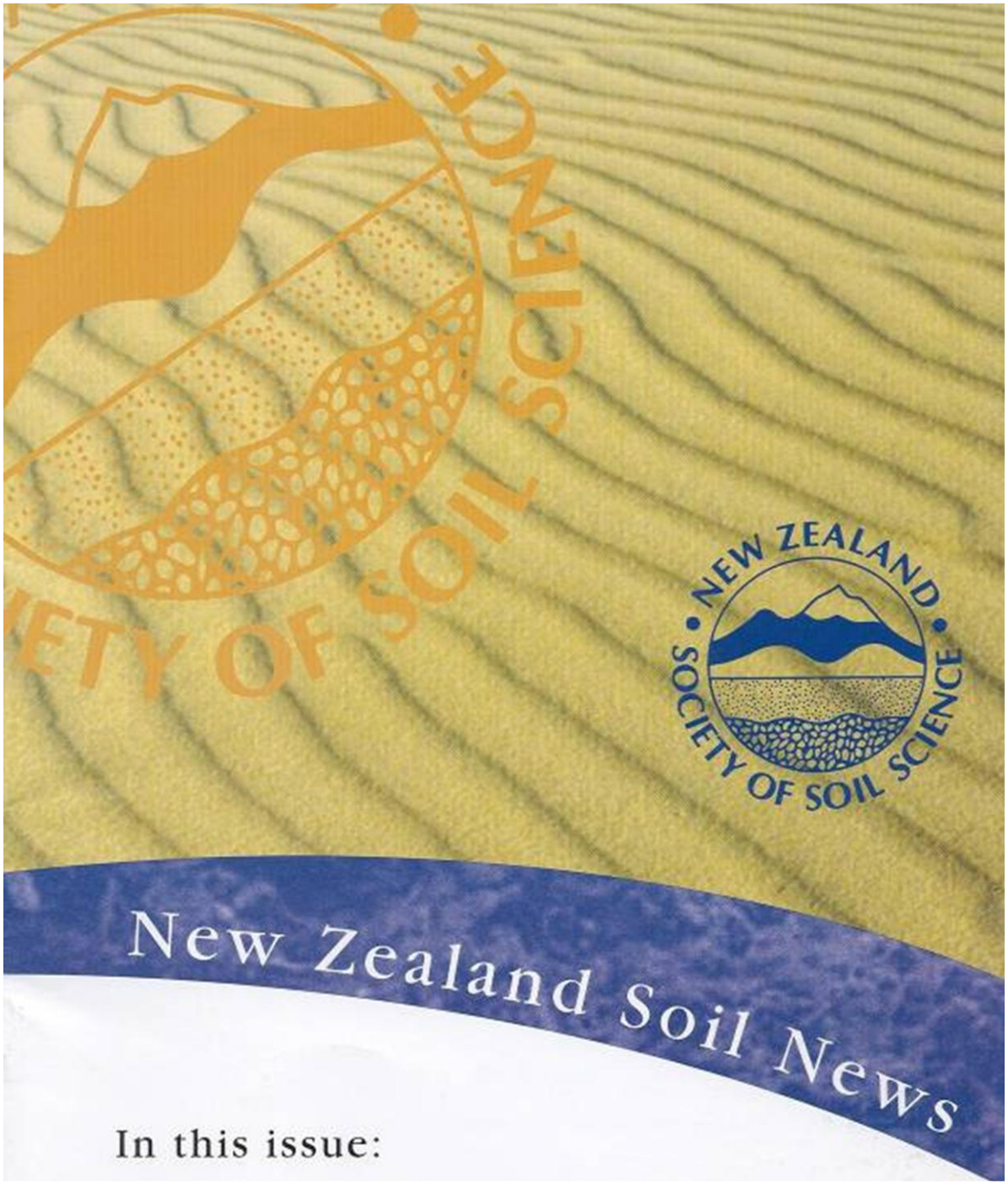

- **Editorial – Reversing the Aging Process (Bob Cathcart)**
- **NZSSS Awards – call for nominations**

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New Zealand Soil News

Newsletter of the New Zealand Society of Soil Science

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Contents

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 15th August 2014**

Visit our website:
http://nzsss.science.org.nz/

New Zealand Soil News

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New Zealand Society of Soil Science Officers 2012–2014

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Reversing the Aging Process

Bob Cathcart, formerly Land Management Specialist with the Northland Regional Council and now land and environmental management consultant with AgFirst, Northland. Bob worked as a soil conservator with the Northland Catchment Commission between 1965 and 1979. He was appointed Chief Soil Conservator to the North Canterbury Catchment Board in 1979 and returned to Northland in 1984 to be Chief Executive Officer to the Northland Catchment Commission.

Bob has held several positions within the Northland Regional Council since restructuring of local government in 1989 but in the last few years has assumed a soils specialist and mentoring role in the Land Management Team at the Council. He retired from the Council in December 2013 after 49 years in local government to join the team at AgFirst Northland.

Bob has been a member of the NZ Society of Soil Science since 1965. He graduated from Massey University with a B. Ag. Sc. and Dip. Business Studies, received a Certificate in Soil Conservation from Lincoln and the Soil Conservation and Rivers Control Council, was awarded Honorary Membership of the NZ Association of Resource Management, and is a Member of the NZ Institute of Primary Industry Management and a Registered Primary Industry Consultant.

Our understanding of soil development, particularly under a moist temperate or even sub-tropical climate, is largely to do with the processes of aging – weathering, leaching, podzolisation and laterisation; it's all downhill. How well do we understand management practices which reverse this aging process?

After almost 50 years of observing soils and their management, most of those years in Northland, I am still coming to grips with the region's 230^{+} soil types. Thanks to the persistence of Jim Pollock, Cliff Fife and Harry Jacks at Massey, I have been able to understand at least some of what I see in a roadside cutting and what is happening in a paddock.

Thanks also to detailed soil mapping of the whole region and development of a soil suite classification by Norman Taylor and Charlie Sutherland. A co-worker, Charles Wright, described the soil suite system as an ecological approach to classification, a very apt and quite logical system for Northland. Take a rock type, track the development and aging of soils under the region's warm moist climate, in a particular place on the landscape and, as the fertility levels drop, replacement of broadleaf-podocarp forest by kauri. Eventually kauri killed itself out and the almost sterile podzol it created is perpetuated by gumland heath vegetation. Yes, that process is pretty well understood.

So too is the laterisation process that formed ironstone soils on the basalt plateaux between Kerikeri and Okaihau. In contrast to the almost pure silica horizon of gumland soils, Okaihau gravelly friable clay has an accumulation of iron, aluminium and manganese nodules. Instead of being sterile like the silica pan, this layer is toxic and binds almost all nutrients at low pH. Primary production clings to the top 100mm or so.

But how well do we understand what happens when we raise the pH, supply essential nutrients, establish pasture and subject the land to intensive grazing? These mature soils, largely undeveloped until the 1950s, now support some of our most intensive dairy and bull beef production.

Between 1965 and 1970 I supervised the construction of 1500 km of graded banks or contour drains on gumland soils. Having surveyed and marked the line by digging a 20 x 20 cm spit of soil every 10 metres along the banks and then watched a road grader cut a 50 to 75 cm deep V-drain, I am very familiar with what lies beneath the surface. Wharekohe silt loam with a cemented silica pan is the end-point of podzolisation on mudstone, claystone and shale. Similar soils have formed on sandstone, dacite-rhyolite, greywacke, dolerite and andesite volcanics, alluvium, water-sorted rhyolite ash and even cemented dune sands and terraces.

A large proportion of this land had eroded down to the silica pan but under well-managed pastoral farming quickly develops a deep black topsoil. I remember a NZ Grasslands Association field day at which Ted Cox dug his spade into a paddock in which I had worked 20 years previously. Over that time it had been subjected to rotational grazing under intensive dairying and had developed 20 to 30 cm of black topsoil, and humus was working its way down cracks between the subsoil columns. Instead of a partial cover of rushes, annual grasses and sundew, this land was supporting a dense pasture sward.

Podzolised soils, while initially structureless and sterile, lack many of the vices of the less mature soils from the same parent material. Early settlers found it much easier to prepare a fine tilth seedbed than was the case on the younger, naturally more fertile but clumpy clay soils cleared of broadleaf bush. Without fertiliser however, nothing would grow on the gumland.

Gumland soils have little or no iron or clay so nutrients applied in fertiliser and cycled through animals are available to support plant growth. Successful farmers fully understand the importance of nutrient management – once pH has been raised and initial infertility has been corrected, maintenance topdressing requirements match the level of production. Losses by leaching through the structureless silica pan seem unlikely but Jenny Edwards (Massey PhD Thesis) measured significant phosphorus losses down preferential flow paths between the prismatic/columnar cracks in the silica pan. Whether phosphorus leaches any further than the clay-rich horizon below the silica pan is another matter but it is still lost from the topsoil. 'Little and often' is good practice topdressing.

Lack of structure and poor internal drainage make gumland soils very susceptible to pugging. The region's naturally wet winters result in sediment runoff, taking with it phosphorus, so carefully managed grazing rotations are essential. Stand-off areas are important. 'Sacrifice paddocks' are not an option and those who try will be rewarded with the purple hue of penny royal for the next few summers. The soil surface seals over, creating an anaerobic and very acid environment beneath. Cultivation or scarifying is then required to aerate the soil before regrassing, exposing the now structureless soil to sheet erosion.

OK, we know what is good and bad practice and we have anecdotal information on improvements in soil organic matter levels, soil structure, nutrient status and productivity. How about a good practice model incorporating all of these and monitoring of a few key indicators of 'improvement'?

Such a tool may be based on or extend Visual Soil Assessment. It would go beyond and complement the purely nutrient management parameters of OVERSEER and would provide farmers and resource managers with a very useful tool for monitoring what are, I believe, mainly positive effects of pastoral farming on previously marginal land.

I am a fan of triple-bottom-line accounting but we need the tools to produce robust data to sit alongside physical and financial production data. The primary effect is in the paddock, not in-stream water quality, and I challenge members of the NZ Soil Science Society to provide us with that tool. Perhaps the medical profession and health authorities can provide the third leg of the trifecta by using statistics on stress-related diseases to measure the social impact of farming?

Bob Cathcart

The Dirt

A collection of soil-related oddities from Godzone and around the world

Space… the final frontier

Growing anything in microgravity has its challenges: keeping the soil and water in contact with plant roots, which way is "up" and food safety are just a few. Orbital Technologies Corporation (ORBITEC) in Madison, Wis., developed "Veggie" a new low-cost, expandable plant growth chamber used in-orbit on the international space station. Veggie uses a flat-panel light bank that includes red, blue and green LEDs for plant growth and crew observation, and expands up to a foot and a half as plants grow inside it. Red romaine lettuce seedlings are placed in special root-mat pillows filled with "space dirt"; not sure what that is but it sounds like the coolest dirt around.
http://www.nasa.gov/mission_pages/station/research/news/veggie/

Dig it!

If you happen to be in Sacramento Ca. anytime from now until April 2015 you should stop by The California Museum for the Dig It! exhibit. This American-sized 4,000-square foot exhibition was developed by the Smithsonian's National Museum of Natural History with support from SSSA. "Dig It! The Secrets of Soil" includes interactive displays, hands-on models, videos, and 54 soil monoliths representing soils from each U.S. state, territory, and the District of Columbia. Anyone else thinking that a New Zealand-version would be a welcome addition to Te Papa?
https://www.soils.org/discover-soils/dig-it

Waikato/Bay of Plenty

Landcare Research

Malcolm McLeod recently presented some of his work at a Farm Open Day (Figure 1) in association with Mike and Sharon Barton (of Tihoi), who recently won the Regional Ballance Farm Environment Award. The Open Day was a great success: nearly 200 people (Figure 2) attended to hear how the Bartons farm within the nitrogen cap the farm is under as a result of Council-imposed restrictions in the Taupō catchment. Malcolm has been studying nitrogen leaching under pasture and lucerne in a large lysimeter facility that has been established on the Barton's property for the last 4 years.

Photo 1: Malcolm presenting data from his large scale lysimeter trail

Photo 2: Attendees of the Farm Open Day.

Mike and Sharon's beef operation supplies cold, boned, aged beef to the top-end market on a year round basis; and the beef is also available from M21 Meats (Taupo). The crowd heard from the Michelin-starred Michel Louws (Executive Chef at Huka Lodge, and as seen on Master Chef) about the consistency and quality of the beef and were lucky enough to sample some sirloin prepared by Michel.

At the Open Day, Mike Barton suggested any future research should focus on finding ways to increase production within the environmental limits set by the Council. Any science involved with production or productivity increases needed to be modelled through Overseer and would also need to be relative to nitrogen leaching. Mike and Malcolm will continue to work together at the large lysimeter facility. To hear more of Mike's views on modern, sustainable farming, catch his talk at the New Zealand Society of Soil Science conference that will be held in Hamilton in December this year.

David Palmer and **Sharn Hainsworth** have been working with Mike Martindale, Auckland Council, and James Linehan, a student from the University of Waikato, investigating new methods of soil mapping at high resolutions. The results include detailed maps for use with Overseer and the Pond Storage calculator for farm dairy effluent.

Scott Fraser and his team have continued their work on S-map with approximately 120 000 ha in the southwest of the Waipa catchment surveyed over the last 6 months. In addition, detailed soil landscape models have been developed in the survey area as part of the "Waikato soil windows" project. These will be used both to help inform non-pedologists of the soil patterns in this part of the Waipa at the farm scale, and to help develop digital soil mapping in the south east of the Waikato Region. For further information contact Scott or visit our website at http://smap.landcareresearch.co.nz.

Suzanne Lambie is working with the Waikato River Authority and Waterways, Wetland and Environmental Development to restore a large wetland near Taupiri (Figure 3). The project will involve not only planting of the riparian and wetland zones but also the installation of a floating wetland system. The goals of the project are to reduce the nutrient and sediment load into the Mangawara Stream and to enhance the local biodiversity. Suzanne will also be assessing how soil properties change after the restoration.

Figure 3: Site of wetland restoration project

AgResearch Ruakura

An SFF field day was held on the Parekarangi Trust farm near Rotorua with about 60 farmers attending. **Stewart Ledgard** gave a presentation on results from research on-farm on the effects of withholding N fertilizer use on pasture production and species composition and on the reduction in N leaching measured in an on-farm system trial with replicated grazed paddocks receiving regular or no N fertilizer (>50% decrease). He also gave an overview talk on drivers of P losses from the farm together with farmer talks on what they have done using bunding in sloping paddocks to reduce sediment and P losses on their farms.

Mark Shepherd, **Dave Houlbrooke** and **Bill Carlson** have been on their hands and knees looking at pumice soils near Mangakino as part of a project looking to assess the influence of pastoral development time on soil structure, soil depth as well as C and N status. The first scoping study involves an assessment of 20 different pits representing a range of topography and likely development age.

Overseer nutrient budgets model was part of the **AgResearch** stands theme at this year's Mystery Creek field days. **Diana Selbie**, **Natalie Watkins**, **Bob Longhurst**, **Geoff Mercer**, **Paula Philips** and **Dave Houlbrooke** were in attendance to discuss nutrient budgeting with farmers, agricultural industry stakeholders and the general public. The longstanding mystery creek event proved again to be a successful event.

And finally, the whole NMEF team participated in a field trip to look at some of the experiments happening around the Ruakura farm and beyond. **Diana Selbie** and **Sheree Balvert** presented some preliminary results from their nitrogen mineralisation and immobilisation lysimeter trial. **Bill Carlson** talked about nitrous oxide emissions from a forage rape crop (pictured above), and **Justin Wyatt** explained the finer points of 'urine spotting'. This curious pastime will be a thing of the past once urine sensors (in development) have been perfected. The end of the day was spent admiring the picture-perfect sheep and beef farm of **Bill** and **Sue Garland**, outside of Cambridge *(Pictured left).*

Manawatu/Hawke's Bay

Landcare Research, Palmerston North

In March-April, **Surinder Saggar** invited by the Japanese Society for Promotion of Science (JSPS) as JSPS Fellow met key Japanese scientists working on the impacts of land-use and land-management change on agricultural greenhouse gas emissions, soil carbon storage, and sustainable production systems, participated in and contributed to discussions on agricultural greenhouse gas (GHG) emissions and mitigation from Japanese allophanic soils under rice paddy and forestry with different land management regimes and inorganic and organic inputs.

Researchers at National Institute for Agro-Environment Sciences, Tskuba, Japan

During this visit Surinder gave a plenary address at the "Interdisciplinary approaches to climate change in agriculture" symposium of the 237th Conference of the Crop Science of Japan. He also presented a series of seminars at Agriculture Faculty of Tokyo University, Chiba University, Yamagata University and National Institute for Agro-Environment Science Tskuba.

Then he spent a week at the Faculty of Agriculture Science, Yamagata University in Tsuruoka where he was closely involved with post graduate students in discussing the planning of laboratory and field experiments, developing protocols to measure and estimate GHG emissions and the results from these experiments, lecturing students and giving research presentations to the faculty and students and participating in scientific meetings with students and scientific staff at the University and assisting in manuscript review.

The presentations and discussions with the researchers were very productive. Most of the discussions centred around common research interests in GHG emissions particularly methane and nitrous oxide, differences between rice paddy vs, grazed pasture systems, sustainable production systems, global warming and political willingness to address this issue. There was a particular interest on enhancing the reduction of nitrous oxide during denitrification. Major interest was in the DNDC model, uncertainties and some concerns about this model's inability to adequately model nitrous oxide emissions under certain conditions. The discussion progressed with 2-3 scientists keen to spend their sabbatical with Landcare Research and develop future collaboration.

Other news - **Pranoy Pal** and **Pierre Roudier** are in South Korea at present attending the World Soil Congress in Korea. We welcome **Khadija Malik** who will be undertaking a PhD with Surinder Saggar on the topic of "Quantification of greenhouse gas emissions from off-paddock dairy barn excreta collected, stored and applied to land".

Benny Theng has recently published the 2nd Edition of his book originally published 35 years ago: "Formation and Properties of Clay-Polymer Complexes, 2nd editon" by Elsevier. The book has been very well received and a recent review by George Christidis, the chief editor of the journal Clay Minerals, explains: "The first edition covered missing gaps of the clay-organic interactions, but since then a large volume of new data has been produced due to modern analytical, computational and spectroscopic techniques. These data have shed light on the mechanisms of the interactions between clays and organic molecules which previously were studied in a rather empirical way. Hence, the clay-organic interaction is not a ''young'' science as it was 35 years ago, but has developed into a topic with ample ramifications in soil science, environmental protection and the chemical industry. The remarkable research progress in the field of nanocomposites over the past 25 years is a good example, suggesting that the second edition was necessary and is indeed welcomed."

Massey University, Palmerston North

Mr Aldrin Rivas was recently presented with his Ravensdown Agricultural Research Award from the Vice Chancellor, Steve Maharey. The scholarship was established in 2011 with funds that accumulated from rebates on Ravensdown fertilisers bought by Massey University's farms and is supplemented each year by a grant from Ravensdown Ltd. Aldrin Rivas was also the recipient of the D G Bowler Scholarship in Soil Science, established as a memorial to Dermot G. Bowler who was a member of Massey Agricultural College (later Massey University) staff from 1946 to 1982. Supervised by Ranvir Singh, Dave Horne (Massey University) and Jon Roygard (Horizons Regional Council) Aldrin Rivas is undertaking a PhD with the research project titled 'Characterisation of Denitrification in the Subsurface Environment of the Manawatu Catchment, New Zealand'.

Mr Aldrin Rivas receives his scholarship awards from the Vice Chancellor, Steve Maharey.

We welcome a new PhD student, Khadija Malik from Pakistan who will be working under the supervision of Professors Surinder Saggar and Mike Hedley on a project entitled 'Quantification of greenhouse gas emissions from off-paddock dairy barn excreta collected, stored and applied to land'.

Several postgraduate students of the Soil & Earth Sciences had their degrees conferred at the graduation ceremonies in Palmerston North in May 2014.

Jamal (Jay) Howes - BAgriSci (Hons).

Jay Howes

Jay's honours dissertation was based on the development of a calculator to help dairy farmers explore issues associated with investing in irrigation. Farmers considering the adoption of irrigation can use the calculator to predict the likely profitability of irrigation. The main conclusions drawn from the use of the calculator on three case study farms was; the likely profitability of an investment in irrigation is not easy to identify (and may be unexpected); the amount of extra grass grown under irrigation is an obvious consideration in an irrigation investment analysis but arguably how this grass is utilized is just as important; as there is a large 'production cost' associated with increasing the stocking rate on irrigated dairy farms and this can affect the financial feasibility of irrigation; in the Manawatu region, irrigation is likely to be more profitable on dairy farms that can grow more than 2 t/ha-1 additional dry matter and harvest this with current cow numbers. Jay is now employed as a Junior Research Officer with the Fertilizer & Lime Research Centre at Massey as he embarks on his PhD.

Christine Christensen - PhD, Soil Science
Chief Supervisor: Mike Hedley
"Duration-controlled grazing of dairy cows: Impacts on pasture production and losses of nutrients and faecal microbes to water"

Dr Christine Christensen

As a global exporter of quality milk products, the New Zealand dairy industry requires proven mitigation strategies to reduce nutrient and faecal microbe losses to waterways. Urine and dung patches from cows (deposited in the paddock during grazing) are the primary cause of these losses, through drainage and surface runoff. Dr Christensen implemented Duration-controlled (DC) grazing (grazing for 4 hours at a time), and returned collected effluent to the paddock uniformly. Nitrogen leaching losses were reduced by an average of 52%, with more modest reductions for phosphorus and faecal microbes in surface runoff. Pasture production and cow intakes could be maintained with the correct timing of effluent return. Dr Christensen's results mean that DC grazing is now a practicable and recognised management strategy for New Zealand farmers to reduce nitrogen leaching losses.

Samuel Gregory - PhD, Soil Science
Chief Supervisor: Chris Anderson
"Remediation of New Zealand sheep dip sites using biochar and phytoextraction technologies"

Dr Sam Gregory

Historic sheep dip sites are synonymous with significantly high soil concentrations of arsenic and organochlorines. There are an estimated 50,000 contaminated sheep dip sites in New Zealand, representing what may be the country's most significant, but understated, environmental challenge. Mr Gregory investigated whether water and food sources in proximity to these sites were being contaminated. His investigation uncovered that water sources and aquatic plants (such as watercress) were highly contaminated with arsenic. His research also focussed on whether this contamination could be remediated in a sustainable manner. By using a technique that couples biochar (a form of stable carbon similar to charcoal) with phytoextraction (a plant's ability to extract contaminants from soil), Mr Gregory was able to show that this natural technology system can reduce the remediation time of these contaminated sites by up to 92%.

Saleem Bhatti - PhD, Soil Science
Chief Supervisor: Chris Anderson
"Arsenic irrigated vegetables: Risk assessment for South Asian horticulture"

Throughout South Asia, people are at risk of arsenic poisoning due to the presence of arsenic in drinking and irrigation water. Mr. Bhatti investigated the scenario where carrot, radish, spinach and tomato were irrigated with arsenic contaminated water. This is a common practice in the agricultural areas of South Asian countries, particularly Karachi, Pakistan. The highest levels of arsenic were found in spinach where flood irrigation was practiced, and where cattle manure was added to soil as an amendment. Using a USEPA risk assessment model, the risk to human health was defined as unacceptable with ingestion of As-enriched spinach leaves where the concentration of arsenic in irrigation water was greater than 50 µg L^{-1}. Mr. Bhatti's findings can be used to inform and strengthen regulations that protect human health in locations where arsenic contaminated water is used to irrigate vegetable crops.

Dr Saleem Bhatti with Chris Anderson

Michael Bretherton - PhD, Soil Science
Chief Supervisor: David Horne
"An investigation into repellency-induced runoff and its consequences in a New Zealand hill country pasture system"

Dr Mike Bretherton

The objective of the thesis was to examine repellency-induced runoff and to study its consequences in New Zealand hill country pasture systems, with a particular focus on the East Coast of the North Island as represented by the research area at Alfredton and a catchment near Waipawa. Detailed meteorological data, surface runoff measurements from small plots and soil moisture values gathered over two years at the Alfredton catchment were used to determine the effect of soil water repellency on the infiltration rate of the soil and surface runoff, and to assess its importance as a hydrological process in that catchment. A soil water balance model, which incorporates the observed throttling effect of repellency in the top 50 mm of soil, was developed to help assess when this phenomenon was most likely to occur. In summary, repellency-induced runoff does not appear to play a major role in the soil water balance of the study catchment at Alfredton. Furthermore, repellency-induced runoff does not seem to have a marked impact on stream flow under the drier Waipawa climate.

Staff of the Fertilizer & Lime Research Centre at graduation in May 2014
From left: James Hanly, Mike Bretherton, Jay Howes, Christine Christensen, Dave Horne and Mike Hedley

In the week before Easter, Emeritus Professor **Vince Neall** travelled up to Japan to participate in a Workshop organized by the Japanese Soil Survey Inventory Forum. It was entitled "Institutional Design for Sustainable Conservation of Soil Resources - Challenge for a New Human-Soils Relationship – Toward International Year of Soils 2015-". The key organizers

were Dr Toshiaki Ohkura from the National Institute for Agro-Environmental Sciences (NIEAS) and Dr. Tomoyoshi Murata from the National Institute of Environmental Studies (NIES). Key attendees included a former Prime Minister, and a Congressman who seemed keen to enact legislation that will protect Japan's valuable soil resources into the future. Presentations included the history of soil survey in Japan, what Japan might do for the International Year of Soils, new lifestyles by urban greening technologies, and appreciating the value of land and soils from the viewpoint of landschaft ethics in Germany. Mr Ronald Vargas, from FAO in Rome, attended and made a presentation about the new FAO Global Soil Partnership. He explained a draft implementation plan of outreach and awareness which seems to have political traction at the highest levels of international diplomacy. Vince was asked to talk about conserving soils in New Zealand, which enabled him to cover everything from the Resource Management Act to Horizons Regional Council's One Plan and his personal experiences of regaining recognition of limiting urban growth on soils of high value for food production around Palmerston North.

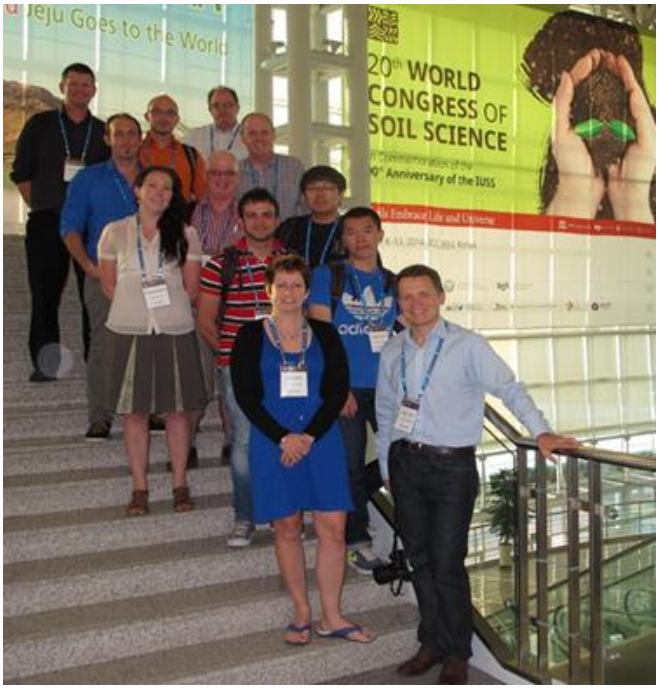
As part of his visit Vince also gave his talk to the soils community at the National Institute of Agro-Environmental Sciences in Tsukuba. A visit was also made to the NARO Institute of Vegetable and Tea Science's Kanaya Research Station near Shizuoka. Vince has had a long standing interest in camellias and chairs the Camellia Memorial Trust Inc. here in New Zealand that funds research into the genus. So it was of great interest to learn of the history of tea cultivation in Japan, the harvesting and processing techniques, and Camellia problems in Japan. A fascinating discovery has been a variety of green tea named "Benifuuki" which is claimed to relieve the symptons of allergic rhinitis or hay fever. Some packets of this tea purchased from the local railway station complex will provide the basis for some New Zealand trials this spring!

Vince Neall at Tokyo Metropolitan University

On the last day Vince visited Professor Makiko Watanabe and Professor Takashi Kosaki at the Tokyo Metropolitan University. Makiko san is a specialist in fungal sclerotia in soils with its many facets from radiocarbon dating to stability of organic matter. Takashi san is President of the Japanese Society of Pedology, and Chair of Division 3 of the IUSS. Vince presented a lecture on "Why Study Volcanic Ash?" to the soil science postgraduate school in the University's Graduate School of Urban Environmental Studies, which is part of the Department of Geography. Not having been to Japan before, Vince found his visit enlightening and is highly appreciative of the hospitality extended by many new friends.

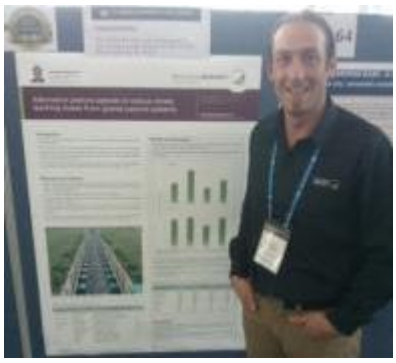
Canterbury

Lincoln University



Twelve staff and students from Lincoln University attended the 20th World Congress of Soil Science Conference in Jeju, Korea. Lincoln University was over represented in the poster prizes with Hannah Franklin (best poster, session 3), Dr Brendon Malcom (best poster, session 4) and Dr Pranoy Pal (best poster, session 1). These posters selected from a pool of >2800 abstracts.

Prof. Leo Condron co-authored an oral presentation with Ben Turner in the session "The Lifetime contributions of Prof. Keith Syers to international Science- A Memorial symposium". Other oral presentations were given by Carol Smith, Brett Robinson, Hong Di, Nik Lehto and Roger McLenaghen.



Dr Brendon Malcolm's poster, co-authored with Keith Cameron, Jim Moir and Hong Di, won the 'Best Poster' Award (session 4). The poster was based on his PhD studies at Lincoln University.

Hannah Franklin's winning poster (session 3). Hannah is in the final stages of her PhD supervised by Nicholas Dickinson (Department of Ecology) and Brett Robinson (Department of Soil and Physical Sciences) at Lincoln University. Hannah's poster was entitled "The potential of New Zealand native plants to mitigate nitrogen transport from agricultural land".

The Department of Soil and Physical Sciences would like to welcome Dr Jupei Shen, who is visiting from Department of Soil Environmental Sciences, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing. Saloomeh Seyedalikhani is starting her PhD research with Brett Robinson, Nick Dickinson, Juergen Esperschuetz, and Rainer Hofmann on the use of biosolids to enhance the production of essential oil crops on degraded soil.

Otago/Southland

AgResearch Invermay

There's no doubt winter has arrived in Otago. We have already had a day of road closures and wild weather and its only just June. Many of our activities focused on winter cow grazing have commenced.

Ross Monaghan has been busy recently updating cost-benefit metrics for farm mitigation practices that can reduce contaminant losses to water. These metrics will eventually be incorporated into nutrient modelling tools such as the Mitigator model and BMPToolbox.

Tony van der Weerden and a team of wonderful research associates have laid down a new field trial in the hill country near Invermay, where they will be determining N2O emission factors for sheep and beef urine and dung deposited onto medium and steep sloping land. This is a testing environment, as the steep slope has created a few 'challenges', but at least the dung didn't roll down the hill following application.

"Otago Steep hill country site – the trick here is not to lose gear, nor personnel, off the edge"

Seth Laurenson and **Jen Robson** have been GPS tracking sheep around our Waiora farm to find out how much time they spend near to waterways. Jen has been collecting and weighing poo as a means of determining the *E.coli* loading to land.

Marlborough

A recently snapped picture by Nicky Eade from the Marlborough District CouncilI of Iain Campbell during soil sampling in the Tuamarina Valley near Blenheim. Iain, in his 80th year and still going strong, is into the third year of a soil mapping project on the Waimea Plains for the Tasman District Council.

Soils as Art: Call for expressions of interest from the soil science community

Art is potential a means of engaging an audience with the importance, variety, and beauty of soils, that may not be much interested in soil science. We are planning to hold an exhibition of soil-related art works, *created by YOU the soil science community*, in conjunction with the NZ Society of Soil Science conference in Hamilton in December 2014. We want to share our love of soils and show the wider world that scientists are multi-talented people who are about a lot more than white coats and "incomprehensible" conversations. To make this a success we need you to contribute.

We are interpreting art-works in the widest possible sense. The artwork may be any media and any size (within reason). Media may include photography, drawing, painting, printmaking, sculpture, textiles or artwork made from soil itself. The artwork should relate to, or feature, soil in some way. You may have a great photo or two, paintings that feature or have some connection with the soil/earth, sculptures made from clay or other soil materials…, soil peels, poems, posters – we are open to your suggestions.

The exhibition will be on display-panels and tables in the NZSSS conference venue for the duration of the Conference from 1st-5th December 2014.

If you are interested in further information or have some art/sculpture work that you would like to exhibit please can you email either Megan Balks (m.balks@waikato.ac.nz) or Peter Singleton (peter.singleton@waikatoregion.govt.nz) so we can plan in more detail. We will be looking for final confirmation of contributions in October. So get your thinking caps on and your pencils sharpened – the more contributions we have the better it will be!

Minutes of the NZSSS Council
held by teleconference at 9:00 a.m. Monday 14th May 2014.

Apologies: Hamish Lowe, Roger McLenaghan, Mike Hedley.

Present: Tim Clough, Trish Fraser, Tony van der Weerden, Reece Hill, Dave Houlbrooke, Iris Vogeler, Allan Hewitt, Isabelle Vanderkolk, Megan Balks.

Secretariat:
Matters arising: - no matters arising from previous minutes. These were taken to be a true and accurate record, moved Trish/seconded Tim, (secretary will send out a copy of previous minutes with next agenda).

Items for General Business: - No items received.

Agenda was approved: moved Trish/ seconded Tim.

Special General Meeting
This will be held as soon as possible for the purpose of approving the accounts. These need to be approved by a minimum of 15 NZSSS members prior to them being lodged with the Companies Office of Incorporated Societies.

Conferences
NZSSS Hamilton conference:
http://www.nzssconference.co.nz/
'Soil Science for future generations', Hamilton New Zealand. December 1-4, 2014
Organising committee report everything is on track, sponsorship running at about $40,000. Thus small profit should be made. Social events calendar is being organised. Conference has organised to accommodate 180-220 persons.
Abstracts deadline is 1st September 2014.

Joint NZSSS-ASSS Conference
Tony reported that this will be two years after NZ conference.
There is a move in Australia to host a Nitrogen workshop in December in 2016. Thus this caused some action for dates (28th Nov to 1st December (Mon – Thurs last week November)) to be set here in New Zealand for the joint conference. It is suggested that the conference company that should be used is ONCUE as they have been performing well in organising the upcoming 2014 event in Hamilton. Organising committee needs to be finalised (what roles, names for these?, scientific committee? Etc.) Besides local scientists there will also be a need to involve local industry members to assist if they are interested. Venue would be Queenstown. Post conference analyses have previously been performed so need to look at these to learn from any comments made.

Treasury
Tony reported on the NZSSS accounts. Currently Profit and Loss YTD (for 1 July 2013 to 30 April 2014) shows total income is $19,604, with operating expenses at $26,485, resulting in a net profit to date of -$6,836. For the month of April there were fewer new members so some decline in income there. No major concerns or issues with accounts.

Membership
The following members are deceased or have resigned and it was voted on and passed (moved Tim/ seconded Allan) that they should be removed from the membership list:
Margaret DiMenna –deceased
Kuan Goh – deceased
Ian Metson - resigned

Removals of members for non-payment of subscriptions
There are $5865 of outstanding subscriptions in arrears.
It was agreed that the following members, who have two years or more of outstanding subscriptions, should have their names removed from the membership list (Moved Trish/seconded David):

	Gordon Rajendram	Gregory M Snook
Peter R McIntyre	Stacey O'Driscoll	Goerg Kruger
Rebeca Bylsma	Peter West	Felix S Gitai
Wayne Anderson	Olivia J Motion	Erwin I Wisnubroto
Richard Lardner	Nabil Z G Soliman	Dew B Krisnayanti
Malcom Stapleton	Krishna B Karki	Amandeep S Ghatora
Lynette A Ellis	Janice Asing	
Laurie Greenfield	Harmanjit S Haer	

Efforts will continue to be made to actively contact those remaining on the list to either have subscriptions paid or resignations made.

Soil News
There has been request for placing companies advertising material in Soil News. While this is a potential income generator if it was charged for it also raises a lot of difficult issues such as ensuring the integrity of the products being advertised, and the need to monitor and rule on such issues. At this stage it is easier not to take advertising.

Hard copies are ceasing to general membership with only 15 members left on hard copy 'list'.

NZSSS World Wide Web Page
Allan asked about progress on getting the chapters from the Molloy book up on the web. Is it technical issues or time preventing this happening? Rees will look at a site that uploads pdfs that could be linked through to NZSSS site.
Hamilton conference convenors to send Iris any updated conference related information.

Soils in the NZ landscape.
Allan and Megan were contacted by Springer to do an updated 'Soils in the New Zealand Landscape' book. Completion is June 2017. Working title is "Soils of New Zealand".

Awards
Dave has been talking to Bert Quin to sponsor an award (replace Altum Award). It's a 'yes' from both parties and the value is under consideration (currently $4,000).

Rees received information regarding Grange medal nomination and will get information for next soils news. This is a biennial award. Nominations due 31st July. Need judges for awards. Hamish has done this in the past.

Names and cheques and certificates need to be sorted for 2013 undergraduate awards at Massey and Lincoln.

NZSSS nominations are required for Life Membership (service to NZSSS)/Fellowships (science) and need to be considered.

Similarly any nominations for Royal Society Fellowships need to be made.

Promoting soil science
Megan provided an update on poster progress. The latest version made after feedback considered, 'less is more'. Megan has sent around an updated version for further feedback, and which is the penultimate version. NZSSS website link will be added. Should be finalised July/August. Any 'better' photos will also be considered.

World Soils Congress has several 'soil art' sessions.

World Soils Day (5th December). NZSSS need to organise media coverage of a soil's message/events to promote soil science and its importance in NZ.

Royal Society is hosting 31st General Assembly- International Council for Science in Auckland. David Lowe has offered to either take them on a boat trip to Motutapu Island or Devonport (Climb Mt Victoria).

Science Fairs
All on track.

General Business
No general business was raised.

Next Meeting
Next NZSSS teleconference meeting will be August 7th Thursday 9:30 to 12 noon.

NZSSS

Bert Quin Award announced

Fertiliser innovator Dr Bert Quin has again shown his support for soil science by establishing a new award. The Bert Quin Award grants a selected post-graduate student with $5,000 to further his or her studies. This new award, replaces the Altum Award, previously known as the Summit-Quinphos Postgraduate Bursary and prior to that the Quinphos Postgraduate Bursary. After nine years, support for the Altum Award came to an end this year. The NZSSS Council is grateful to those that have contributed to the award over the years and thrilled to see that support for budding soil scientists will continue thanks to Dr Quin's generosity. Conditions of the new award remain unchanged and applications are invited in [month] each year. See the NZSSS website for more information.

On behalf of the NZSSS I thank Bert for his generous support of the Society and doctoral students in New Zealand soil science.

New Zealand Soil Science Society Awards 2014

Award	Presented	Dead line	Eligibility	Conditions
Bert Quin Award 	Annual	31 July 2014	Advanced level in PhD study (not yet completed)	Head of the Soil and Earth Science Groups from Massey, Lincoln, Waikato and Victoria Universities can nominate one student who is an active member of NZSSS.
The Grange Medal	Bi-ennial (conference year)	31 July 2014	Open to non-members, members, fellows, or life members of NZSSS	Any active member of NZSSS can nominate non-members, members, fellows, or life members of NZSSS
Morice Fieldes Memorial Award	Annual	31 July 2014	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 can nominate one thesis from their group.
Sir Theodore Rigg Award	Annual	31 July 2014	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 can nominate one thesis from their group.
Undergraduate award	Annual	21 Nov 2014	Best 3rd 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.
Leamy award	Bi-ennial (conference year)	31 July 2014	Author(s) of most meritorious publications in the last three years	Any active member of NZSSS can nominate active members from Universities, CRIs and other organizations (e.g. Regional Councils).
Blakemore award	Bi-ennial (conference year)	31 July 2014	Technician/ support staff	Head of the Soil and Earth Science Groups from Massey, Lincoln, Waikato and Victoria Universities, CRIs and other organisations (e.g. Regional Councils) can nominate one active member from their group.

Bert Quin Award

1. The award recognizes 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 Bert Quin Award and shall carry a stipend of $5000 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 by the **31st of July**. 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 Award shall be presented or announced at a General Meeting of the Society.

The Grange Medal

The L.I. Grange Medal for Outstanding Service to New Zealand Soil Science
(short title: The Grange Medal)

Description

The Grange Medal is for outstanding service to New Zealand soil science. It commemorates Dr Leslie I. Grange's extraordinary leadership and service to New Zealand soil science through his pioneering pedology, his far-sighted and constructive administration, and for his pivotal role in helping establish the discipline in New Zealand*. The Grange Medal is normally made every two years to one or two individuals who have made an extraordinary contribution to the promotion or advocacy of soil science (in its broadest sense) including for the following reasons:

- through outstanding use of the media
- through outstanding administration or management
- through outstanding publications including outreach/extension and other ('non-academic') material (e.g. development of a DVD or CDR)
- through outstanding advocacy of soil conservation or sustainable land-use practises
- through outstanding mentoring

Nominations are open to both non-members of the Society as well as members, fellows, or life members of NZSSS.

Nominations

Nominations every two years are made by two or more active members of the Society in the form of a statement up to 2 pages in length that summarises the extraordinary contribution the nominees have made to the promotion of soil science in New Zealand. Nominations are due by 31 July in the year of the award. The awards are decided by the president, vice-president, and immediate past president on advice from Council. The medal is normally awarded at the Society's biennial conference or at the four-yearly Australia-New Zealand joint soils conference. In special circumstances and at the discretion of the Council the medal may be awarded more frequently.

*A summary of Grange's career is given in *New Zealand Soil News* 55, p.177-180 (2007)

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.

M. L. Leamy Award

This award commemorates the outstanding ability and contributions to New Zealand Soil Science of Mike Leamy, and is made to the author or authors of the most meritorious New Zealand contribution to soil science, published in the last three years. A single paper, a series of papers on a theme, a scientific paper, a map or a lecture series may qualify a person for the award. The results of joint authorship will be considered where the candidate is senior author and has other eligible publications.

Nominations must be received in writing accompanied by a statement of not more than two pages listing the candidate's achievements and publication(s) etc that are to be considered for the award. Nominations must carry signatures. No self-nominations will be accepted. The candidate and both Nominators must by fully paid members of NZSSS.

L. C. Blakemore Award

This award honours the outstanding ability and contributions to New Zealand Soil Science of Les Blakemore and is awarded to the outstanding New Zealand Soil Science Technician or support staff member of the past two years. Eligibility is open to all aspects of technical and support work that assist soil science, for example analyses, field trials, cartography, computing, data storage and manipulation, archiving etc. Candidates shall have been employed in the field of soil science for at least three years, have shown marked ability in their field of employment and have made a notable contribution to the work of their institution, field team etc.

Nominations must be received in writing accompanied by a statement of not more than two pages detailing the candidate's achievements and worthiness for the award. Nominations must carry signatures. No self-nominations will be accepted. The candidate and both Nominators must by fully paid up members of NZSSS.

Nominations should be sent to:

Dr Reece Hill
Soil Scientist,
Waikato Regional Council
Private Bag 3038
Waikato Mail Centre
Hamilton 3240, NZ

Ph:+64 7 859 0709
Mob: +64 22 191 3695

Fellowship of the New Zealand Society of Soil Science

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. **Nominations close on 31 July each year.**

FELLOWSHIP RULES

Rule 1. Nominees must be active members of the Society at the time of nomination.

Rule 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.

Rule 3. Nominations for the Fellowship must be submitted to the NZSSS Secretary by 31 July each year, and should be accompanied by the following documents:

* Fellowship Nomination Form (available from http://nzsss.science.org.nz/awards.html);
* 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.

Rule 4. 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.

Rule 5. 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.

Rule 6. Fellowships will be announced at an Annual General Meeting of the Society.

Rule 7. Nominations will remain valid for 2 years.

Rule 8. Fellows will be permitted to use the letters FNZSSS after their name and will receive a certificate.

IUSS

IUSS Working Groups

The scientific activities of the IUSS are organized through the Divisions and Commissions and Working Groups. We have recently updated the list of IUSS working groups (see also the IUSS website), and the groups and their chair are listed below. If you are interested to join any of these Working Groups please contact the chair.

Acid Sulphate Soils - Chair Peter Österholm posterho@abo.fi
Cryosols - Chair Dimitry Konyushkov dkonyushkov@yandex.ru
Digital Soil Mapping - www.digitalsoilmapping.org - Chair Mogens Greve mogensh.greve@agrsci.dk
Digital Soil Morphometrics - www.digitalsoilmorphometrics.org - Chair Alfred Hartemink hartemink@wisc.edu
Forest soils - Chair Zhihong Xu zhihong.xu@griffith.edu.au
Global Soil Change - Chair Dan Richter drichter@duke.edu
Heritage Soils - Chair David Dent dentsinengland@hotmail.com
Hydropedology - Chair Henry Lin hul3@psu.edu
Land Degradation - Chair Bal Ram Singh balram.singh@ipm.nlh.no
Modelling of Soil and Landscape Evolution - http://soillandscape.org - Chair Peter Finke Peter.Finke@UGent.be
Paddy Soils - Chair Ho Ando handou@tds1.tr.yamagata-u.ac.jp
Proximal soil sensing - www.proximalsoilsensing.org - Chair Raphael Viscarra Rossel Raphael.Viscarra-Rossel@csiro.au
Soil monitoring – Chair Dominique Arrouays Dominique.Arrouays@orleans.inra.fr
Soil Information Standards - www.soilinformationstandards.org - Chair peter.wilson@csiro.au
Soils of Urban, Industrial, Traffic, Mining and Military Areas (SUITMA) - http://ticri.inpl-nancy.fr/urban_soils.en - Chair Jean-Louis.Morel@ensaia.inpl-nancy.fr
Universal Soil Classification System - http://clic.cses.vt.edu/IUSS1.4/ - Chair Jon Hempel jon.hempel@lin.usda.gov
World Reference Base - http://www.fao.org/nr/land/soils/soil/en/ - Chair Peter Schad schad@wzw.tum.de

Bringing soil science to young people

Wondering how to introduce soil science to young people? Soil Farming and Science – free, multi-media teaching resources – is an introduction to nitrogen, phosphorus and soil properties. It also explores issues surrounding agricultural intensification and environmental impacts. Videos and short articles profile these topics along with the innovative ways science is helping farmers balance productivity, nutrient management and water quality. Novel, yet simple hands-on activities explore soil quality, nutrient leaching and some often-unseen aspects of the nitrogen cycle. The resources are also of value outside of the classroom with one farm consultant saying, “They provide a thorough understanding of nutrient cycles in an easily assimilated manner. Most importantly it is a non-threatening format for farmers who feel too shy to say they don’t fully understand nutrient cycling.” See http://www.sciencelearn.org.nz/Contexts/Soil-Farming-and-Science

New Commission 1.4 Soil Classification Newsletter

The chair and vice-chair of Commission 1.4 Soil Classification have released Newsletter 7 (http://clic.cses.vt.edu/IUSS1.4/Newsletters/IUSS_Soil_Classification_Newsletter_1.4.7.pdf). The 36 page newsletter contains a summary of the past four years activities of the Commission and alerts members of presentations scheduled for the 20th WCSS. The classical 1932 soil characterization paper on soil colloids in relation to classification of soil by H. Byers and M. Anderson is included for review.

New World Soil Museum

ISRIC has opened the new World Soil Museum in Wageningen, The Netherlands. ISRIC, founded by a proposal of the ISSS (now IUSS) has hosted an international soil museum since 1966. In the new World Soil Museum, visitors can learn about the role of soils in life and ecosystems and get an impression of the variation in soils of the world, from the colourful volcanic ash soil from Indonesia to the Terra Preta soil from the Amazon. The museum displays soil monoliths with accompanying data including a full profile description, soil chemical and physical data, and information on the landscape and land-use. For more information click here

New Publications

Soil Colloids: Properties and Ion Binding. Series: Surfactant Science Series Volume 156. By Fernando V. Molina. 2013. CRC Press. ISBN: 978-1-43-985114-2. Hardcover 545 pages. Price $179.95.

The Soils of the Philippines. World Soils Book Series. By R.B. Carating, R.G. Galanta, and C.D. Bacatio. 2014, XXV. Springer. ISBN: 978-94-017-8681-2. Hardcover, 293 pages. Price $179.00.

Chemistry of Europe's Agricultural Soils (2 parts). By C. Reimann, M. Birke, A. Demetriades, P. Filzmoser and P. O'Connor (Eds.). Part A: Methodology and Interpretation of the GEMAS data set. Geologisches Jahrbuch B102. 2014. Schweizerbart. ISBN 978-3-510-96866-6. Hardcover 528 pages. Price 118 Euro.

Application of Soil Physics in Environmental Analyses: Measuring, Modelling and Data Integration. By W.G. Teixeira, M.B. Ceddia, M.V. Ottoni, G.K. Donnagema (Eds.). *Progress in Soil Science* Series. 2014. Springer, Dordrecht. ISBN 978-3-319-06012-5 Hardcover 476 pages. Price $209.00.

IUSS Alerts are e-mailed to more than 12,000 people in over 100 countries. Please forward the IUSS Alerts to your friends and colleagues. Send information for the IUSS Alerts to hartemink@wisc.edu

News from the International Council for Science

Dr. Steven Wilson resigns as Executive Director

Dr. Steven Wilson, Executive Director of the International Council for Science, has announced that he will step down from his role at ICSU at the end of September 2014 to join the United Synagogue, the largest synagogue movement in Europe, as their CEO, based in London.

On this announcement, he said: "I would like to take the opportunity to warmly thank you for the support, guidance and encouragement you have provided me during my time at ICSU. I will miss my colleagues and friends across the vast ICSU family, but am looking forward to the challenges of my new position, which came at a timely moment for my family as they were ready to move back to the UK."

Carthage Smith resigns as Deputy Executive Director

After more than twelve years at the International Council for Science, Carthage Smith left ICSU in May 2014 to join the OECD Global Science Forum Secretariat.

On leaving ICSU, he said "It has been a privilege working at ICSU over the past 12 years. I have witnessed enormous changes, with new programmes and activities replacing their worthy predecessors. An ongoing challenge has been for ICSU to maintain its core values while staying ahead of the curve, to operate strategically while ensuring 'bottom up' support from the scientific community. Initiatives such as the International Polar Year or Future Earth illustrate how this approach makes all the difference. When it works, it seems simple but behind the scenes a huge amount of thought and work goes into getting these initiatives off the ground. I am fortunate to have been part of a really exciting period in ICSU's development, to have worked with so many great colleagues and scientists from all over the world, and to have been able to contribute in a small way to advancing international science for the benefit of society."

Registrations for General Assembly close on 18 July

There is a little over a month left to register for the ICSU General Assembly in Auckland, New Zealand later this year. If you haven't done so yet, please do so as soon as possible. For those attending, there is also Facebook event you can join to see who else is attending.

For all information relating to the General Assembly, head to the General Assembly pages on the ICSU website.

2nd young scientists networking conference on the future of the green economy

From May 25-31, 30 excellent young scientists from across the globe met at Villa Vigoni, Italy with an interdisciplinary team of leading senior scientists to advance integrative research and knowledge on societies' transition towards a green economy.

Read more about this event on the ICSU website.
http://www.icsu.org/news-centre/news/top-news/young-scientists-met-to-debate-future-of-the-green-economy

Abstracts

Bayesian Network for Point and Diffuse Source Phosphorus Transfer from Dairy Pastures in South Otago, New Zealand

Gina M. Lucci [*abd], David Nash[c], Richard W. McDowell[ab] and Leo M. Condron[b]

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Abstract

Many factors affect the magnitude of nutrient losses from dairy farm systems. Bayesian Networks (BNs) are an alternative to conventional modeling that can evaluate complex multifactor problems using forward and backward reasoning. A BN of annual total phosphorus (TP) exports was developed for a hypothetical dairy farm in the south Otago region of New Zealand and was used to investigate and integrate the effects of different management options under contrasting rainfall and drainage regimes. Published literature was consulted to quantify the relationships that underpin the BN, with preference given to data and relationships derived from the Otago region. In its default state, the BN estimated loads of 0.34 ± 0.42 kg TP ha^{-1} for overland flow and 0.30 ± 0.19 kg TP ha^{-1} for subsurface flow, which are in line with reported TP losses in overland flow (0–1.1 kg TP ha^{-1}) and in drainage (0.15–2.2 kg TP ha^{-1}). Site attributes that cannot be managed, like annual rainfall and the average slope of the farm, were found to affect the loads of TP lost from dairy farms. The greatest loads (13.4 kg TP ha^{-1}) were predicted to occur with above-average annual rainfall (970 mm), where irrigation of farm dairy effluent was managed poorly, and where Olsen P concentrations were above pasture requirements (60 mg kg^{-1}). Most of this loading was attributed to contributions from overland flow. This study demonstrates the value of using a BN to understand the complex interactions between site variables affecting P loss and their relative importance.

doi:10.2134/jeq2013.11.0460 Journal of Environmental Quality July 2014

The challenge of the urine patch for managing nitrogen in grazed pasture systems

Manuscript accepted to Advances in Agronomy, expected publishing date October 2014

Diana R. Selbie[1], Laura E. Buckthought[2] and Mark A. Shepherd[1]

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Corresponding author: Mark Shepherd mark.shepherd@agresearch.co.nz

Abstract

Ruminants excrete as much as 70-95% of the nitrogen (N) they consume. The urine patch is the conduit through which much of this N is recycled in grazed pasture systems. This review focuses on three key areas: urine patch characteristics and N cycling processes; implications for N cycling at the farm and paddock-scale; and strategies available to mitigate N losses from the urine patch.

The urine patch N loading rate is a key metric for quantifying and modelling fate of N; yet it is a derived value, relying on estimates of urine volume and N concentration, and the urine patch surface area, all of which are variable. Much is known about N cycling processes in the urine patch but further understanding of N_2 loss, leaching of dissolved organic N and mineralisation-immobilisation turnover is needed. Typical values (as a percentage of the deposited urinary N) were estimated as: 13% ammonia volatilisation; 2% nitrous oxide emission; 20% nitrate leaching; 41% pasture uptake; 26%

gross immobilisation. The relative importance of each process is influenced by urine patch characteristics and environmental factors. Models are an important tool for scaling from the individual urine patch to the paddock and farm scale, though accounting for variability in urine patch characteristics, and spatial and temporal distribution, remains a challenge. Many potential management strategies to decrease N loss from the urine patch are still at the proof of concept stage with few actually deployed on the farm. Further research is required to integrate these into farm management systems.

Key words: nitrogen, urine patch, pasture, ruminant, mitigation, leaching, ammonia, denitrification, immobilisation, nitrate.

Nutrient and microbial loss in relation to timing of rainfall following surface application of dairy farm manure slurries to pasture

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Abstract. This study investigated nutrient and faecal microbe (*Escherichia coli*) loss in surface runoff following
application of dairy manure slurry to intact soil monoliths. Time between manure slurry application and first simulated rainfall event varied from 0 to 20 days. Manure slurries of varying dry matter (DM) content, ranging from 3 to 14%, were also investigated. Results indicated that phosphorus (P), nitrogen (N) and *E. coli* concentrations decreased with time since application because of chemical and physical breakdown of the manure. Greatest risk to water quality occurred when rainfall was received within 2 days of manure slurry application. When the period between manure slurry application and first rainfall event was _10 days, concentrations of N, P and faecal microbes was generally similar to those from dairy grazed pasture. Variation in slurry DM content appears to have little effect on measured runoff concentrations. Results suggest that manure slurries should be applied _2 days before rainfall events likely to cause surface runoff in order to limit nutrient and faecal microbe loss when applying manure slurries.

Additional keywords: dairy manure slurries, faecal microbe loss, land application, nutrient loss, surface runoff.
Received 24 December 2013, accepted 12 March 2014, published online 26 June 2014

Trade-offs between high class land and development: recent and future pressures on Auckland's valuable soil resources

Fiona Curran-Cournane, Melanie Vaughan, Ali Memon, Craig Fredrickson
Auckland Council

Abstract
Sustainable land management is essential to meeting the global challenge of securing soil and water resources that can support an ever increasing population. In Auckland, New Zealand's largest city, population growth is forecast to increase from 1.5 to 2.5 million by 2040 which will put immense pressure on the region's soil resources. The objective of this study was to robustly quantify the amount of high class land (Land Use Capability Classes 1-3) that has been converted, and what is likely to occur, to urban development in Auckland using both long term trend records and future growth projections.

Spatial analysis indicated that over the various spanning datasets 10,399 hectares (or 8.3%) of Auckland's high class land has been converted to urban development through incremental urban extension, operative/approved greenfields and building consents. Of this, 10,080 hectares of high class land was converted to development between the years, 1975-2012. The rate of urban extension onto high class land has accelerated since 1996. Furthermore, the majority of land allocated to urban extension since 1996 has been high class land. Looking into the near future, lodged/future greenfield developments equate to an additional potential development of 6,010 hectares (or 4.8%) of current high class land. Future growth pressures indicate that this trade-off will continue.

There is a real need to analyse the economic benefits and long term sustainability of future development against the protection of high class land for current and future production requirements. Further research should account for the true cost of lost provisioning, regulating and cultural soil ecosystem services to ensure that these values are recognised and considered by not only urban planners but by both policy and decision makers.

PDF link:
http://ac.els-cdn.com/S0264837714000489/1-s2.0-S0264837714000489-main.pdf?_tid=f5f29b36-0154-11e4-9e11-00000aacb35e&acdnat=1404242694_2e0cdeb90711e6fed1a642f7474231a2

Conferences:

August 2014

- **9th International Symposium AgroEnviron**, **3-7 August 2014** in Goiânia, Brazil. "Impacts of Agrosystems on the Environment: challenges and opportunities".
  www.agroenviron2014.com

- **II Curso latinoamericano – Micromorfologia de suelos y técnicas complementarias (**CLMSTC) Bogota (Colombia) from **04 to 10 August 2014**.
  jcloaiza@unal.edu.co; willyposada@yahoo.es

- **Phosphorus in Soils and Plants 5th International Symposium 26-29 August 2014** Le Corum Montpellier France **http://psp5-2014.cirad.fr**

- **4th Annual World Congress of Agriculture** (WCA-2014), **August 29-31, 2014** in Changchun, China.
  http://www.bitcongress.com/wca2014/program.asp

- **International Conference on Water, Informatics, Sustainability and Environment Gatineau - Ottawa, Canada, 26 – 28 August 2014**

September 2014

- **British Society of Soil Science Annual Meeting 2014**: Delving into the dark - emerging techniques, approaches and tools for soils research **3rd and 4th September 2014** at the University of Manchester, Manchester, United Kingdom.
  http://www.soils.org.uk/events/event-204/

- **XIII International Symposium and Field Workshop on Paleopedology,** Poland, **1-6 September 2014**. The meeting is organized by the 'Paleopedology Comission IUSS and Polish Society of Soil Science.
  www.home.umk.pl/~paleopedology2014

- **21st General Meeting of the International Mineralogical Association** (IMA 2014) **1-5 September 2014** South Africa **www.ima2014.co.za**

- **ELS 2014 - the Earth Living Skin: Soil, Life and Climate Changes**, under the auspices of the Soil System Sciences Division of the European Geosciences Union, **21 – 25 September 2014** in Nova Yardinia, Italy **www.els2014.eu.**

- **XII Congress of the Croatian Society of Soil Science Dubrovnik**, in the independent Republic of Croatia, the 28th EU member, from **September 22-26, 2014**. More information see: **www.congress-csss.org**

October 2014

- **Biogeochemical Interfaces in Soil** – Towards a Comprehensive and Mechanistic Understanding of Soil Functions. **6-8 October 2014**, Germany. www.spp1315.uni-jena.de

- **9th International Soil Science Congress** on "The Soul of Soil and Civilization" **14 – 16 October 2014**. **http://soil2014.com**

- International Conference on Advances in Agricultural, Biological & Environmental Sciences **(AABES-2014) , Oct 15-16, 2014 Dubai (UAE)** **http://www.iicbe.org/2014/10/15/51**

- **EcoForum Conference and Exhibition. 29-31 October 2014**. **http://www.ecoforum.net.au/program.html**

- **2014 2nd International Conference on Sustainable Environment and Agriculture (ICSEA 2014)**. **October 29 & 30th**, San Diego **http://www.icsea.org/**

November 2014

- Latin America Soil Science Congress, Cuzco Peru **9-15 November 2014** **http://www.slcs.org.mx/img/XX_Latinamerican_Soil_Science_Congress_Cusco_Peru.pdf**

- **6th Global Workshop on Digital Soil Mapping**, **11-14 November, 2014**, Nanjing, China. **http://dsm2014.csp.escience.cn**

- **2nd International Conference on Environment Pollution and Prevention (ICEPP 2014) www.icepp.org** **12th November 2014**, **Auckland, New Zealand**

- **National Soil Science Conference-** MCG Melbourne, Victoria Australia **23-27 November 2014**. **www.soilscience2014.com**

December 2014

http://www.nzssconference.co.nz

- **International Conference on Agriculture, Biology and Environmental Sciences (ICABES'14) Dec. 8-9, 2014 Bali (Indonesia)** **www.iicbe.org**
  8th December 2014

January 2015

14th ISSPA International Symposium, 26th - 30th January 2015, Kona Beach, Hawaii

Abstract Submission deadline is 15th October 2015**.** Topics and submission guidelines are on the symposium website **www.isspa2015.com**

September 2015

LuWQ2015 - 2nd International Interdisciplinary Conference on
LAND USE AND WATER QUALITY: *Agricultural Production and the Environment*
Vienna, Austria, 21-24 September 2015

More information is on **http://web.natur.cuni.cz/luwq2015/**

ABSTRACT SUBMISSION:
Abstracts are due by 1 February 2015. Abstract submission will be possible by end September 2014.