soil science. In 1992 his wider service to Earth Sciences was recognised with an MBE, followed in 1995 by his appointment as a Fellow of the Soil Society of New Zealand.

John McCraw was the first in New Zealand to propose a new concept, called Earth Sciences, to integrate tertiary courses in geology, pedology, climatology and hydrology, that would deal with the physical environment as a whole and be especially relevant to New Zealand requirements. So was born in 1970 the Department of Earth Sciences at the University of Waikato, with John McCraw as its Foundation Professor. The emphasis was on courses and research that dealt with the surface, and near surface of the Earth, where the bulk of New Zealand's wealth is generated.

John has had a 70-year association with the Royal Society of New Zealand (RSNZ), beginning as a member of the Junior Group of the Otago Branch at age 10. He was an active member of the early Waikato Branch, was President of that branch from 1965–66, and was a member of the separate RSNZ Geology and Quaternary national committees during the years 1975–82. John was a foundation member of the New Zealand Society of Soil Science, and co-founder and Chairman of the newly formed Waikato Branch of the Geological Society of New Zealand in 1968. Other membership and office holding positions John has held include with the National Water and Soil Authority (1976–1985), the UNESCO Man and Biosphere Programme (1971–76), the Abbotsford Landslide Commission of Inquiry (1979–80), the Friends of Waikato Museum, the Friends of Hamilton Gardens, Patron of the Waikato Geological and Lapidary Society, and Advisor to the David Johnston Science Scholarship Trust. He was Chairperson of the Rabbit and Land Management Task Force (1988) and of the Public Consultation Committee of the Hamilton City Council Pollution Control Scheme (1994–96).

John has spent his life communicating science and technology issues to the general public. From 1948, he gave regular talks to Rotary Clubs, schools and other organisations on soils and geology. From 1960 onwards about 30 lectures on Antarctica were given to various organisations. Since 1963 an average of two talks a month have been given to clubs, societies and organisations throughout the central North Island, including to Forest and Bird, Probus, Lions, Rotary Lyceum, 60 Plus and Foundation Societies. Two or three times a year buses, often of secondary school students, are taken on science field trips by John around the Waikato region.

As Dean of Science at Waikato from 1975–84, John accompanied the Vice-Chancellor several times a year on week-long visits to selected regions ranging from Northland to East Coast and Taranaki. On each trip they visited two secondary schools a day and spoke about current research at the University to senior students. John used these opportunities to also give illustrated talks to groups of businessmen and local body people about ongoing research and the possibilities of collaborative research, which lead to securing the first research contracts for the University. During 1975–80 John gave 26 Vice-Chancellor's guest lectures to the public from Kaitaia to Gisborne and Napier. Each was an illustrated talk, at layman's level, on the geology and landscape of the local district.

John has about 100 publications in soils, geology, geomorphology, and botanical history. Most recently, in retirement, he is researching gold mining history, archaeology and general history of Central Otago. To date he has written four books on the history of gold mining in Central Otago, one on the history of fruit growing and irrigation in the region, and four on other aspects of Otago history.

The above contributions demonstrate that John McCraw has fulfilled with distinction an advocacy role for the promotion of science and technology throughout his career and on into retirement. I'm sure all members of the Geological Society of New Zealand join me in congratulating him on the well deserved award of Companion of the Royal Society of New Zealand (CRSNZ).

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thesis abstract

Abstract of a thesis submitted in partial fulfilment of the requirements for the Degree of Doctor of Philosophy, Lincoln University

Effects of long- and short-term crop management on soil biological properties and nitrogen dynamics

Christine Stark

To date, there has been little research into the role of microbial community structure in the functioning of the soil ecosystem and on the links between microbial biomass size, microbial activity and key soil processes that drive nutrient availability. The maintenance of structural and functional diversity of the soil microbial community is essential to ensure the sustainability of agricultural production systems. Soils of the same type with similar fertility that had been under long-term organic and conventional

crop management in Canterbury, New Zealand, were selected to investigate relationships between microbial community composition, function and potential environmental impacts. The effects of different fertilisation strategies on soil biology and nitrogen (N) dynamics were investigated under field (farm site comparison), semi-controlled (lysimeter study) and controlled (incubation experiments) conditions by determining soil microbial biomass carbon (C) and N, enzyme activities (dehydrogenase, arginine deaminase, fluorescein diacetate hydrolysis), microbial community structure (denaturing gradient gel electrophoresis following PCR amplification of 16S and 18S rDNA fragments using selected primer sets) and N dynamics (mineralisation and leaching).

The farm site comparison revealed distinct differences between the soils in microbial community structure, microbial biomass C (conventional>organic) and arginine deaminase activity (organic>conventional). In the lysimeter study, the soils were subjected to the same crop rotation (barley (*Hordeum vulgare* L.), maize (*Zea mais* L.), rape (*Brassica napus* L. ssp. *oleifera* (Moench)) plus a lupin green manure (*Lupinus angustifolius* L.) and two fertiliser regimes (following common organic and conventional practice). Soil biological properties, microbial community structure and mineral N leaching losses were determined over 2½ years. Differences in mineral leaching losses were not significant between treatments (total organic management: 24.2 kg N ha^{-1}; conventional management: 28.6 kg N ha^{-1}). Crop rotation and plant type had a larger influence on the microbial biomass, activity and community structure than fertilisation. Initial differences between soils decreased over time for most biological soil properties, while they persisted for the enzyme activities (e.g. dehydrogenase activity: 4.0 and 2.9 µg g^{-1} h^{-1} for organic and conventional management history, respectively). A lack of consistent positive links between enzyme activities and microbial biomass size indicated that similarly sized and structured microbial communities can express varying rates of activity.

In two successive incubation experiments, the soils were amended with different rates of a lupin green manure (4 or 8t dry matter ha^{-1}), and different forms of N at 100 kg ha^{-1} (urea and lupin) and incubated for 3 months. Samples were taken periodically, and in addition to soil biological properties and community structure, gross N mineralisation was determined. The form of N had a strong effect on microbial soil properties. Organic amendment resulted in a 2 to 5-fold increase in microbial biomass and enzyme activities, while microbial community structure was influenced by the addition or lack of C or N substrate. Correlation analyses suggested treatment-related differences in nutrient availability, microbial structural diversity (species richness or evenness) and physiological properties of the microbial community.

The findings of this thesis showed that using green manures and crop rotations improved soil biology in both production systems, that no relationships existed between microbial structure, enzyme activities and N mineralisation, and that enzyme activities and microbial community structure are more closely associated with inherent soil and environmental factors, which makes them less useful as early indicators of changes in soil quality.

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news from correspondents

AgResearch Invermay

Ross Monaghan and Bob Wilcock from NIWA Hamilton, enjoyed a couple of days on the West Coast looking at a catchment study project near to Lake Brunner. With almost 5 m of annual rainfall, this is an intriguing study site where dairy farms manage to operate quite successfully despite the obviously wet soil conditions.

David Houlbrooke has also been out and about and gave a talk to the NZ Institute of Primary Industry Management annual Conference in Dunedin on the management of farm dairy effluent. He also presented to an Environment Southland field day on the risks to soil health of wintering dairy cattle. Together with Jeff Morton, David also attended an Irrigation efficiency workshop in Christchurch hosted by the NZ Irrigation Association and SFF.

Cecile de Klein went a little further a field and visited the agricultural research institute Alterra, in Wageningen, The Netherlands to discuss recent developments in N_2O research. Cecile also presented a paper at the 4th International Symposium on Non-CO_2 Greenhouse gases in The Netherlands, discussing the environmental and economic impacts of potential N_2O mitigation strategies in New Zealand dairy systems.

Australia

Rob Bramley reports that his group has recently moved from CSIRO Land and Water into CSIRO Sustainable Ecosystems. It hasn't involved any physical re-location, but it represents a better, more appropriately organised divisional and program structure. Rob will be in NZ for a week in August to speak on precision agriculture at the Romeo Bragato Conference (the leading NZ wine industry technical meeting) in Gisborne, and to have discussions in Blenheim with the recently created Marlborough Wine Research Centre concerning planning of a major workshop on vineyard variability. Rob was also in Sweden in June where he gave a couple of papers at the 5th European Conference on Precision Agriculture.

Jock Churchman has been busy preparing lectures on clays and their use in soil amendments for a Primary Industry South Australia field officers course, and on the origin and formation of soil minerals for the Surficial Geology 3 course held at the Adelaide University. As he is presenting 2 lectures and running a practical class all on the same day, Jock says it is going to be a new experience for him!

Mike Laffan has decided to finish up with Forestry Tasmania at the end of the year. After 15 years it is time for a change, and he is forming a private company (Soil Professionals Pty Ltd) and setting up as a consultant to provide soils advice for forestry and horticultural enterprises.

Ensis

For those who are not aware, SCION, formerly Forest Research (New Zealand) and CSIRO (Australia) have formed an unincorporated joint venture called Ensis. **Tim Payn** has been appointed general manager of Ensis Environment unit.

It has been a busy end of financial year with the normal flurry of papers, fieldwork and conferences and travel. **Tim Payn** was part of the ministerial delegation to New York attending the United Nations framework convention on forestry meeting in late May. While in New York, Tim attended a meeting of the Montreal process technical committee.

Guna Magesan and **Lisa Langer** had a meeting recently with the Ministry for the Environment staff regarding our biosolids research. The MfE team was led by **Glenn Wigley**, Manager (Working with Local Government). On the same day they met with their ESR colleagues at ESR. In both meetings, Guna talked about the current biosolids research work at Ensis Environment and Lisa presented information on social issues and about 'Scenario workshops' which she is conducting with Dr **Joanna Goven**, University of Canterbury.

Marika Fritzsche, a student at the University of Applied Science, Eberswalde (Germany), is working with **Guna Magesan** on a 9-weeks internship, or professional training, as part of her BSc program in International Forest Ecosystem Management. Marika will assist Guna with establishment of laboratory/field experiments to study N leaching.

Guna Magesan was the Master of Ceremony during the SCION 2005 Long Service Awards.

Due to the sale of a large area of forests owned by the Selwyn Plantation Board, **Alan Leckie** and **Peter Clinton** had to rapidly plan and undertake the final sampling of a large biosolids application trial in new record time.

Anysley Tizzard joined the Christchurch team of Ensis in April to take up a SCION post doctoral fellow in the area of microbial ecology. Following in her footsteps was her PhD supervisor **Gareth Loyd-Jones** who has joined SCION.

The harvesting of the national network of soil and site quality plots has occupied a large team consisting of **Murray Davis**, **Graham Coker**, **Mike Watt**, **Alan Leckie**, **Roger Parfitt** and a cast of thousands. Thankfully the weather has not been too bad at the many sites they have visited this year.

Peter Clinton and **Tim Payn** are amongst a large group of SCION and Ensis staff from both sides of the ditch who are taking part in the 22nd IUFRO World Congress in Brisbane in August. This will be attended by just over 2000 delegates, and is the first time in the 113 year history of IUFRO that the Congress is going to be held in the Southern Hemisphere. In addition to catching up on the science of colleagues from around the world it will give a great opportunity to catch up with new colleagues in Ensis.

Together with about 20 other SCION and Ensis staff members, **Barbara Hock**, **Brenda Bailie** and **Hailong Wang** from Ensis Environment will be involved in judging exhibitions at the 29th Bay of Plenty Science and Technology Fair on 10 August 2005.

Landcare Research, Palmerston North

Dr Hideo Hashizume of the National Institute for Materials Science in Tsukuba, Japan, has invited **Benny Theng** to spend 3 weeks in August/September as a guest scientist at NIMS. Besides discussing progress on the role of clay minerals in the abiotic synthesis of RNA, Benny hopes to use the opportunity to characterise some organically modified clays using humidity- and temperature-controlled X-ray diffractometry. During his stay in Japan, Benny will also attend the 13th International Clay Conference (ICC) in Tokyo (21–27 August, 2005) where he will present a poster, and give an invited lecture at a special symposium. After ICC 2005 he will visit Dr Y Fukushima at Toyota Central R&D Laboratories in Nagoya to discuss further collaboration on the synthesis and characterisation of clay-polymer nano-composites for potential commercial applications.

Brian Daly has completed 40 years service and has reduced his work to four days a week. He will continue as Laboratory Manager for the Environmental Chemistry Laboratory for the next few years.

Brajesh Singh, a molecular microbial ecologist visiting from Macaulay Land Use Research Institute, UK, is spending a few weeks with the greenhouse gas research group. Brajesh was enticed to New Zealand by reports that some of our methane oxidising microbes consume methane at some of the faster rates reported in the international literature: specifically, soil methanotrophs in the Craigieburn native forest soils consume approximately 10 kg methane per hectare per year. Brajesh is incubating some of our soils with ^{13}C-labelled methane, and then extracting the ^{13}C labelled DNA. DNA extraction is being undertaken at the Institute of Environmental Science and Research Ltd (ESR), Porirua. It is hoped that DNA cloning and sequencing carried out in the UK will identify the micro-organisms responsible, including new methanotroph species. Brajesh will be returning in the summer to Landcare Research (returning to where? here?) to continue these studies.

Brajesh hard at work in his temporary home at Landcare Research.

Lincoln Environmental

The 'SPYDIA' vadose zone project in the Lake Taupo catchment continues to be in the forefront of the minds of the Hamilton team. **Greg Barkle** has recently been almost permanently at the SPYDIA site completing the instrumentation phase and **Olaf Andler** and **Aaron Wall** have joined him for extended periods.

Sadly for us, **Jan Mertens** has received and accepted a very attractive job offer from the KU Leuven in his native Belgium and will be leaving us in September. The international job market for a 'Vadose zone hydrologist/Modeller' has proved very tight, but we are nevertheless hopeful of finding a suitable replacement for Jan within the next few months. If interested in this position, please see our web site for a job description: www.lincolnenvironmental.co.nz.

Roland Stenger has recently been to the US to present a paper on our Toenepi catchment work at the '*Watershed Management 2005'* conference in Williamsburg, Virginia. During Roland's absence, **Aaron Wall** had sole charge of our winter high-intensity measuring programme, which promises to shed some fresh light on the nitrogen flowpaths in this dairying catchment.

Olaf Andler and Aaron Wall installing power to the SPYDIA shed on a bleak winter's day.

Lincoln University

A new Lecturer in Soil Science has been appointed and will join the Soils Group before the beginning of Semester 1 in 2006. Dr **Suzie Reichman**, currently Centenary Research Fellow in the School of Botany at the University of Melbourne, has a Bachelor of Land Resource Science (1st class honours) and PhD degrees from the University of Queensland and has also spent time as a Postdoctoral Researcher at the University of California. Her research has mainly been in the area of heavy metal chemistry of soils and plants and their inter-relationships. We look forward to Suzie joining us.

We also welcome **Ketan Kolhe**, who is providing support to the Analytical Services team for three days per week.

Congratulations to **Tim Clough** who was selected as this year's recipient for the American/New Zealand Soil Science Professional Exchange Award, which includes a travel grant for him to conduct research at the University of Rhode Island on the fate of nitrous oxide in saturated soils. He is presently at the University of Rhode Island and returns to Lincoln mid-September.

The panelists for the 2006 Performance Based Research Fund (PBRF) Quality Evaluation of Research Performance of Academic Staff in Universities and Tertiary Institutions in New Zealand were named in July 2005. **Kuan Goh** has been appointed to the Physical Sciences Panel.

Graeme Buchan has been appointed to the International Advisory Board of the 'International Journal of Sustainability in Higher Education', which is published in Europe by Emerald Group Publishing Ltd. This follows partly from his contributions to the inaugural 'World Environmental Education Congress', Portugal, in 2003, and from his co-authorship of an award-winning paper in IJSHE.

John Scott of AgResearch, based in Soils, attended a Nutrient Cycling Satellite Workshop of the International Grasslands Congress in Oxford, UK, in July and presented a poster paper on 'Soil aggregate dynamics, particulate organic matter and phosphorus under dryland and irrigated pasture'.

Congratulations to **Christine Stark** who successfully defended her PhD oral examination on 1 August. The abstract from her thesis (published in this issue) investigates the effects of long- and short-term crop management on soil biological properties and processes and nitrogen dynamics, which was completed in 3½ years with funding from FertResearch and Lincoln University. She was supervised by Associate Professor **Leo Condron** and Professor **Alison Stewart**, with co-supervisors Professor **Hong Di** and Dr **Maureen O'Callaghan** (AgResearch, Lincoln).

We welcome three new students to the Group. **Janet Bertram**, who did Honours with us last year, and is doing a PhD on microbial dynamics under urine patches, **Yoshitaka Uchida**, who is studying for an Honours degree, and a Masters (by thesis) student, **Mathew Brown.**

Massey University

July has been a busy month for the Soil & Earth Sciences Group at Massey, with a number of arrivals and departures, a 'try to avoid' travel experience and of course, plenty of work to keep us busy.

Dr **Santiago Mahimairaja** has returned to India after completing two years of postdoc work with Prof **Nanthi Bolan**. Raja has been working on remediation of arsenic contaminated soil and has produced a comprehensive report on his project. He has been spending long hours at work and has been involved in publishing/presenting 14 papers from his research work. Professor **Donald Spark** has commended one of his invited reviews, (Mahimairaja, S., Bolan, N.S., Adriano, D.C and Robinson, B. (2005) Arsenic contamination and its risk management in complex environmental settings. *Advances in Agronomy 86*: 1–82), as a seminal publication. Many friends and colleagues gathered to say farewell to Dr Mahimairaja. In his speech he thanked everyone who had contributed to the success of his postdoc work, giving particular mention of his gratitude to Prof. Nanthi Bolan for his guidance and continually challenging him to achieve his best. *(We know Raja – that's just a polite way of saying he*

was always cracking the whip and telling you to work harder!) Raja will be missed by his colleagues here at Massey.

Farewell morning tea speech—Dr Santiago Mahimairaja (centre standing)

Two new postgraduate students have arrived at Soil Science. Mr **Bambang Kusumo** from Lombok Island, Indonesia will begin his PhD studies on field sensing of soil properties. Bambang will work with **Mike Hedley**, **Mike Tuohy** and **Carolyn Hedley** and will initially focus on mapping soil properties of soils with high spatial variability such as recent river alluvium and previously forested pumice soils. Mrs **Janice Asing** from Malaysia has also recently arrived and will begin an MSc, Soil Science, specialising in fertiliser technology with **Nanthi Bolan**, **Mike Hedley** and **Loga Loganthan**. In May, **Arivin Rivaie** successfully defended his PhD thesis 'Understorey effects on phosphorus fertiliser response of second-rotation *Pinus radiata*'. Arivin, who was supervised by **Loga Loganathan**, **Russ Tillman** and **Tim Payn** (Forest Research, Rotorua) has now returned to his former work place in Indonesia. You will be missed Dr Arivan Rivaie, and we look forward to keeping in touch. In July, **Tehseen Aslam** successfully defended his PhD thesis, 'Investigations on growth and P uptake characteristics of maize and sweet corn as influenced by soil P status'. Congratulations Dr Tehseen Aslam.

Postgraduates from the Institute of Natural Resources gave Tehseen Aslam a party to celebrate him successfully defending his thesis.

Mid semester break saw Dr **Bob Stewart** heading off to Turangi, Taupo and Rotorua on the Earth Science Fieldwork II — tephrachronology trip (3rd – 15th July). According to the students this went well and there were some pretty decent meals too (albeit healthy).

Another day at the rock face for Earth Science Fieldwork II. Well…one interested student out of three isn't bad!

Now for a warning to those intrepid travellers amongst us. Dr **Chris Anderson**, (frequent flyer and holder of many air points) was finally a victim of those who prey upon the weary at Brussels train station. Stolen passport and travel documents meant there was no point in boarding the train to the airport, but instead it was off to the NZ Embassy for help. Chris got back to London where his passport problems could be sorted out and awoke the next day to a city in turmoil—the first of the London bombings. Chris has made it back to NZ now, weary but wiser and we are all glad he made it home safely in the end.

In July the Fertilizer and Lime Research Centre held its third short course of the year on Sustainable Nutrient Management in NZ Agriculture. Given the increasing level of interest in this course, it is certain that there will be a fourth course and possibly a fifth, in 2005. Since its inception in 2002, nearly 300 people have taken this course. About two-thirds of these are fertiliser field officers from the major companies, the remainder are from small companies, private consultants, Regional Council Land Management Officers and others associated with agricultural production, both pastoral and arable.

By the end of this year, Soil & Earth Sciences group will experience some disruption in our workplace when renovations are started on our floor of the Agriculture/Horticulture building. This will involve some very welcome upgrades to our facilities, particularly for our labs and we are looking forward to the end result.

Waikato University

Congratulations are due to Waikato Earth Sciences founding Professor and Soil Scientist, **John D McCraw,** who was recently honoured as a companion of the Royal Society for his life-long and continuing work in public communication and promotion of science, and Earth Sciences in particular. Although he has been 'retired' for over 15 years Prof McCraw is still very much in demand as an entertaining and informative speaker to a wide range of audiences. He is still regularly publishing, mainly books with an historical bent.

MSc students, **Fiona Shanhun** and **Erica Hofstee** both successfully presented papers at the Annual Antarctic Conference in Christchurch in July and are now working on finishing the write-up of their Antarctic soil-related projects. **Debbie Dewar**, **Janine Sedgwick**, **Bruce Murdoch** and **Emma Moffit** have successfully completed MSc theses and Debbie and Emma are both now working in Auckland environmental consulting companies, while Janine has set off on her OE. **Stacey O'Driscoll** has secured a TIF with a company called Gwazee and is investigating the effects of a new soil aeration device on soil properties while **Daniel Spelchan** is working with **Peter Singleton** at EW to investigate planning tools for N management.

Staff are on the move with **David Lowe** now on sabbatical leave until June 2006 and travelling to Canada. **Megan Balks** is off to a cryosols conference in Russia, and **Dave Campbell** is planning a holiday in USA. **Louis Schipper** is holding the fort with a very busy semester as he picks up a significant teaching load.

Susanna Jonker has commenced a PhD study with Louis Schipper and Dave Campbell on interactions between nutrients and organic matter decomposition. **Christian Fritz** has arrived from Germany to undertake an MSc study with Dave Campbell on peat chemistry and hydrology at Opuatia wetland.

First year MSc soils student **Natalie Watkins** recently won an award form the Perry Foundation, along with two other Earth Science students to support her studies.

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nzsss

norman taylor memorial lecturer, 2005

The Norman Taylor Memorial Lecture is awarded annually by the President in recognition of outstanding contributions to Soil Science in New Zealand. This year the award has been made to Professor Ron McLaren.

Professor McLaren is Professor of Environmental Soil Science at Lincoln University and Deputy Director of the Agriculture and Life Sciences Division. He came to Lincoln in 1981 from the East of Scotland College of Agriculture in Edinburgh and since then has gained international recognition for his research on soil chemistry and plant availability of trace elements and heavy metals. He has developed a large number of collaborative and productive research linkages both within New Zealand and overseas. He has worked very successfully with the agriculture and environmental industries and with New Zealand regulatory authorities, and is the co-author of a very successful textbook which is widely used in New Zealand universities.

Professor McLaren is a member of the New Zealand, American, British and International Societies of Soil Science and served as President of the New Zealand Society from 1998–2000. He was awarded a Fellowship of NZSSS in 2000.

The title of Ron's Norman Taylor Memorial Lecture is 'Too little or too much: the trace element conundrum'. The lecture will be presented in Hamilton, Palmerston North and at Lincoln, probably in the week starting 14 November. Further details will be provided in the October issue of Soil News.

John Adams
President, NZSSS

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nzsss special general meeting

A special general meeting of the Society will be held at Lincoln University prior to the Norman Taylor Memorial Lecture.

The meeting will take place on **Wednesday 16 November** at **3 pm** in lecture room S2 in the Stewart lecture block.

Agenda

1. Apologies.

2. Financial report and balance sheet for the year ending 30 June 2005.

3. General business.

P M Fraser
Secretary, NZSSS

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america-new zealand soil science professional exchange fund

The ANZSSPEF was established to foster enhanced co-operative soil science research between the United States and New Zealand. It facilitates this by providing grants for travel between the two countries. The award is made in alternate years for travel from New Zealand to the United States and this year's awardee is **Dr Tim Clough.** Tim is a research officer in the Soil and Physical Sciences Group at Lincoln University. He is using the award to further his research into the use of stable isotope technology for studying the behaviour of nitrous oxide in soils and sediments. During his visit he will be working with colleagues at the University of Rhode Island and the Institute of Ecosystem Studies in Millbrook, New York on new techniques to assess indirect emissions of nitrous oxide from soils.

J.A. Adams
President

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publication

New book:
Phosphorus: agriculture and the environment.
2005. Edited by J T Sims and A N Sharpley. Agronomy Monograph No. 46. ASA-CSSA-SSSA, Madison Wisconsin, USA. 1121 pages. ISBN 0-89118-157-1. US$124. (Includes 3 chapters with New Zealand scientists as lead authors—N S Bolan, L M Condron and M J Hedley.)

Phosphorus: Agriculture and the Environment provides a comprehensive, systematic review of the varied aspects of phosphorus use in crop and livestock production and of the relationship between agricultural phosphorus management and water quality. This monograph draws upon the expertise of leading international scientists to present a contemporary analysis of the forms and cycling of phosphorus in soils and the agricultural and environmental management practices used today to optimize crop production while preventing nonpoint P pollution of our surface and ground waters.

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abstracts

Soil physical quality under cattle grazing of a winter-fed brassica crop

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This 2-year study investigated the effects of winter brassica forage crop grazing treatments on soil physical properties on a Fragic Pallic soil, susceptible to compaction, in South Otago, New Zealand. Soil physical measurements including bulk density, percentage of pores >300 μm, macroporosity (air-filled porosity; percentage of pores >30 μm), total porosity, air permeability, and saturated hydraulic conductivity (K_{sat}) were taken 1.5 and 4 months after completion of winter grazing in year 1, and 2.5 months after grazing in year 2. Treatment main effects in year 1 for macroporosity were ungrazed crop ($P < 0.05$, 15.5%), established pasture (12.2%), crop on-off grazing (12.8%), crop grazed with back fence (9.6%), and current practice (strip grazing without a back-fence, 8.6%). During both winters the soil was generally more compact at 0.05–0.10 m depth than at 0.15–0.20 m, particularly for the current practice treatment, which may increase the risk of overland flow. Micro-topography differences between hump and hoof-hollow areas for the current practice treatment were also investigated during one sampling, with very low values of K_{sat} at 0–0.05 m in hoof-hollow areas ($P < 0.05$, 5 mm/h), compared with hump areas (129 mm/h). Overall, the crop on-off grazing treatment and, with some exceptions, the grazed with back fence treatment have some merit for reducing damage to soil physical properties compared with current practice.

Source: *Australian Journal of Soil Research* (2005) **43**: 525–531.

Effect of sheep treading on soil physical properties and pasture yield of newly sown pastures

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The effects of intensity of treading by sheep during winter (0, 900 and 1800 sheep ha^{-1}) on soil physical properties and pasture yield were studied for 3 years on a newly sown ryegrass-white clover pasture in Southland. Intensive winter treading in wet conditions caused considerable visual soil pugging and pasture damage. Macroporosity (percentage of pores >30 microns) at 0–5 cm was significantly reduced from 11.1% in the control to 10.2% and 9.4% in the 900 and 1800 sheep ha^{-1} treatments, respectively. Winter treading reduced soil earthworm numbers at 0–5 cm, but not at 0–20 cm. Soil macroporosity showed some improvement between the post winter-treading and summer periods from natural soil rejuvenation processes. Soil macroporosity at 0–5 cm, significantly increased from 9.4% after the winter treading periods, to 11.3% in the summer periods. Macroporosity at 5–10 cm showed a decreasing trend after sowing, while saturated hydraulic conductivity increased during the 3-year period.

Source: *New Zealand Journal of Agricultural Research* (2005) **48**: 39–46.

Modelling loess landscapes for the South Island, New Zealand, based on expert knowledge

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In New Zealand, occurrence of loess often determines the spatial pattern of soil depth, and influences droughtiness, leaching potential, organic matter accumulation, nutrient retention, and natural plant-species distribution. Understanding loess distribution is therefore a major prerequisite for soil and land resource management. Although New Zealand's soil scientists have accumulated a good empirical knowledge of loess distribution through several decades of field investigation, only some of this knowledge its recorded in papers and reports. This study estimates loess thickness and percent cover, and provides loess landscape models for the internal loess distribution of all land units in the South Island based on expert knowledge. We derived loess depth classes and percent cover classes and assembled land units with similar loess distribution patterns. The soil sets underpinning the map units of the New Zealand Land Resource Inventory (NZLRI) were classified according to loess depth, loess cover, and loess pattern. New loess maps of the South Island were produced from those classifications, displaying loess coverage, thickness, loess pattern, and loess landscapes. These maps present our current knowledge of the coarse-scale loess distribution and provide a framework for fine-scale loess landscape modelling.

Source: *New Zealand Journal of Geology & Geophysics* (2005) **48**: 117–133

Numerical analysis to investigate the effects of the design and installation of Equilibrium Tension Plate Lysimeters (ETPLs) on leachate volume

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The composition and quantity of leachate as it moves down through the vadose zone is seldom measured directly as sampling in this unsaturated zone at the depths required has proven to be extremely difficult. A promising technique is the use of large porous plates (Equilibrium Tension Plate Lysimeter or ETPL) which have a controlled suction exerted on them that mimics the soil matric potential measured in the surrounding undisturbed soil profile. In the design phase for the installation of 15 ETPLs at 5 different depths (3 replicates) around a central access chamber in the vadose zone, within the Lake Taupo catchment of New Zealand, questions arose regarding the effects of the design and installation layout of the ETPLs on the measured leachate fluxes. To investigate the important design criteria and the spacing of the ETPLs, a numerical investigation using the HYDRUS 2D software was conducted. This analysis showed that the distance between the tension plate and the base (lower boundary) of the ETPL needs to be large enough to ensure that the effect of the dry zone (rain shadow effect) created below the ETPL on the soil zone being sampled above the plate is minimized. The boundary condition between the ETPL and the central access chamber was also shown to be critical, requiring a free-drainage condition in this location. The sampling efficiency of the ETPLs increases when the horizontal distance between adjacent ETPLs increases. Less obvious was the result that the sampling efficiency decreases with increasing vertical distance. This work demonstrates that the design and installation configuration of the ETPLs can significantly impact sampling efficiency. The relationships demonstrated in this work must be recognized and implemented in the design

process particularly when multiple ETPLs are installed at various depths through the vadose zone at other locations.

Source: *Vadose Zone Journal* (2005) **4**: 488–499.

Evaluation of simple quick tests for determining the nitrogen mineralisation potential in soils in controlled environments

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Four simple quick test methods were evaluated for their ability to predict the N mineralization potential of six pastoral soils under controlled glasshouse or incubation conditions. Soil samples were taken to determine N mineralization potential and extractable NH_4^+ by different extractants. The relationships between N mineralization potential and extractable NH_4^+ were assessed. Autoclave extracted-NH_4^+ (R^2 = 0.70; P <0.001), HCl extracted-NH_4^+ (R^2 = 0.83; P <0.001) and $NaHCO_3$ (R^2 = 0.81; P <0.001) methods were the best indicators of N mineralization rate. The potential of these simple quick tests to be used as rapid, simple indices of N mineralization rate in pastoral soils need to be further evaluated under field conditions where inputs of N fertilizer and farm effluents occur.

Source: *New Zealand Journal of Agricultural Research* (2005) **48**: 359–366