

- **Editorial – Is there scope for improved utilisation of our municipal wastewater in New Zealand?**
- **Obituary –Dr Sally Officer**
- **Call for NZSSS Awards**

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New Zealand Soil News

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Your contributions are required - New Zealand Soil News is your newsletter

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Deadline..... for the August issue of Soil News is Friday 9th August 2013

Visit our website:

<http://nzsss.science.org.nz/>

New Zealand Soil News

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Is there scope for improved utilisation of our municipal wastewater in New Zealand?

In New Zealand the demand for irrigation water has steadily increased over the past decade, particularly in regions such as Canterbury, North Otago and Marlborough due by and large to favourable commodity prices and subsequent intensification of land-use. However, this increase in irrigation has generally been to the detriment of water quality in many lakes and rivers, an issue that is of paramount public concern throughout the country. The degradation in water quality results from anthropogenic nutrient enrichment from leaching and surface water run-off as well as a reduction in flow volume that limits assimilation of the nutrient load. Schemes that apply wastewater to land have been advocated by most regional councils as the preferred method of final treatment and discharge. By and large this has been approached from a view of disposal as opposed to re-use; however, there is increasing realisation that better utilisation of wastewater will have both economic and environmental benefits.

Approximately 1,450 million litres of wastewater are generated every day and processed by 322 municipal treatment plants. The average flow of wastewater is around 410 litres per person, per day. For nearly 72 % of plants, final discharge is to fresh water or ocean, with the remainder discharging to land. With adequate treatment and management, the use of these wastewaters in agricultural production systems can play an essential role in local hydrology by reducing environmental pollution associated with direct discharge to surface waters while also providing a valuable water and nutrient resource. Important components of a successful wastewater re-use scheme include, (i) population of the metropolitan region in relation to both the volume of wastewater produced and demand for horticultural products, (ii) the size of the water demand in relation to the current agricultural production, and (iii) the cost of water distribution in relation to the economic return from the land use.

Wastewater management in South Australia

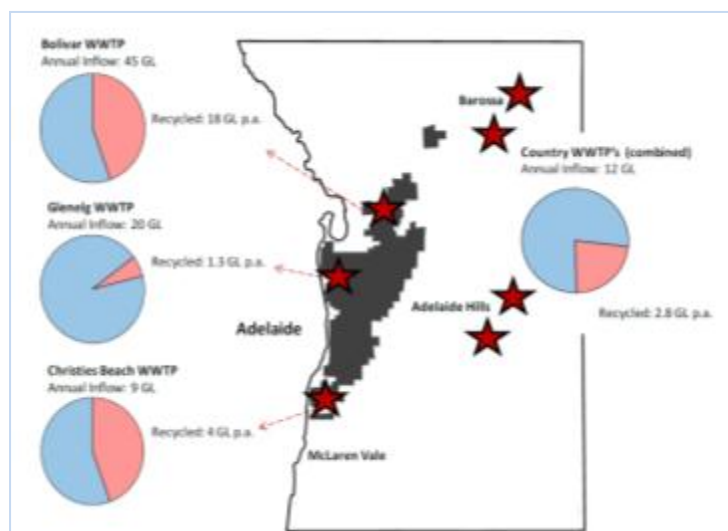


Figure 1. Wastewater Treatment Plants around Adelaide (indicated by red stars) and proportion of waste stream re-used for irrigation.

In Australia around 24,000 GL of water are used within the industry and domestic sectors per annum. The vast majority, 65 %, is consumed within the agricultural industry for irrigation, followed by domestic supply that consumes 24 %. With an intention to safeguard against water shortages and help restore the health of river ecosystems, current initiatives aim to better utilize alternative water supplies such as storm water and recycling of wastewaters for food production.



Figure 2. The purple pipe network that delivers recycled wastewater to farmers in Willunga, south of Adelaide.

In South Australia, the governmental water authority, SA Water, treats 95,000 ML of wastewater annually through three major WWTP's servicing around 1.2 million people in metropolitan Adelaide. Bolivar treats approximately 45,000 ML wastewater annually and has resulted in high quality Class A treated wastewater being piped to vegetable growers on the Northern Adelaide Plains. Glenelg treats approximately 21,000 ML wastewater annually. A high percentage of the treated wastewater is then used to irrigate parks and sports playing fields around Adelaide. Christies Beach treats about 11,000 ML annually and provides treated wastewater to the important wine growing region of McLaren Vale. Wastewater users are charged an annual fee (approximately AUD\$750 per ML) based on a set allocation. Two important benefits are gained through the treatment and re-use approach. These are (i) reduced amount of treated wastewater entering Gulf St Vincent and, (ii) recycling of high quality treated wastewater for irrigation purposes.

Figure 3. Carrots grown in Angle Vale using wastewater from the Bolivar Wastewater Treatment Plant for irrigation.





Figure 4. Tomatoes grown in glasshouses on the North Adelaide Plains round the use wastewater from the Bolivar WWTP for irrigation throughout the year.

Depending on the degree of treatment, a wastewater of definable quality is produced from the wastewater treatment process. In South Australia, treated wastewater quality is classified as Class A, B, C or D. When used for irrigation, the level of treatment (i.e. Class) determines the degree of restriction placed on crop type and irrigation method permissible. Recycled water of Class A (equivalent to the Californian Standard Title 22) for example has received a level of treatment greater than classes B to D and is suitable for unrestricted irrigation to all crop and fodder types. The use of class C recycled water however is restricted to a limited selection of crops. In the case of Bolivar WWTP, Class A wastewater is produced enabling unrestricted irrigation of all horticultural crops, including cauliflower, cabbage and potato along with a number of salad crops that are typically eaten raw such as lettuce, tomato and capsicum. Other tree and vine crops such as olives and grapes also receive recycled water irrigation. The current production area under wastewater irrigation in Northern Adelaide Plains is approximately 9,000 hectares consisting of both glasshouse and field based market gardens.

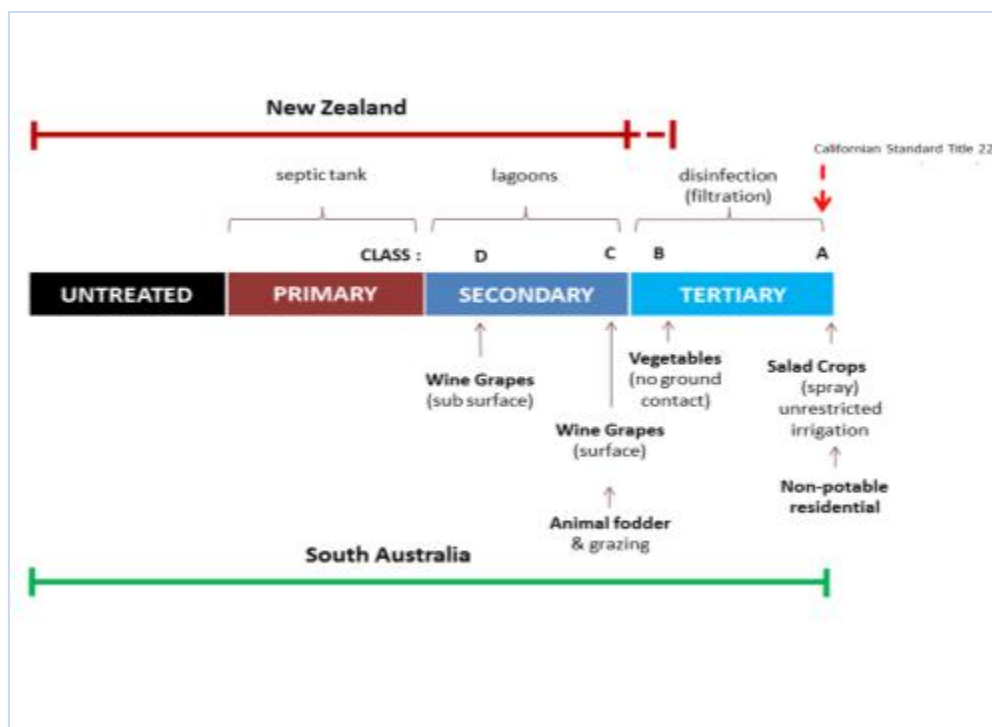


Figure 5. Wastewater quality and permissible use in South Australia and New Zealand

Re-use potential of wastewater in New Zealand

Although New Zealand is faced with the same environmental imperative to manage large volumes of wastewater, land application schemes are commonly limited in their economic viability due to the greater land areas required to achieve suitable hydraulic loading rates due to lower irrigation demands and wetter winters and as the area needed for land application increases, so do distribution costs.

However, demand for animal feed is increasing throughout New Zealand, primarily due to expansion and intensification of the Dairy Industry. Assuming animal production grows by 3% p.a. it is expected that a 3-fold increase in animal feed will be required by 2050. In many areas of New Zealand, the increased quantity feed required will exceed the amount that can be grown on land currently under, or deemed suitable for, improved pasture and crop. Therefore, there will be greater reliance on imported feedstuff from other regions of the country where cut and carry systems operate. Pasture and crops grown with municipal wastewater have the potential to supply a portion of this demand. The benefit of using wastewater in this way is four-fold; (1) it will help lower the nutrient load to surface waters by reducing direct discharge volumes (2) it may be the most cost-effective means of treatment, (3) it will lower the volume of water extracted from rivers, and, (4) is more culturally acceptable.

Under the Dairy Industry Environment and Animal Welfare Policy (2000) the spreading of human waste to grazed pasture or to feed crops for dairy animals, has been banned. A revision of policy by Fonterra in 2005 led to the development of guidelines that would allow city councils to irrigate human effluent to pasture supporting dairy. Wastewater that meets the Californian Standard Title 22 (Class A in the Australian metric used above) can be used to irrigate pasture or feed that is fed to lactating animals supplying Fonterra. Feed grown with wastewater that does not meet the Californian Standard Title 22 may be fed to dry stock but not within 30 days before the start of lactation. No sewage sludge derived from the treatment of human waste may be used to grow pasture or feed that is fed to lactating animals.

When considering the successful integration of recycled water into agricultural systems, it is imperative that; (i) optimal productivity of that system is maintained or enhanced, (ii) any negative impact to off-site environments due to nutrient loss is minimized, and (iii) distribution of the agricultural product is not compromised by negative public perception. There are several examples of successful systems currently operating in Australia where agricultural success is not compromised by product quality and/or negative public perception. To ensure sustainable irrigation practices, regulation will need coupling with grower information and education programs aimed at promoting awareness of potential effects arising from recycled water irrigation on soils and the natural environment.

Obituary – Dr Sally Officer



On Monday 26 November 2012, sadly our friend and colleague Sally Officer (PhD) passed away peacefully at home in Wairakei, surrounded by her family, after a valiant battle against cancer.

Sally undertaking a “promo” for her research measuring nitrous oxide release from the soil using high-tech Perspex and steel gas collection chambers

<http://www.stockandland.com.au/news/agriculture/cropping/general-news/get-a-handle-on-your-nitrous-oxide/2152439.aspx>

Sally was taken from her family and career far too early. Sally had become the complete soil and plant scientist and, working as a project leader for the Department of Primary Industries Victoria, had just begun to make a major contribution to greenhouse gas science. Sally joined the Department of Primary Industries, Victoria, as a soil scientist in 2005 and for the last six years she had been leading a project measuring the rate of release of nitrous oxide from cropping systems in different environments and under different crop management regimes. Working in Australia and on greenhouse gas emissions meant that Sally kept in touch with a large co-hort of colleagues, who had either been at Massey University during her undergraduate and postgraduate years (1988-1999), had worked with her during her post-doctorate excursions into precision agriculture at Texas A&M and Illinois University (1999 - 2001), or had worked with her at Crop and Food Research at Lincoln (2001-2004).

At university, as an undergraduate, Sally was the student in the class that always asked the tricky question “well if that’s as you say it is, then how can you account for?” This questioning and inquisitive nature gave Sally a solid grounding in plant and soil science in her Bachelor of Horticultural Science (Massey University, 1983 – 1987) and a desire to embark on some research of her own. Sally was very keen to undertake some topical research for her Masters in Horticultural Science (Massey University 1988-90). Lectures on reactive phosphate rocks as alternative P fertilisers for acidic soils left Sally intrigued with the practicalities of how to improve the agronomic effectiveness of reactive phosphate rock by fine grinding but also overcome the problem of handling and spreading the fine powder. Sally conducted an extremely thorough review of the reactive phosphate rocks that were available and then manufactured ground, or unground, and granulated, or ungranulated, products that were to be evaluated for agronomic effectiveness in field and glasshouse trials. Sally was particularly innovative in developing a new technique (using tallow!!) to granulate these products. Sally embraced isotope inverse dilution techniques and used an “A value” technique, in which permanent pasture in lysimeters on Tokomaru silt loam were uniformly labelled with carrier free ^{32}P using the “infamous isotope injector” that had been built for the purpose. The fertiliser treatments were duly applied and Sally harvested the pasture waiting for the ^{32}P specific activity of the sward to show greatest dilution by the most effective P fertiliser. Unfortunately despite the best “cross fingers” of Sally and her supervisors Nanthi Bolan and Mike Hedley variability between replicates ruled the day, and differences between rock phosphate products was not significant. Sally embarked on a hunt to find out what had caused the variability. This hunt included careful dissection of the cores and with Chris Mercer’s help Sally found variable nematode infections and damage on clover roots.

With the Masters thesis handed in Sally won her first professional job as a research crop agronomist for Watties in Gisborne (1990) and was involved in the production and snap freezing of sweet corn for export.

The “itch to do more soils research brought Sally back to Massey at the end of 1992 to undertake her PhD on “Soil potassium fertility of steepland pastures in the southern North Island of New Zealand”, supervised by Russ Tillman, Alan Palmer and Dave Scotter. This was a large project, which tested among other hypotheses, the potential risk that cattle and sheep, grazing but not camping on steep slopes, transferred potassium away from the steeper slopes. For this Sally’s undertook major soil sampling surveys on hill country farms. Once back in the lab Sally extracted available and reserve potassium using techniques that had been developed a year or so earlier by Aravind Surapaneni. The detailed soil analysis allowed Sally to study clay mineralogy under the wing of Jo Whitton. Sally’s conclusion (published in IPNI Bulletins and Geoderma) was that the relative K loss from steepland was small and the current practice of not applying K fertiliser to these areas of hill country farms was sustainable. A pleasing result for sheep and beef farmers. The PhD research introduced Sally to methods in spatial statistics for describing the variation in K availability in the landscape. So after a mammoth effort to complete the thesis publication (2000), Sally set sail for a post-doctorate research positions at Texas A&M University and then in the Department of Crop Sciences at Illinois University. At both institutions the groups Sally joined were focussed on using precision agricultural techniques to address the spatial variability of soil fertility. Sally’s work (published in the Precision Agriculture Journal) involved statistical analysis of large data sets of soil conductivity (EC) measurements, made across a range of soil types, topographies and soil fertility conditions.

Returning from the USA in 2002, Sally was appointed a soil scientist for the Institute of Crop and Food Research, in Lincoln, New Zealand. The work there was a combination of research, survey and extension activities, mainly concerned with extending the practical use of soil quality indicators.

With this wide range of experience under her belt Sally moved (2005) to her post with Department of Primary Industries Victoria. Here she was able to use her isotope skills again to determine the best placement of the P fertiliser MAP in dry land grain seedbeds. Then more recently Sally undertook the challenging research problem of quantifying nitrous oxide emissions from field crops. Many were envious of the automatic chambers Sally and her team had installed to measure these emissions. She discovered that nitrous oxide output from these systems after rainfall could be as much as one kilogram of N₂O per hectare per day. This was far higher than had been recorded elsewhere. To put this into context, more N₂O can come off a high-rainfall system in one day than in 100 years in low-rainfall systems.

This volume of emissions overwhelms current mitigation technologies. Given that in these zones, with decreasing rainfall and rising temperatures, cropping will become increasingly viable, Sally discovered and confirmed this as an important issue for Australian agriculture.

We will remember Sally for the significant contributions she brought to the various teams she has worked with. Those of us in the wider “ soils community may remember Sally for a polished communicator who with her eye for the “best shot” drew great satisfaction from creating slide shows to support her award winning oral and poster presentations.

Remembrances of Mike Hedley, Nanthi Bolan and David Maryland



News from the Land Monitoring Forum

The Land Monitoring Forum is a Special Interest Group for regional authorities to share ideas and identify issues and solutions around land and soil monitoring and information. As a number of our members are soil scientists and members of the NZSSS we thought it useful to provide some news from the local government land and soil space. You can find out more about the LMF at <http://www.envirolink.govt.nz>

The Land Monitoring Forum members meet twice a year, often inviting CRI scientists to talk about specific land issues or have mini technical workshops around current joint work initiatives.

Our last meeting was held in February, Wellington. Attendees included Reece Hill, Matthew Taylor and Haydon Jones (WRC), Jeromy Cuff (ECan), Fiona Curran-Cournane (AC), Colin Gray (MDC), Barry Lynch (HBRC), John Drewry (GWRC) and George Ledgard (ES). Numerous guests attended and presented. Allison Collins (LCR) provided an update on the National Land Resource Centre. Daniel Rutledge and Georgina Heart (LCR) ran a technical session on the Envirolink Tools project "Guidelines for Monitoring Land Fragmentation". Dave Palmer (LCR) gave two presentations, the first on the national C:N ratio dataset he has developed, the second on the Waikato Soil Windows concept that Landcare Research is working on with the council formerly known as EW (WRC).

Other topics discussed included the development of a Tier 1 Statistic – Soil Health in collaboration with Brent King at MfE, the usefulness of Hot Water Carbon as a soil quality indicator, the inconsistencies in Olsen P measurements across different laboratories (Drewry et al., 2013), and Auckland Council report cards for soil quality and trace elements.

There is always plenty going on in this space and the Forum is keen to interact with research providers.

Reference:

Drewry J., Taylor M., Curran-Cournane F., Gray C. McDowell R. 2013. Olsen P methods and soil quality monitoring: are we comparing "apples with apples"? 26th Annual Fertilizer and Lime Research Centre Workshop: Accurate and Efficient Use of Nutrients on Farms. Occasional Report No. 26, Fertilizer and Lime Research Centre, Massey University Palmerston North.

New Zealand Soil Science Society Awards 2013

Award	Presented	Dead line	Eligibility	Conditions
Altum	Annual	1 Aug 2013	Advanced level in PhD study (not yet completed)	Head of the Soil and Earth Science Groups from Massey, Lincoln, Waikato and Victoria Universities should nominate one student who is an active member of NZSSS.
Morice Fieldes Memorial Award	Annual	1 Aug 2013	PhD thesis submitted within the previous calendar year	Head of the Soil and Earth Science Groups from Massey, Lincoln, Waikato, Victoria, Otago, Canterbury and Auckland Universities should nominate one thesis from their group
Sir Theodore Rigg Award	Annual	1 Aug 2013	MSc thesis submitted within the previous calendar year	Head of the Soil and Earth Science Groups from Massey, Lincoln, Waikato, Victoria, Otago, Canterbury and Auckland Universities should nominate one thesis from their group.
Undergraduate award	Annual	21 Nov 2013	Best 3 rd year student in Soil and Earth Sciences	Head of the Soil and Earth Science Groups from Massey, Lincoln and Waikato Universities should nominate one student

Altum Fertilizer Postgraduate Bursary

1. The award recognises the efforts and present or likely contribution to New Zealand soil science arising from a Doctorate study.
2. Eligibility: A postgraduate (Ph.D) student working on the properties, productivity or sustainability of New Zealand's soil and land resources who is about to enter their third year of study.
3. The annual award shall be known as the Altum Fertiliser Postgraduate Bursary and shall carry a stipend of \$4,000 for one year.
4. Nominations must be received in writing from the Head of Department or Group, or delegated academic staff member with two other signatories. Nominations should include a CV, and a supporting statement of not more than two pages. Only one nomination will be accepted from each University Department/Group.
5. The award shall be judged by a subcommittee designated by Council.
6. To be eligible, candidates must be either student or full members of the NZSSS and should not be on the academic or technical staff of the department that nominates them.
7. The Bursary shall be presented or announced at a General Meeting of the Society.

Postgraduate awards (Morice Fieldes Memorial Award and Sir Theodore Rigg Award)

1. To be eligible for the awards, theses must have been presented for a degree which was awarded by a university council in the calendar year immediately prior to its submission to the Society (for the purposes of these rules, "awarding of the degree" implies approval in the previous year, not necessarily actual conferring of the degree at a graduation ceremony).
2. The awards are open to all degree candidates irrespective of their status as full or part-time postgraduate students or as university or research institute staff members.
3. The awards will be judged by a committee of three persons appointed annually by the Council of the New Zealand Society of Soil Science. The committee shall have the power to seek the opinion

of others to help decide whether a thesis is of outstanding merit, provided that opinion is not sought from the supervisors or examiners of the thesis.

4. The committee shall normally recommend one award in each category each year, but in exceptional circumstances the committee may recommend up to two awards in each category.

Nominations should be sent to:

Reece Hill
Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240

reece.hill@waikatoregion.govt.nz

NZ SOCIETY OF SOIL SCIENCE:

FELLOWSHIP RULES

Fellowship of the Society is an honour conferred for distinction in any or all of the following areas; research, technology, teaching, extension and/or the advancement of soil science.

1. Nominees must be active members of the Society at the time of nomination.
2. Nominations must be made by two Full Members, or Life Members of the Society. Nominations cannot be made by members of the Fellowships Committee of Council.
3. Nominations for the Fellowship must be submitted to the NZSSS Secretary by 1 July each year, and should be accompanied by the following documents:
4. Fellowship Nomination Form (available from the Secretary);
 - Three copies of the Fellowship Nomination Summary Form (available from the Secretary);
 - Three copies of the nominee's curriculum vitae;
 - Three copies of the nomination statement prepared by the nominators of up to 500 words, stating why, in the view of the nominators, the candidate is worthy of becoming a Fellow;
 - Where applicable, three copies each of up to five of the nominee's most significant publications or other works.
5. Fellowship nominations will be judged by the Fellowships Committee of Council, consisting of the President, Vice-President, and Past-President. Fellowships will be endorsed by Council.
6. Normally up to two Fellowships may be awarded in any one year, except in the first two years when up to a total of twelve Fellowships may be awarded.
7. Fellowships will be announced at an Annual General Meeting of the Society.
8. Nominations will remain valid for 2 years.
9. Fellows will be permitted to use the letters FNZSSS after their name and will receive a certificate.

(Nominations and supporting documents must reach the Secretary **before 31 August** in the year of nomination.)

Waikato/Bay of Plenty

Waikato University



A good-sized audience appreciated Dr Malcolm McLeod's very interesting and informative N.H. Taylor Memorial Lecture (2012), "Progress", that was held at Waikato University on Friday 10 May (Fig.1).

Fig. 1. Dr Malcolm McLeod, N.H. Taylor Memorial Lecturer for 2012, after making his presentation on Friday 10 May 2013 at Waikato University.

Malcolm's talk was followed by refreshments provided by the Department of Earth and Ocean Sciences (Fig. 2).

Fig. 2. Happy soil scientists enjoying refreshments after Malcolm's talk.



On Tuesday 21 May, Professor Louis Schipper presented his inaugural professorial lecture to one of the largest audiences ever seen at the inaugural lecture series, attesting to his status as both an expert scientist and excellent speaker. These events are public lectures and Louis delivered an outstanding talk entitled "Soil microbes that complete the nitrogen cycle: can we work in partnership?"



Fig. 3. Professor Louis Schipper at his inaugural professorial lecture flanked by Waikato University's Deputy Vice-Chancellor, Prof Alister Jones (left), and Faculty of Science and Engineering Pro-Dean, Professor Craig Cary (right), who introduced Louis to the audience.

In mid-May, David Lowe took 10 year-1 MSc students to the annual Quaternary Techniques short course at GNS Science's National Isotope Centre, Lower Hutt, the 10th course to be held (<http://www.gns.cri.nz/qtshortcourse/>) (Fig. 4). Organised and expertly run by Christine Prior, Karyne Rogers, and Marcus Vandergoes, the course attracted more than 40 graduate/postgraduate students, including four from Melbourne, and, fittingly for the tenth anniversary, was a great success.



Fig. 4. Waikato graduate students at the 10th Quaternary Techniques Short Course “Measuring change and reconstructing past environments”, held from 16-17 May, 2013, at GNS Science National Isotope Centre.

From left, Tim, Kate, Mel, Camillia, Emma, Zac, Amy, Megan, Rebecca, and Ravinder. Photo courtesy of Camillia Garae.

On the topic of palaeoenvironmental reconstruction, I wish to advise members that the NZ-INTIMATE* project, which began effectively in 2004 with a meeting at GNS Science in Lower Hutt, has culminated in publication of a New Zealand climate event stratigraphy by Barrell et al. (2013) (the abstract is reported elsewhere in Soil News). This paper forms part of a special issue of Quaternary Science Reviews compiled for the Australasian INTIMATE project. The issue comprises 18 papers on both New Zealand and Australian research examining past climates and environments for the past 30,000 years in the region. A symposium encompassing the NZ-INTIMATE project, and Quaternary climate change, was held during last year's Geoscience Society of New Zealand conference in Hamilton. I wrote a report on the symposium (Lowe, 2013). Earlier, Bostock et al. (2012) reviewed some of the advances made in Quaternary science research in New Zealand since the year 2000.

Megan Balks had departed on a two-part sabbatical leave. At the time of writing, she is at the University of Washington. Megan returns in early September at the completion of part 1.

Finally, a reminder that this year's Waikato-Bay of Plenty one-day soil science conference, Wai-BoP Soils 2013, is to be held on Thursday, 5th December, at the University of Waikato, Hamilton. More details are provided elsewhere in this issue.

*INTIMATE = INTegration of Ice core, MARine, and TERrestrial records

References

- Barrell, D.J.A., Almond, P.C., Vandergoes, M.J., Lowe, D.J., Newnham, R.M., NZ-INTIMATE members 2013. A composite pollen-based stratotype for inter-regional evaluation of climatic events in New Zealand over the past 30,000 years (NZ-INTIMATE project). Quaternary Science Reviews (online 30 May 2013) <http://dx.doi.org/10.1016/j.quascirev.2013.04.002>
- Bostock, H., Lowe, D.J., Newnham, R.M., Almond, P.J. 2012. Quaternary research in New Zealand since 2000: an overview. Quaternary Australasia 29, 30-36.
- Lowe, D.J. 2013. Quaternary symposium and discussion, Geoscience Society of New Zealand annual conference 2012, Hamilton. Quaternary Australasia 30 (in press).

AgResearch Ruakura

Increasingly, the soils team at Ruakura need to soil sample down to 900 mm depth for measurement of soil mineral N as a part of N leaching studies. Unfortunately, we couldn't source a commercially available sampler that came close to meeting our requirements, so we designed our own. The design was developed by Lincoln engineers with major input from the soils team at Ruakura who knew exactly what they wanted! The Beast, as it is affectionately known, is a tad slower than manual sampling, but easier on the back! As well as being routinely used on some of our local experiments (200-300 cores per day to 600-900 mm), the machine has just returned from Telford where it extracted 1600 soil cores to 450 mm over 4 days without the slightest hiccup. This beats its previous record of 1600 cores to 150 mm. An added bonus is that the hydraulic sampling arm can be tilted to make holes at 45 degrees; ideal for installing porous cup leachate samplers to 600-900 mm depth (also required in their hundreds in some experiments!).



Alec McGowan
(right) and **Wayne Worth** testing the soil sampler ahead of its marathon stint at Telford Rural Polytechnic.

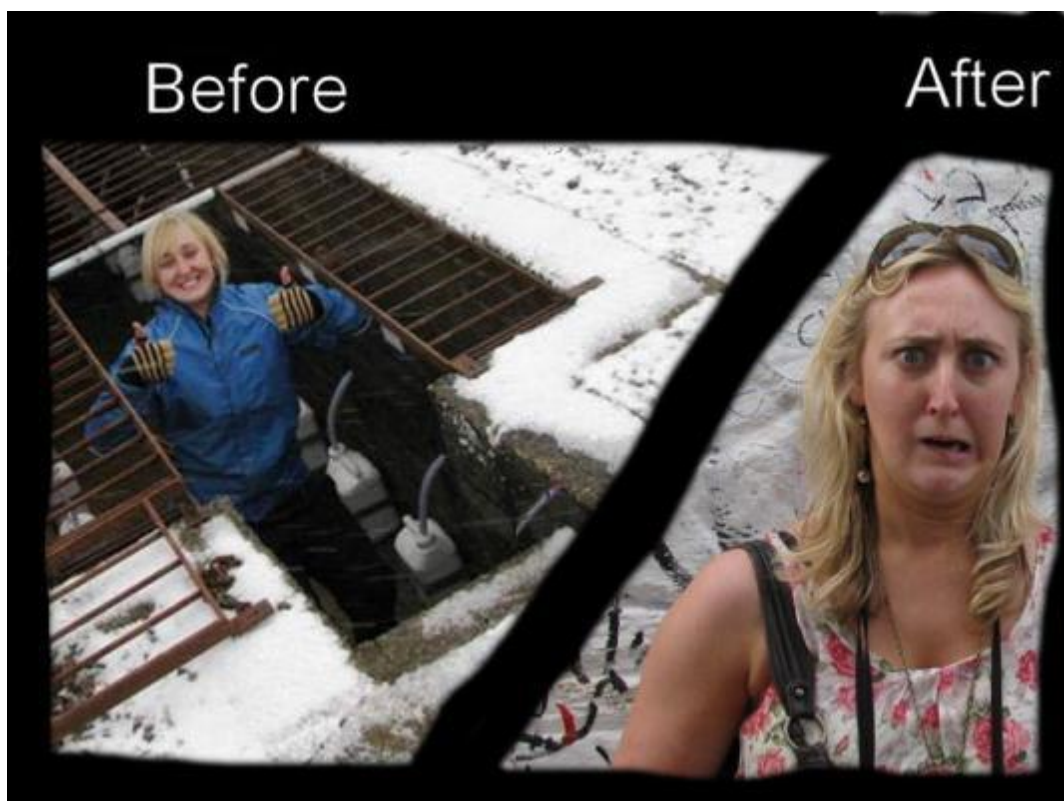
Meanwhile, **Stewart Ledgard** has been busy down at a field day on Parekarangi in the Lake Rotorua catchment. At the field day he gave presentations on phosphorus management, and on pasture responses to nitrogen fertilizer and mitigation of nitrogen losses. Stewart has been working with dairy farmers in the catchment, as part of an SFF project, on options to reduce N and P losses to the lake from their farms. He is also working with DairyNZ and local consultants modeling new farm system options for farms in the catchment.



Diana Selbie has put together a new trial looking at the effect of animal urine on the daily rates of mineralisation and immobilisation in soils of differing development status. The hypothesis is that pasture soils recently converted from forest will immobilise more N than soils under a more intensive grazing system, such as dairying. A grand total of 462 incubations were prepared by a mammoth effort from most of the Ruakura Research Associate team lead by **Sheree Balvert**.

*Pictured here helping out: **Justin Wyatt**, **Martin Kear** (holding urine), **Emma Bagley**, **Moira Dexter**, and **Brendon Welten**.*

Diana is also happy to report that she's on home straights now, and only weeks away from submitting her PhD. We also have photographic evidence of the physical and psychological effects of a PhD project: (left) the happy, early field-work stage of PhD in Ireland, and now (right), the crazy, mad write-up stage!



Manawatu/Hawke's Bay

Massey University, Palmerston North

Ranvir Singh and **David Horne** from Soil & Earth Sciences at Massey and **Jon Roygard** from the Horizons Regional Council head a project team investigating transport and fate of nitrate from farms to river via groundwater in Manawatu River catchment. Currently, a pilot site has been established at the Massey Dairy Farm 1 to test the methods and the instrumentation being developed for the study.



*David Feek and Ranvir Singh installing shallow piezometers at the project trial site
Massey University's No. 1 Dairy Farm.*

A sound understanding of the transport and fate of farm nutrients is a key component in our understanding and management of the likely impacts of these nutrients on fresh water quality and ecosystem health. While the cycling and transport of nutrients in the soil profile is reasonably well understood, there is limited information available about their transport and fate in the subsurface environment particularly in the Manawatu river catchment.

Last year, the project team welcomed **Aldrin Rivas** to start work on his PhD study as part of this project. Aldrin comes from Philippines, and has completed his Master degree in Water Engineering and Management from the Asian Institute of Technology, Thailand. His PhD study is focused on to gain a quantitative understanding of denitrification and its influencing factors in different hydrogeologic settings in the catchment. This will include field monitoring and field and laboratory experimentation of unsaturated and saturated sediments, and shallow groundwater. This year the project team welcomed another PhD student, **Ahmed Elwan** to start work on his study. Ahmed comes from Egypt, and has obtained his Bachelor's degree in Geology from the Assiut University (Egypt) and Master degree in Land Resources

Engineering from the Vrije Universiteit Brussel, Belgium. Ahmed's research will focus on monitoring and modelling nitrogen flow to assess the influence of hydrogeologic settings on the transport and fate of nitrate-nitrogen via groundwater in the catchment. Field measurements are being conducted to inform the modelling process.



Aldrin Rivas measuring shallow groundwater quality at the Trial Site, Massey University's No. 1 Dairy Farm



Ahmed and Paul Boyce (an honours student) testing different sensors to monitor surface water and groundwater interactions in the Mangatainoka River

The results of this collaborative research are expected to address an identified gap in our current knowledge, by generating quantitative information on the transport and fate (time lag and attenuation) of nitrate-nitrogen from farms to river via groundwater in the catchment. The quantitative information will provide solid indications on the denitrifying capabilities of the subsurface environment. Furthermore, the developed nitrogen flow modelling will contribute to the policy analysis required to formulate future land and water management guidelines for sustainable landuse in the Manawatu river catchment.

Chris Anderson continues to develop his research into environment management at artisanal and small-scale gold mining sites (ASGM) in Indonesia. Between the 12 and 19 May he attended a workshop at the University of Mataram with a working title 'Planning for the sustainable future of ASGM in WNT Province'. He was co-chair of this workshop with **Dr. Dewi Krisnayanti** (Lincoln alumni) who has recently been awarded funding for her work on the subject by the Indonesian Directorate General of Higher Education (three year project). NZ Aid, who funded Dewi's PhD scholarship at Lincoln, remain very pleased to see this continuing example of NZ support for Indonesian science.

Raza Khan was awarded his PhD (Soil Science) in absentia recently (Title: Boron dynamics and availability in *Pinus radiata* plantation). Raza began his PhD studies with **Loga Loganathan** back in 2007. Completing this PhD was a long battle for Raza, but he persevered and the result was a thesis that all examiners judged to be a good contribution to the science of B nutrition in pine forests. He was supervised by **Chris Anderson**, **Loga Loganathan** and **Jianming Xue** and **Peter Clinton** from Scion. Well done Raza!

Christine Christensen has submitted her PhD thesis. After 4 years and 2 months as a part-time PhD student, the document was lodged with the Doctoral Research Office this month. Her studies of 'Duration Controlled Grazing of Dairy Cows: Impacts on Pasture Production and on Nitrogen, Phosphorus and Faecal Microbe Losses to Water' was supervised by Mike Hedley, James Hanly and David Horne. The research of improved farm system practices will continue under Christine's management within the P21 Phase 2 Regional Farm objectives at

the No. 4 Dairy Farm as she continues in her role as Research Officer in FLRC, combining this research with her contribution to the Sustainable Nutrient Management short courses conducted by FLRC.

Plant & Food Research – Palmerston North

We welcome **Trevor Jones** who has joined us in a contracted position to work with **Ian McIvor** on soil erosion matters. Trevor is a wood scientist who previously worked at Scion.

Hannah Leckie has also recently joined the team on a short term contract researching the trends in global water science and policy and their future relevance for New Zealand. She has a BSc (Hons) in Soil Science from Lincoln University and five years of national and international experience as an Environmental Scientist Consultant in New Zealand, Australia and the Middle East. In October this year, she will continue her education undertaking a MSc in Water Science, Policy and Management at the University of Oxford with a view to making a considerable contribution to water science, policy and management, not only in New Zealand, but to Pacifica and World society.

Karin Müller, Brent Clothier and Steve Green visited Saitama University in Saitama, Japan from 19 to 24th May 2013. The purpose of this visit was to kick-start their new bilateral, MBIE/JSPS-funded project ‘Soil architecture and mass transport parameters: interactions with the soil-microbial complex’ with their Japanese colleagues Prof Ken Kawamoto, Prof Toshiko Komatsu, Dr Shoichiro Hamamoto from Saitama University, and Dr Syuntaro Hiradate from National Institute for Agro-Environmental Sciences (NIAES), Tsukuba. This is the team’s second joint project on soil water repellency. The first project focused on investigating the implications of soil water repellency on water dynamics and solute transport. In this new project, the team sets out to improve the understanding of the fundamentals of the genesis of water repellency with the aim to enhance the modelling of the dynamics of water repellency itself. Brent, Steve and Karin visited the laboratory facilities and a field trial of Prof Dr Komatsu’s team. The excellent laboratory facilities include a recently acquired an X-ray CT. The visit provided an opportunity to discuss previous data sets and drafted manuscripts, to update each other on the progress of selecting field sites, and to identify gaps in experiments and data collation with the prospect of developing a modelling tool. Brent, Karin and Steve also gave seminars to post-graduate students and researchers. Needless to say that they also enjoyed the Japanese hospitality and fantastic food during their visit.



Dr Komatsu with Sir Thomas, Drs Müller, Green, Clothier, Hiradate and Kawamoto.

Landcare Palmerston North

Regrettably, we must say farewell to two NZSSS members this month. **Guodong Yuan** has been offered a professorship at the Institute of Coastal Zone Research, Chinese Academy of Sciences; and is hoping to start work there in July or August. Guodong has made a major contribution to our national clay mineralogy expertise over recent years, and we congratulate him and wish him well in his new position. **Gareth Salt** from our Environmental Chemistry Lab leaves us this week. Gareth has worked in the lab for almost twenty years, and so perhaps it was time for a change. Gareth heads into a new lab with Silver Fern Farms in Christchurch next week. We will miss Gareth's very valuable contribution to soil analysis, and we have welcomed Brian Daly back for a few days to contribute to our lab activities, and assist our new lab manager Ngaire Foster.

This month we also welcome two new staff members, who have joined us because of their interest in soils:

Rebecca (Beckie) Phillips is a new senior nitrous oxide research scientist in Palmerston North. Beckie recently moved from the USDA Agricultural Research Service in North Dakota, USA, where she led several greenhouse gas (GHG) and remote sensing-based projects. Beckie earned her Ph.D. at the University of North Carolina Chapel Hill in the department of Environmental Science and Engineering and her M.S. in Interdisciplinary Studies in Ecology at Colorado State University. Last year, Beckie worked with the University of Wollongong, Manildra Environmental Farms and CSIRO in New South Wales to develop new GHG measurement techniques (this manuscript is now in press at the J. of Environmental Quality). Her most recent remote sensing work just came out online at <http://www.tandfonline.com/doi/full/10.1080/15481603.2013.793469>. She is new to New Zealand and the latest addition to the Landcare Research Ecosystems and Global Change group.



Andrew McMillan has also recently joined Landcare Research's Ecosystem's and Global Change team. Having spent several years at NIWA developing and deploying systems to measure trace gas fluxes from agricultural systems, he is excited about the opportunity to work closely with soil and terrestrial ecosystem scientists, and contribute to a better understanding of the processes affecting those fluxes. Andrew gained his PhD in Earth System Science from the University of California, Irvine, where he worked on carbon cycling and gas flux work in rice paddies, and did post-doctoral work looking at the

interactions between fire ecology, carbon cycling and climate in boreal forests. His interests include trace gas biogeochemistry, ecosystem science, with particular foci on the carbon, nitrogen and water cycles in agricultural systems. As well as a variety of flux measurement techniques, he brings experience in remote sensing and ecosystem modelling.

Our other Palmerston North soils people have been involved in a range of activities over the last few months. The National Land Resource Centre, led by **Alison Collins**, is making good progress with web development for communicating our soil information to end users. Informatic data management systems are also being created for better control and storage of our legacy data. The National Soil Archive, housed at Batchelor House continues to provide a very valuable resource for a range of research activities. These include recent soil carbon projects led by **Roger Parfitt** and **Craig Ross**. **Carolyn Hedley** and **Pierre Roudier** are currently scanning the Archive with a Vis-NIR soil spectrometer, to develop a soil spectral library for predicting soil properties. Pierre is also attending the 16th International Conference on Near Infrared Spectroscopy, from 2 - 7 June 2013 in Montpellier this week.

The Climate Change Conference in Palmerston North was well-attended with **Miko Kirschbaum**, **Garth Harmsworth**, **Kevin Tate**, **Neha Jha**, and **Donna Giltrap** all giving presentations on their latest research.

Benny Theng is to give a short course on “The Chemistry of Clay-Polymer Reactions” in conjunction with the forthcoming 15th International Clay Conference in Rio de Janeiro, Brazil (7–11 July, 2013). The pre-conference course is based on Benny’s book “Formation and Properties of Clay-Polymer Complexes, Second edition”, published last year by Elsevier (Amsterdam). The topics that Benny will discuss include clay mineral structures and colloid-chemical properties, interactions of clays with synthetic polymers, interactions of clays with naturally occurring macromolecules (proteins, nucleic acids, polysaccharides, humic substances), and polymer-clay nanocomposites. The website: www.15ICCC.org has more details.

Canterbury

Lincoln University



Dr Amanda Black (Bio-Protection Research Centre) received an Early Career Research Award at Lincoln University. This award recognises new researchers who have demonstrated well-focussed research programmes and proven themselves on the international stage. Amanda has a three year Te Tipu Putaiao Fellowship from the Ministry of Business, Innovation and Employment. Her research focuses on addressing long-term nutrient retention in agricultural soils. Amanda wishes to use her fund to advance her understanding of the influence of metals in nitrogen cycling efficiencies

in agricultural systems using the Synchrotron Facility in Melbourne, Australia.

Ivan Chirino-Valle successfully defended his PhD thesis on the 15th of May. Ivan’s thesis was on Soil Phosphorus Dynamics and Bioavailability in New Zealand Forest Ecosystems. He was supervised by Profs. **Leo Condon**, **Tim Clough** and Murray Davis (Scion).

Nina Stief has arrived from Montpellier, France to work on rhizosphere processes of New Zealand native plants. Nina will work with **Nick Dickinson** and **Brett Robinson**.

Otago/Southland

AgResearch Invermay

Invermay experienced its first snow day of the winter on Tuesday with all routes in and out of Dunedin closed. Despite this, things are ramping up for another busy winter of monitoring. Several trials will continue to run at Telford in Balclutha this winter including a low rate/low depth effluent irrigation trial and a winter forage grazing trial (all associated with the Pastoral 21 program; see below for more details). **Ross Monaghan, Seth Laurenson, Tom Orchiston, Jane Chrystal and Wayne Worth** will be carrying out these assessments as part of the P21 programme. Cows on the Telford farm have been split into three mobs (110 approx./mob). Over the past 9 months, cows from one mob has been restricted from grazing on wet soils, while another control mob have grazed been allowed to graze regardless of soil moisture. We have recently completed extensive soil sampling of all paddocks for chemical and physical assessment of this treatment effect.



Cecile de Klein and Mike Harvey (NIWA) worked with Global Research Alliance (GRA) staff to finalise the newly developed Guidelines for N₂O chamber methodologies for uploading to the GRA website. The Guidelines present the current state of knowledge on N₂O chamber methodologies and have been prepared by a team of international experts, including various NZ scientists. They are now freely available on: <http://www.globalresearchalliance.org/research/livestock/activities/nitrous-oxide-chamber-methodology-guidelines/>.

Congratulations to **Ros Dodd** who has now submitted her PhD for examination.



Two freshwater programmes led by **Rich. McDowell** and David Hamilton (University of Waikato) have recently compiled a special issue of Marine and Freshwater Research on the “Sources, sinks and fate of nutrients from agricultural catchments”.

All papers are open access and available at the following links: <http://www.publish.csiro.au/nid/126/issue/6520.htm>.

Volume 64(5) 2013.

Special Issue: Sources, Sinks and Fate of Nutrients from Agricultural Catchments

Winter forage grazing - Telford

An AgResearch study in South Otago has indicated that simple and low cost management techniques can significantly reduce overland flow and contaminant losses from winter forage crop paddocks. With the growth of dairy farming in Otago and Southland, there has been a corresponding increase in environmental concerns, particularly regarding nutrient loss, faecal microbes and sediment to waterways. Winter forage grazing paddocks are believed to contribute a disproportionately large part of annual farm nutrient and sediment losses as a result of intensive stock grazing on soils with high moisture content.

The paired catchment study was led by Senior Scientist Ross Monaghan, working with Seth Laurenson, Tom Orchiston and Wayne Worth, all from the Land & Environment team at Invermay. It was established at Telford Dairy Farm, just outside Balclutha, and investigates the effect of grazing strategy on overland flow and water quality when paddock soil type, topography, drainage and stock management were taken into account.

It was thought that strategic grazing of cows in a winter forage crop paddock could reduce overland flow and thus sediment and nutrient losses. Two different types of management were used. There was a control group, with cows starting at the bottom of the hill and then strip grazing up the hill. There was no back-fencing and the stream was unfenced and unprotected.

In the treatment catchment the cows enter at the top of the paddock, then strip graze in a downward direction. There was protection of the stream, back-fencing every four to five days, and finally restricted grazing of the area surrounding the stream if conditions were suitable, effectively offering the 'last bite' of winter when conditions allow. The trial has shown that strategic grazing of dairy winter forage paddocks can considerably reduce volumes of overland flow. The strategic grazing method was a combination of protecting the critical source area (CSA) from stock by fencing, and grazing the least risky areas first and grazing towards the higher risk areas. This effectively left the most vulnerable areas with minimal soil damage for as long as possible throughout the winter season.

The trial is continuing in 2013, with the paddocks being swapped to see if the differences between the control and treatment grazing strategies continue to be seen. This research is funded as part of the Pastoral 21 programme, a collaborative venture between DairyNZ, Fonterra, Dairy Companies Association of New Zealand, Beef + Lamb New Zealand and the Ministry of Business, Innovation and Employment.





CALL OF EXPERTS FOR THE INTERGOVERNMENTAL TECHNICAL PANEL ON SOILS

The Global Soil Partnership invites all its Partners to nominate soil experts from their regions as candidates for the Intergovernmental Technical Panel on Soils (ITPS).

The main function of the ITPS is to provide scientific and technical advice and guidance on global soil issues to the GSP primarily and to specific requests submitted by global or regional institutions.

The Intergovernmental Technical Panel on Soils (ITPS) will be composed of twenty-seven recognized experts ensuring proper regional coverage, proper scientific expertise (covering the range of scientific and practical expertise encompassed by the GSP) and gender balance. The ITPS will have the following regional distribution of experts:

- Five from Africa
- Five from Asia
- Five from Europe
- Five from Latin America and the Caribbean
- Three from Near East
- Two from North America
- Two from South West Pacific

Members of the ITPS should act in their personal capacity and provide neutral expert advice on matters relating to their recognized field of expertise to the GSP and GSP Partners. Potential members will be assessed against the following qualifications:

- a recognized academic profile (postgraduate level);
- demonstrated experience at international level in the different soil-related activities, ranging from research to field experience;
- a good record of peer reviewed sound publications;
- a current position that is not in conflict with the provision of expert advice independently from their employment and nationality

Nominations should be sent by GSP Partners to GSP-Secretariat@fao.org on 5 May 2013. They should include the name of the candidate, contact address and their CVs.

The GSP Secretariat will filter and consolidate a final short list of experts on the basis of the above criteria and will submit it to FAO Member Countries by 10 May 2013. They will then select them according to their procedures and regional distribution, and will submit the list of selected regional experts by 31 May 2013 to the GSP Secretariat.

Once selected, the experts will be appointed as members of the ITPS at the Plenary Assembly.

New Publications from IUSS:

Pedodiversity, by J.J. Ibáñez & J.G. Bockheim (Eds). 2013, CRC Press. 256 Pages. ISBN 9781466 582774. Soil diversity (pedodiversity) is part of our natural and cultural heritage. The preservation of the pedosphere is essential for the protection of the biosphere and the Earth's systems, the regulation of climate, and for world food security. In this book, reputed international experts discuss the state of the art of pedodiversity analysis—analyzing the relationships among biodiversity, pedodiversity, landform diversity, lithodiversity, and land use diversity. The first of its kind, the book is intended to be a combined handbook, historical account of pedodiversity research, and essay on its future challenges. Contents: Pedodiversity: State of the Art and Future Challenges; Measuring Diversity of Environmental Systems; Nonlinear Dynamics, Divergent Evolution and Pedodiversity; Fractals and Multifractals in Pedodiversity and Biodiversity Analyses; Pedodiversity and Landscape Ecology; Pedodiversity and Landforms; Repercussion of Anthropogenic Landscape Changes on Pedodiversity and Preservation of the Pedological Heritage; Soil Endemism and its Importance to Taxonomic Pedodiversity; Pedodiversity Studies in China.

Waldböden (Forest Soils, in German). By E Leitgeb, R Reiter, M Englisch, P Lüscher, P Schad, KH Feger. 2013, Wiley-VCH, ISBN 978-3-527- 32713-3. 387 pages, price 59 Euros. The most important soil types of Central European forests are presented with 67 examples. For every example, profile, topsoil and forest pictures are shown, a detailed field description is given, and laboratory data for over 40 soil characteristics are presented for each horizon. Every example soil is classified according to the Austrian and the German system and according to the international system WRB. The book is suitable for teaching, learning and for obtaining practical information. Recommendations for forest use are given for every example. The introductory chapters explain laboratory methods, forest ecology and soil genesis.

Sustainable Soil Management. Deirdre Rooney (Ed.). Apple Academic Press, 2013. ISBN: 978-1-926895-21-5. Hardcover, 246 pages. Price \$99.95. Changing land-use practices and the role of soil biological diversity has been a major focus of soil science research over the past couple of decades—a trend that is likely to continue. The information presented in this book points to a holistic approach to soil management. The first part looks at the land use effects on soil carbon storage, and considers a range of factors including carbon sequestration in soils. The second part of the book presents research investigating the interactions between soil properties, plant species, and the soil biota.

Dune Worlds: How Windblown Sand Shapes Planetary Landscapes. Series: Springer Praxis Books. Subseries: Geophysical Sciences. By Lorenz, Ralph D. & Zimbelman, James. Jointly published by Praxis Publishing, UK and Springer, 2013. ISBN: 978-3-540-89724-8. Hardcover, 300 pages. Price \$129.00. This book describes how sand dunes work, why they are the way they are in different settings, and how they are being studied. Particular attention is paid to their formation and appearance elsewhere in the solar system. New developments in knowledge about dunes make for an interesting story – like the dunes themselves, dune science is dynamic – and the visual appeal of Aeolian geomorphology ensures that this is an attractive volume.

Ecosystem Services and Carbon Sequestration in the Biosphere. Lal, R., Lorenz, K., Hüttl, R.F., Schneider, B.U. & von Braun, J. (Eds.). Springer, 2013. ISBN: 978-94-007-6454-5. Hardcover, 495 pages. Price \$209.00. This book describes comprehensively potential, co-benefits and drawbacks of carbon (C) sequestration for ecosystem services. Soil generates

numerous ecosystem services for human wellbeing and ecological functions. The services discussed include provisional (feed, food, timber, biofuel), regulating (carbon sequestration, pests, diseases), cultural, and supporting (soil formation, nutrient cycling) services. Recarbonization of the biosphere is a potential strategy to redistribute C among global pools, and to enhance ocean but most importantly land-based C sinks with possible feedback on soil-based ecosystem services. Land use and soil management can degrade soil quality, and either reduce quantity and quality of ecosystem services or lead to disservices and create large ecological footprint. Thus, trade-offs between carbon sequestration and ecosystem services must be considered when incentivizing land managers through payments for ecosystem services. Together with sustainable management of land-based C sinks for climate change adaptation and mitigation this will minimize the risks of recarbonization of the biosphere for ecological functions and human wellbeing.

IUSS Conference and Meetings

4-6 September 2013. *IUSS Commission 3.6 conference Utilization and protection of halophytes and salt-affected landscapes*. Kecskemét, Hungary

<http://members.iif.hu/tot3700/salinityconferencehungary2013.html>

30 September-5 October 2013. *Soils in Space and Time. IUSS Division 1 conference*. Ulm, Germany.
<https://iuss-division1.uni-hohenheim.de>

7-9 October 2013. *IUSS Digital Soil Mapping Working Group GlobalSoilMap meeting*. Orleans, France
<https://colloque.inra.fr/globalsoilmap2013>

26-28 March, 2014. *Soil Change Matters. Combined meeting of the IUSS Working Groups on Soil Change, Soil Monitoring, and Proximal Soil Sensing*. Bendigo, Australia. Further information contact: Richard.MacEwan@dpi.vic.gov.au

Abstracts

A composite pollen-based stratotype for inter-regional evaluation of climatic events in New Zealand over the past 30,000 years (NZ-INTIMATE project)

**David J.A. Barrell^a, Peter C. Almond^b, Marcus J. Vandergoes^c,
David J. Lowe^d, Rewi M. Newnham^e, and INTIMATE members**

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Abstract

Our review of paleoclimate information for New Zealand pertaining to the past 30,000 years has identified a general sequence of climatic events, spanning the onset of cold conditions marking the final phase of the Last Glaciation, through to the emergence to full interglacial conditions in the early Holocene. In order to facilitate more detailed assessments of climate variability and any leads or lags in the timing of climate changes across the region, a composite stratotype is proposed for New Zealand. The stratotype is based on terrestrial stratigraphic records and is intended to provide a standard reference for the intercomparison and evaluation of climate proxy records. We nominate a specific stratigraphic type record for each climatic event, using either natural exposure or drill core stratigraphic sections. Type records were selected on the basis of having very good numerical age control and a clear proxy record. In all cases the main proxy of the type record is subfossil pollen. The type record for the period from ca 30 to ca 18 calendar kiloyears BP (cal. ka BP) is designated in lake-bed sediments from a small morainic kettle lake (Galway tarn) in western South Island. The Galway tarn type record spans a period of full glacial conditions (Last Glacial Coldest Period, LGCP) within the Otira Glaciation, and includes three cold stadials separated by two cool interstadials. The type record for the emergence from glacial conditions following the termination of Last Glaciation (post-Termination amelioration) is in a core of lake sediments from a maar (Pukaki volcanic crater) in Auckland, northern North Island, and spans from ca 18 to 15.64 ± 0.41 cal. ka BP. The type record for the Lateglacial period is an exposure of interbedded peat and mud at montane Kaipo bog, eastern North Island. In this high-resolution type record, an initial mild period was succeeded at 13.74 ± 0.13 cal. ka BP by a cooler period, which after 12.55 ± 0.14 cal. ka BP gave way to a progressive ascent to full interglacial conditions that were achieved by 11.88 ± 0.18 cal. ka BP. Although a type section is not formally designated for the Holocene Interglacial (11.88 ± 0.18 cal. ka BP to the present day), the sedimentary record of Lake Maratoto on the Waikato lowlands, northwestern North Island, is identified as a prospective type section pending the integration and updating of existing stratigraphic and proxy datasets, and age models. The type records are interconnected by one or more dated tephra layers, the ages of which are derived from Bayesian depositional modelling and OxCal-based calibrations using the IntCal09 dataset. Along with the type sections and the Lake Maratoto record, important, well dated terrestrial reference records are provided for each climate event. Climate proxies from these reference records include pollen flora, stable isotopes from speleothems, beetle and chironomid fauna, and glacier moraines. The regional composite stratotype provides a benchmark against which to compare other records and proxies. Based on the composite stratotype, we provide an updated climate event

stratigraphic classification for the New Zealand region. The stratotype and event classification are not intended to act as definitive statements of paleoclimate history for the New Zealand region, but rather provide a firm baseline against which to compare other records including those from the marine realm.

Quaternary Science Reviews (2013) <http://dx.doi.org/10.1016/j.quascirev.2013.04.002>
(on line 30 May 2013)

Effect of amending cattle urine with dicyandiamide on soil nitrogen dynamics and leaching of urinary-nitrogen

Welten, B.G., Ledgard, S.F., Schipper, L.A., Judge, A.A.

Abstract

Oral administration of dicyandiamide (DCD) to grazing ruminants for excretion in urine represents an alternative delivery technique to conventional broadcast application of DCD to reduce urinary nitrogen (N) losses from grazed pastures. A field lysimeter trial and an allied plot mowing trial were conducted to examine the effects of intermixing DCD in cattle urine on soil and pasture N dynamics and leaching losses in a free-draining pumice soil. DCD was either intermixed with urine to achieve equivalent application rates of 10, 30 or 60 kg DCD ha⁻¹, or surface broadcasted as a spray solution (10 or 30 kg DCD ha⁻¹) onto the soil surface following urine application and compared to controls (urine and nil-controls without DCD). A single application of ¹⁵N-labelled artificial cattle urine (equivalent to 600 kg N ha⁻¹) and corresponding DCD treatments were applied in late autumn and monitored over the following 300 days. DCD altered the partitioning of the applied urine-¹⁵N by increasing plant uptake of urinary-N by 32–60% and decreasing urine-¹⁵N in leachate, which was primarily influenced by the amount of DCD applied. The method of DCD application had no significant effect on leaching of any N constituent, except for ammonium-N, which was higher in the intermixed relative to the spray DCD treatments (26 vs. 18 kg N ha⁻¹, respectively; $P < 0.05$). The total amount of nitrate-N leached was reduced from 217 kg N ha⁻¹ in the urine-control to 143, 80 and 61 kg N ha⁻¹ ($P < 0.05$) with increasing rates of DCD application of 10, 30 and 60 kg ha⁻¹, respectively. Application of DCD also significantly ($P < 0.05$) decreased the total amounts of ammonium-N and dissolved organic-N (DON) leached, but led to leaching losses of DCD-N. Rapid and large leaching losses of DCD down the soil profile led to spatial separation from the ammonium-N retained in the surface layer. Leaching of DCD (below 600 mm) at 55–69% of that applied represented an important leachable organic-N source (equivalent to 4–27 kg N ha⁻¹), and reduced the overall efficacy of DCD in decreasing total N leaching losses. The total N leaching losses from all measured N fractions were 332 kg N ha⁻¹ in the urine-control compared to 236, 157 and 154 kg N ha⁻¹ at DCD application rates of 10, 30 and 60 kg ha⁻¹, respectively. This study highlights the potential benefit from delivering DCD in cattle urine to reduce urinary-N leaching losses, with the most effective targeted single application rate being 30 kg ha⁻¹ under the experimental conditions of this study.

Agriculture, Ecosystems & Environment 167, 12–22. 2013

Effects of prolonged oral administration of dicyandiamide to dairy heifers on excretion in urine and efficacy in soil

Welten, B.G., Ledgard, S.F., Schipper, L.A., Waller, J.E., Kear, M.J., Dexter, M.M., 2013..

Abstract

Oral administration of the nitrification inhibitor dicyandiamide (DCD) to grazing ruminants for excretion in urine represents a targeted mitigation strategy to reduce nitrogen (N) losses from grazed pastures. A field trial and allied laboratory incubation study were conducted to examine the effects of oral administration of DCD to non-lactating Friesian dairy heifers on excretion of DCD in urine and efficacy in soil. Dairy heifers were orally administered DCD daily at three treatment levels (low, medium and high; 12, 24 and 36 g DCD heifer⁻¹day⁻¹, respectively) and compared to a nil-DCD control group over a 90-day continuous dosing period. There were no adverse effects of DCD administration on heifer health or growth, as inferred by live-weight gain and measured blood metabolite levels. Prolonged administration of DCD to dairy heifers resulted in the sustained excretion of DCD in the urine over 90 days and inhibition of nitrification of urinary-N in the silty peat soil for up to 56 days (incubated at 20°C; $P < 0.001$). Field soil sampling (0–75 mm depth) of individual urine patches for DCD analysis revealed that a 3-fold increase in the rate of DCD administered resulted in a similar increase in the concentration of DCD voided in the urine and subsequently deposited in urine patches (median equivalent DCD application rates of 22, 36 and 59 kg ha⁻¹ for the low, medium and high DCD treatment levels, respectively; $P < 0.001$). However, large differences (up to 40-fold) existed between individual urine patches in the rate of DCD deposited at each treatment level, which showed a positively skewed distribution. This study highlights the viability of prolonged daily administration of DCD to ruminants for sustained excretion in urine and effective inhibition of nitrification in soil as a practical targeted mitigation technology to reduce urinary-N losses from grazed pastures.

Agriculture, Ecosystems & Environment 173, 28-36.

Conferences:

Soil Rumbustification Mini-Conference 6th September Massey University AH2

Soil Rumbustification in Middle Earth
Getting the local dirt on soil –
Sharing our soil knowledge to grow ideas
Propagating ideas from sharing soil knowledge

We invite you to submit a 5 minute talk for the NZSSS Mini-Conference here at Massey University on the **6th of September** starting at 10.am. We will be hosting the event in the AgHort Lecture Theatre Block Lecture Theatre 2. We are also happy if you would like to just come and listen. Lunch will be provided. Parking is available in the Orchard Road car park at the cost of \$2.00 for the day.

If you would like to attend: please R.S.V.P L.Haarhoff@Massey.ac.nz by the 9th August.
If you would like to submit a 5 min talk, please send the title to Liza Haarhoff by 9th August.

A brief outline of the sessions:

10.00 am	MORNING TEA
10.30 am	Sustainable Soils (Mike Hedley to chair)
11.45 am	Drainage and irrigation (Dave Horne to chair)
12.15pm	LUNCH
1:00 p.m.	Gassy Soils (Kevin Tate to chair)
2.15 pm	Carbon Dynamics (Alec Mackay to chair)
3.15pm	Consulting Soils (Hamish Lowe)
3.45pm	AFTERNOON TEA AND FINISH





BIT's 3rd Annual World Congress of Agriculture-2013

Time: September 23-25, 2013, Place: Hangzhou, China

On behalf of the organizing committee of BIT's 3rd Annual World Congress of Agriculture - 2013, which will be held on September 23-25, 2013 in Hangzhou, China, we cordially welcome you to give a speech at **Track 3-6: The Significance of Soil Science in Agriculture**. WCA-2013 is always committing itself to be one of the world's leading conferences in the field of Agriculture technology. Under our theme The Key to Feeding the World a particularly rich technical program will leave you struggling to decide which concurrent session to attend.

Some Topics of the track are as the following. Please do not hesitate to contact me if you have any other ideas.

Topic1 : Application of Soil Moisture Monitoring Technology

Topic2 : The Role of the Soil in Planting System

Topic3 : Soil Fertility in Agricultural Systems

Topic4 : Soil Classification and Characterization

Topic5 : Soil Microbiology Research

Topic6 : Edaphology and Environmental Science

Topic7 : Research Tendency of Soil Science

Topic8 : Research on Soil Mineralogy

Topic9 : Sustainable Soil Management

This conference will seek the views and creative ideas on technologies for improvement and application of agriculture technology. The sessions will present the most recent advances in the fields of Plant Biology & Plant Biotechnology, New Energy Sources from Agriculture, Crop Production and Management, Pillar Industries, Food Science and Nutrition for Agriculture, and so on. Selected high qualified speakers will be from all over the world, and heads of the most important developing projects on the use of agriculture technology in many applications. These presentations will identify or offer solutions to problems, utilize case studies, identify knowledge gaps or collaboration opportunities, and discuss broader applications and implications of material presented.

For more details about the conference, please log on:

<http://www.bitconferences.com/wca2013/>

Wai-BoP Soils 2013

One-day conference: Thursday, 5th December, 2013

University of Waikato, Hamilton

As announced earlier, we propose to hold the second one-day regional conference of Waikato-Bay of Plenty-based soil scientists on **Thursday 5th December, 2013**, at the University of Waikato, Hamilton. The conference will be convened by professors David Lowe and Louis Schipper of the Department of Earth and Ocean Sciences, University of Waikato. The meeting will provide a great opportunity for the many soil scientists and others in the region with interests in land and soil to assemble for a stimulating day of talks and networking away from the commitments and rush associated with bigger conferences. We hope to conclude the conference with the N.H. Taylor Memorial Lecture for 2013.

Students will be strongly encouraged to attend and participate and to meet and talk with local geoscientists and others interested in soils. As in 2011, we plan to make the day as straightforward as possible (Fig. 1). The conference will be held on the Waikato University campus, probably starting at around 8.30-8.45 am (tbc). We will not publish abstracts nor proceedings. Our provisional plan is for oral presentations of 12 minutes in total, 10 minutes for presentation followed by 2 minutes for questions or comments, strictly enforced, so the day will move along at a fair clip. We also hope to have extended breaks for informal discussions and networking. There will be no posters. We may have to limit the number of oral presentations if we have a lot of proposals for talks.

Although the meeting will target Waikato-BOP soil scientists, we welcome attendance from those in other regions who have a professional interest in soils (e.g., from Auckland, Hawke's Bay, Taranaki), our only stipulation being that all participants must be paid-up members of the New Zealand Society of Soil Science (NZSSS). Society membership application forms are available on the website <http://nzsss.science.org.nz/join.html> (annual membership, if paid before 31 October, is only \$60 for full membership, \$35 for students). Registration for the conference is free, thanks to generous sponsorship for the event by the **Waikato Regional Council, University of Waikato**, and NZSSS.

Call for papers and notification of attendance

If you want to present an oral paper, please email David Lowe (d.lowe@waikato.ac.nz) by Tuesday 5 November 2013 at the latest with the title of your paper, the authorship, and the name of the person who will present it. The title must reflect the content. We will notify presenters if the paper has been accepted or otherwise a week or so after the deadline. So that we can plan for catering and venue size, we also need to know likely attendance by those not giving papers. Consequently, all those who are planning to attend must advise David via email by Monday 5 November, 2013. Earlier notification of your paper or attendance is welcome of course!

Please feel free to pass this notice on to people or organisations who may be interested in attending. We hope to see many of our society members and others interested in the wonderful world of soils at the Wai-BoP Soils 2013 conference on the 5th of December. Remember, "Wai-BoP Soils? Why not!"

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Louis Schipper: schipper@waikato.ac.nz

NEW ZEALAND SOCIETY OF SOIL SCIENCE

NZSSS 2014 Soils Conference

Soil Science for Future Generations

December 1-4, 2014 · Hamilton, NZ



Please submit ideas for:

·Themes· ·Fieldtrips· ·Guest Speakers· ·Sponsors·

to any of the organizing committee members: Dave Houlbrooke, Gina Lucci, Natalie Watkins, Megan Balks, Louis Schipper, Reece Hill, Hayden Jones or Sharn Hainsworth