

Soil News



Issue # 3 – Vol # 65 – August 2017

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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 November issue of Soil News is **Friday 17th November 2017**

Visit our website:

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

New Zealand Soil News

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NZSSS subscriptions become due on **1 July** each year. Individual members who do not pay their subscription before 31 October in a given year will be asked to pay an additional \$NZ10.00 as a penalty for late payment.

	<i>If paid by 31st October:</i>	<i>After 31st October:</i>
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Letter from the editor

Welcome to the, slightly belated, August issue of the Soil News!

As mentioned in the last issue, you will start to see a few changes to the Soil News, both in form and content. This issue we introduce a new feature: “Message from the President” by the NZSSS President Dave Houlbrooke. Here Dave announces this year’s recipient of Norman Taylor Memorial Award, and the outcomes of a sorely needed budget review. This is the start of a semi-regular feature for the president to make any direct communications to the society’s members.

Our editorial for this issue was contributed by Amanda Black at Lincoln University. I invited Amanda to share some background and learnings from the award-winning Māori biosecurity network: Te Tira Whakamātaki (TTW). This network connects Māori scientists working on biosecurity problems with Māori communities holding a wealth of traditional knowledge. This innovative model of collaboration is something that I think we can all be inspired by.

As always, our contributors have supplied us with regional news. I would like to especially welcome the contribution from SCION. It’s wonderful to get a download on forest soils research including an update on an MBIE programme about increasing forest production. The folks at WaiBER have turned out three stunning new research cakes (yes, I did say cakes), creatively and tastily summarising recent research.

Did you know that planning is already underway for the next Soils Conference in 2018 in Napier? You will find an update on progress and more information in the “Society News” section.

For our next issues we will try something a little bit different. Each issue will have a theme that will guide the content of the newsletter in terms of the editorial and highlighted features. The theme will also guide the selection of our new “Meet the student” section where a post-graduate is given space to introduce themselves and their research. We’ll see how this evolves and all members are welcome to submit ideas for themes for the next upcoming issues.

The theme for the next issue is “Soils and climate change”

The theme for the next issue is “Soils and climate change”. Please send in any features, abstracts, photos or discussion pieces related to the theme. As always, we look forward to receiving society news on any subject along with opportunities for training, funding or employment.

Bye for now and happy digging!

Gina

Editorial: What’s in a Network - by Amanda Black

A recently established network of Māori scientists, communities and industry has filled a vacuum in the biosecurity sector. The Māori biosecurity network, officially named Te Tira Whakamātaki (TTW) has helped both Māori and non-Māori understand the benefits of inclusion in NZ’s biosecurity system, and this has recently been recognised at the inaugural New Zealand Biosecurity Awards, presented at Parliament, August 2nd 2017.

The network has been two years in the making, with its founding members Dr Amanda Black and Melanie Mark-Shadbolt (Lincoln University), and Dr Nick Waipara (Auckland Council) initially holding many regional hui to understand the needs of Maori in this fast-paced field including defining what “biosecurity” means for Māori? One of the key objectives was to encourage dialogue between individual Māori, rather than organisations.

Since its inception the Network has been helping understand how Māori knowledge, interests and values can be embedded in New Zealand’s biosecurity system. Te Tira Whakamātaki means ‘the watchful (vigilant) ones’ and it has been established to ensure Māori have a voice in New Zealand’s biosecurity

systems and Government Industry Agreements (GIA) on biosecurity research priorities. This includes guiding development of biosecurity processes to ensure the Māori voice is being heard, and that Māori are being included, and providing or soliciting biosecurity research that includes Māori perspectives and solutions. The Network is also highlighting the effects of biosecurity threats and policy on Māori social policy, political strategy, economic interests, technology, and culture.

Establishment of TTW has fortuitously coincided with development of the Ministry of Primary Industries, Biosecurity 2025 Direction Statement which has an ambitious Mission: *The biosecurity system protects New Zealanders, our way of life, our natural and productive resources and our biodiversity from the harmful effects of pests and diseases.* Underpinning this mission is the combined actions of 'a biosecurity team of 4.7 million' which refers to the need for ALL New Zealanders to be contributing to the biosecurity effort. This remarkable feat of citizen science engagement, with 4.7 million pair of eyes watching out for unwanted pests and diseases, will require broad public engagement, especially with Māori who are the single largest landowners in New Zealand and have an integral part to play in the sustainable development of New Zealand's primary sector and in the protection of the country's biosecurity status.

Members of the network have been working alongside MPI to assist in incursion responses as well as to help deliver on their Biosecurity 2025 strategic directions. While the working relationship may have commenced as a marriage of convenience, it has progressed to a more constructive one at the strategic level with healthy tensions remaining on some issues. *We need to harness the contribution, skills and views of all New Zealanders but especially of those who have the longest memory of the ecosystem which we are living in and relying on for our survival.* Māori also have a responsibility to protect species considered taonga, predominantly indigenous species such as kauri, pōhutukawa, kawakawa and tōtara, from the threats of pests and diseases. The Network serves to strengthen and support the role of mātauranga Māori and kaitiakitanga (guardianship) in biosecurity.

The success of the Network is based on three key attributes: 1) skills (chemistry, ecology, plant pathology, microbiology, toxicology, social research and soil science); 2) connections (government, industry, research and Māori); and 3) cohesiveness. The Network's terms of reference are deliberately inclusive and its strategies are encouraging the participation of all Māori. Significantly, the Network has been mandated by 74 Iwi at the 2017 Iwi Chairs Forum. The strong foundation and network built by the team is already proving invaluable in discussions and decision making about the management of the recent myrtle rust incursions. Ultimately, this work will improve the resilience of New Zealand's biosecurity system at a regional and national level.

Additionally, the rationale being developed by Te Tira Whakamātaki is also applicable to indigenous communities in other countries, who are also at risk of losing their cultural identity through lost socio-ecological links. Thus, it is satisfying to see the Network's innovative approach leading the way in this area and attracting attention both nationally and internationally. Team members are now building collaborations with other groups interested in integrating indigenous values into their protocols including Royal Botanic Gardens KEW and the Millenium Seed Bank Programme.

From its inception, TTW has experienced a tumultuous ride through suspicion, silos, gate keeping and academic snobbery from established institutes, but has been kept afloat by some very supportive individuals, all the while existing on the very thinnest of shoe string budgets.

Te Tira Whakamātaki deserves recognition for its innovative and progressive approach to incorporating indigenous values into biosecurity. The Network has filled a critical gap in New Zealand's biosecurity system, by connecting Māori scientists working on biosecurity problems with Māori communities holding a wealth of traditional knowledge. Application of this approach in the biosecurity system may only just be the beginning; as a nation we are facing some hard and tough discussions around how we incorporate and manage the impacts of climate change, especially freshwater allocation and quality in a world that continues to operate under a neoliberal economic model.

Amanda Black

Message from the President

Kia ora NZSSS members. A few updates from me. First of all I would like to announce the 2017 recipient of the Norman Taylor Memorial Award as **Professor Tim Clough** from Lincoln University. The title of Tim's talk will be '**Developing integrated approaches to nitrogen management: defining soil's role**'. He will present his talk in three places; Hamilton on the 5th of December (as part of the WaiBOP soils day), Palmerston North on February 7th (as part of the FLRC workshop and in Christchurch at a date yet to be determined, likely to also be in December. More information will be available in the future on our website, in our November issue of Soils News and by email to our membership.

Between September and December this year the International Union of Soil Sciences will be holding an election for Division & Commission chairs and deputy chairs. The responsibility to coordinate the election for each country sits with each national soil science body. The NZSSS has decided to host the election in September and we will send out via email instructions of candidates and voting instructions. Two NZSSS members – Megan Balks and Leo Condrón are candidates for the Soil Genesis Commission and Soil Properties and Processes Division respectively.

The NZSSS council has recently undertaken a comprehensive budget review, looking at previous year's income vs expenditure and forecasting out a budget for the next two years (to encompass the differences between conference and a non-conference years). In recent years the council has placed a strong emphasis on supporting students, in particular through generous support for their attendance at our biennial NZSSS conference. This has resulted in our level of cash reserves (term deposits) falling from a total of \$169,632 as at 30 June 2016 to \$147,833 as at 30 June 2017. The Council has decided that it would be prudent to maintain the current level of cash reserves going forward to help ensure the financial security of the society into the future and to provide a source of income in the form of interest on the term deposits. To avoid the need to draw down the Society's cash reserves any further and help enable a balanced budget, the NZSSS council's recommendation is that there be an increase in NZSSS membership fees to be introduced in 2018 (i.e. in 11 months' time). At the same time, we are also making some cuts to anticipated expenses to help balance the budget. The Council recommends raising the standard NZ member fees from \$60 to \$70 per year, the student and retired member fees from \$35 to \$40 per year, and the Library member fees from \$70 to \$80 per year. As is currently the case, all fees will continue to be \$10 higher if paid after 31 October (e.g. from 2018, standard member fees paid after 31 October would be \$80). We welcome any feedback on this matter via email to either Dave Houlbrooke (President) david.houlbrooke@agresearch.co.nz, Haydon Jones (Treasurer) Haydon.Jones@waikatoregion.govt.nz, or through discussion at our Special General Meeting (SGM) to be held at the WaiBOP Soils day on December 5th at The University of Waikato.

Regards Dave Houlbrooke – NZSSS President

Soil-art exhibition – invitation and advance warning

After our successful inaugural soil art exhibition at the Hamilton conference in 2014 we are planning to again hold a soil-related art exhibition at our NZSSS conference in Napier in December 2018. We would like to showcase the widest possible interpretation of soil-related art, produced by you, the New Zealand Soil Science community.

Everyone can participate - all forms of art will be accepted including: sculpture from soil/clay/earth materials or with a soil-related theme, paintings related to soils or made using soil materials, poems or short statements that can be displayed on a wall poster, photography, fibre art, computer generated art, soil peels, sand paintings, cartoons – everything is possible.

WHY??

- Art is fun to create and to view.
- Art is a way to reach a non-science audience with messages about the importance, beauty, vulnerability and versatility of soil.
- Art (done by the science community) is a means to break down stereotypes about the sorts of people who are scientists.

Thus, the challenge is to get creative. Start now while there is lots of time to work on it. There is still time for you to join a pottery, art, or sculpture class to get some upskilling to create your masterpiece. Do something to show off some of your interpretations of soil or soil materials.

Get committed, let Megan Balks megan.balks@waikato.ac.nz or Diana Selbie diana.selbie@agresearch.co.nz know if you plan to contribute so we can ensure we have enough suitable display space.



Volunteers needed - World Soils Day – Hamilton family fun event at Waikato Museum 10.00am-2.00pm on Saturday 9 December

We are planning a world soils day event in collaboration with the Waikato Museum targeting children.

Planned activities include finger painting with soil, play with clay, building a soil profile in a jar using layers of different soil materials, and a short talk about Discovering soils and landscapes.

If you are able to come along and help you would be most welcome (or put it in your diary to bring your kids along to join the fun) – please contact Megan Balks megan.balks@waikato.ac.nz

Minutes of NZSSS meeting held by video conference on 16th May 2017, 09:00 to 12:00

Present: David Houlbrooke, Haydon Jones, Reece Hill, Megan Balks, Mike Hedley, Selai Letica, Tim Clough, Brendon Malcom, Roger McLenaghan (left meeting early)

Apologies: Sam Carrick, Hamish Lowe

Secretariat:

- Minutes of the last meeting: These were read and taken to be a true and accurate record (moved Tim/seconded Reece).
- Matters arising from the minutes to be placed on agenda for general business included NZGA, Australian Soil Science Society, and NZSSS web site.

Approval of agenda: Agenda was approved (moved Tim/seconded Reece).

Treasury:

- Balance sheet up to 30th April 2017 shows total assets \$165,105 with liabilities \$0
- Profit & loss from 1 July 2016 to 30 April 2017 shows an income of \$23,640 (mainly subscriptions) and operating of \$36,162, a net income of (\$12,476) which is negative due to awards and conference expenses such as student support.
- Question was raised as to how income and expenditure differs this current financial year compared to previous years. Contributing to a negative net income to date are printing of 'Soils in the NZ Landscape', International Year of Soils costs, expenditure updating NZSSS website, and poor profit from Queenstown conference. This highlights the importance of getting good sponsorship to ensure adequate profit is made from NZSSS conferences.

Secretariat:

- It was noticed prior to meeting Groundwork Associates had inadvertently omitted the word file with membership updates. It was moved (David, seconded Hayden) that upon receipt of the information the data would be shared by email and voted upon so that timely updates to the membership list could be made prior to the next NZSSS meeting. *Action point: Tim to get updated member details circulated.*
- Aged receivables show approx. 60 members in arrears with their NZSSS subscriptions. *Actions: NZ council members to chase up those they know with emails to others.*

Awards:

- Haydon has now passed on the 'Awards' portfolio to Brendon to curate.
- RSNZ Fellowships: 3 nominations are currently active.
- 'Norman Taylor Memorial Lecture' speaker for 2017 is Tim Clough.
- Reminder emails to HoDs need to go out regarding award nominations. Likewise information needs to be placed in 'Soil News' and on social media. *Action point: Brendon to follow up.*
- Dave will follow up with Bert Quin regarding his award financing.
- Undergraduate prize referral request was received from Michelle O'Grady. This was agreed to. Michelle wants to defer the award for 2 years so enrolment will be March 2019 at the latest. It was moved (Haydon/seconded Brendon) that the \$500 undergraduate prize for graduate student Michelle O'Grady, going on to post graduate study, be deferred until March 2019 at the latest. *Action point: Haydon will inform the applicant.*
- Blakemore's trowel to be mounted in appropriate cabinet. *Action point: Sam has the trowel and Brendon will follow up with Sam to help get this done.*
- Review of Awards portfolio is still ongoing. Haydon hopes to have this finished by next meeting.

RSNZ meetings:

- Since last NZSSS meeting there have been no RSNZ meetings held requiring NZSSS attendance.

New Zealand Grasslands Association:

- Dave followed up with NZGA president about scope for further interaction.

- One suggestion was cross attendance at conferences especially via the use of key-note speakers.
- NZGA are holding special topic symposiums and NZSSS could be a joint organiser of these, partaking in risk and profit. Or NZSSS may simply partake.
- Council thought such interaction was very valuable. *Action point: Dave will go back and register our interest with NZGA.*

Australian Soil Science Society:

- Dave has followed up on looking at CPSS but is not sure that this is something we need in NZ. There are several other certifications. For example, Mike noted NZIPM and DairyNZ have been discussing accredited advisors. There are costs to setting up such schemes, and they may also need ongoing professional development courses. We don't want to compete with on going well recognized schemes. It is also a lot of work for NZSSS to take on. Where the NZ market is at for 'certification of people' doesn't match with CPSS. Hamish also looking at this and will revisit at next meeting.

Public Outreach:

- Megan presented a draft 'Public Outreach and Promotion of Soils' plan/budget for discussion.
 - Need to develop a clear budget for this going forward.
- Action point: Haydon and Megan to look at this and bring a recommendation back to council.*

World Soils Day:

- Megan reported that Waikato Museum are keen to run events relating to this
 - Having kids' activities (playing with clay, building soil profiles, soil stickers etc.)

Supporting students:

- Massey University students requested support for a post-graduate day. Council considered this and while generally supportive deemed that it was not financially viable given the precedent it would set for such event-related requests from other universities.
- Supporting student attendance of soil-judging events, while desirable, is not financially viable at a high level for NZSSS on a continuing basis. A request was received from Lincoln university team for financial support to go to 5th Australian Soil Judging competition (who won the NZ division at the recent Queenstown soil conference). Dave moved (Seconded Megan) that the Lincoln team, as part of their prize for winning the 2016 Queenstown conference soil judging competition, be supported for the total sum of \$500 to partake in the 5th Australian Soil judging competition in September 2017. *Action point: Dave will follow up and reply.*
- However, this level of support and who it aligns with needs to be reconsidered for future entries.
- Mike suggested that a NZ team be formed from across universities for international events.
 - Thus the degree of support for each student could be greater as funding could likely be provided from within faculties.
 - Would need a national 'champion' to organise.
- Sam Carrick had also noted Landcare could potentially provide \$2,000 to assist funding but it was not clear if this was an annual commitment that could be aligned with a national team for example, or if it just related to the current upcoming competition in Australia. *Action point: Sam to clarify commitment.*

Policy:

- Ministry for the Environment have issued a Conservation and Environment Roadmap. Dave will raise with them issues about protecting the soil resource.

Dropbox, NZSSS web page:

- Update on these deferred until Hamish is in attendance.

Soil News:

- Gina Lucci has taken this on as the new editor and next issue is due in May.

Correspondence:

- Sephrah Rayner (Lincoln University) wrote requesting funding for student soil judging competition (discussed above).

- Michelle O'Grady corresponded requesting deferral of her graduate student award (discussed above).
- David Letham corresponded seeking permission to use Figure 12.3 from the book: Soils in NZ landscapes-the living mantle, by Molloy. The figure is for an unpublished presentation concerning glaciation and formation of the Canterbury Plains. Tim will write to David giving NZSSS permission to use the Figure.

Conferences:

- Conference in Hawkes Bay in 2018 will be in Napier with the theme "Diverse Soils – Productive Landscapes". Conference organising team is being headed by Paul Johnstone and includes Dave and Reece as members. Currently identifying keynote speakers and sponsors.
- Conferences need to make a profit if NZSSS is to subsidise student travel/registration.

Meeting ended: 11:40 a.m.

Next Meeting:

- Tim will set up a doodle poll for first two weeks in August

Features

NZ - China Workshop on Water, Nutrients and Horticulture: Roger Williams, General Manager Sustainable Production reports

A group from Plant and Food Research's Sustainable Production portfolio (Brent Clothier, Bruce Searle, Mike Beare, Paul Johnstone, Roger Williams, Steve Green and Wei Hu) along with Allan White and Greg Pringle headed to Yunnan, China on Saturday 29 July to attend a workshop on water, nutrients and horticulture. The event was fully funded by MBIE as part of the NZ-China Water Research Centre with the aim of fostering collaboration between NZ and Chinese scientists.

On arrival on Sunday, they launched straight into the workshop dinner which was a great opportunity to meet some of the key scientists and policy makers in the area of water quality in Yunnan. On Monday they had a full day of workshop presentations learning about the environmental issues and resulting science going on in China. They reciprocated with presentations by all the Sustainable Production representatives as follows:

- Introduction to horticulture in NZ (Roger Williams);
- Soil physical constraints and impacts on productivity and environmental outcomes (Wei Hu);
- Decision Support tools – their development, validation & use for regulating water & nutrients (Steve Green)
- Footprinting, ecosystem services and the filtering function of soils (Brent Clothier on behalf of Karin Mueller)
- Land use suitability frameworks – supporting better planning to enhance water quality outcomes (Mike Beare)
- Spatial variability and precision approaches to managing nutrients and water (Bruce Searle)
- Sustainable and equitable allocation of water for irrigation (Brent Clothier)
- Quantifying nutrient losses under good management practices (Paul Johnstone)

Although the focus was on Yunnan, the event attracted scientists from across China and they learnt how similar their water quality issues are and how different their policy responses are! For example, around Yuxi City whole neighbourhoods that are adjacent to a highly regarded lake are being demolished, and replaced with wetland areas to 'treat' water sources from the city and surrounding farm lands that enter the lake. The following day was spent in a discussion setting chaired by Greg Pringle

and aimed at developing a collaborative research programme that would attract Chinese investment. The group agreed that work to consider the impact of different management practices on water quality, profitability and soil health was needed – from a field to catchment scale.

The final day of the workshop was spent on a series of field trips to get a better sense of horticulture and freshwater in Yunnan. The last field trip was Malong Experimental Station of Yunnan Academy of Agricultural Sciences (YAAS) where the group viewed different experiments on horticultural crops.

They have already been following up on next steps with the Chinese organisers, and a smaller delegation will return to China in September to progress plans.



Group photo of China-NZ workshop



Workshop discussion day chaired by Dr Greg Pringle from Business Development and Commercialization, PFR





*Workshop field trip day. Demonstration of Fuxian Lake in Yuxi (a); Fertigation of a flower company (b); Cherry planting in greenhouse (c); Carbon source materials experiments on rice (d), a Chinese medicinal plant (*Paris polyphylla*) (e); and Long-term experimental site for soil conservation (f)*

As a part of activities for NZ-China Water Research Centre, Drs Mike Beare and Wei Hu from PFR visited Northwest A&F University (NWAUFU) during Thursday 27 July to Sunday 30 July. This trip was jointly funded by MBIE and China's "111" Project. The main purpose of this visit was to build linkages and identify opportunities for collaboration in the areas of soil, water and environment with contacts that Wei established in February this year.

Dr Steve Green (PFR) who started his visiting to NWAUFU on 22 July also joined the visit. Steve was invited by Dr Linsen Zhang from College of Horticulture to do collaborative research on water and nitrogen monitoring and modelling in an apple orchard.

On the morning of 28 July, we met some of the key scientists in the area of apple research (physiology, breeding, and fertigation) from the College of Horticulture, including Dean Fengwang Ma, Prof Pengmin Li, Prof Qingmei Guan, and Associate Prof Linsen Zhang. Both sides briefly introduced research interests followed by a visit to the State Key Laboratory of Crop Stress Biology for Arid Areas and a field trip to the demonstration site of horticultural plant varieties. We identified a common interest in water and nutrient management of the apple orchard. Dean Ma expressed his hospitality and financial support to invite PFR scientist for a workshop in NWAUFU.



Discussion with College of Horticulture staff. L to R Dr Mike Beare, Dr Wei Hu, Dr Steve Green, Dr Linsen Zhang, Associate Dean Lingfei Xu, Dean Fengwang Ma, and Dr Pengmin Li



Presentations given at IWSA, NWAUFU by Drs Mike Beare and Steve Green

We visited the Institute of Water-saving Agriculture in Arid Areas of China (IWSA), NWAUFU in the afternoon 28 July. To start with, we gave two presentations entitled “Soil Science for Sustainable Production and Environmental Protection in New Zealand” (Mike Beare) and “Water and Nutrient Balance of Tree Crop” (Steve Green). After that, we discussed with some of the key scientists in the areas of agricultural water management from IWSA, College of Water Resources and Architectural Engineering (CWRAE), and Institute of Soil and Water Conservation (ISWC), including Prof Pute Wu (Executive Vice President), Prof Huanjie Cai (Dean of ISWC), Prof Bingcheng Si (Distinguished Professor), Prof Hao Feng (Associate Dean of ISWC). Vice President Wu expressed a strong interest in water research collaboration between NWAUFU and PFR and he is quite keen to lead a delegation to visit PFR and identify more opportunities for collaboration in this November. The visit was finished by a visit to their laboratory facilities.

During the NZ - China Workshop in Yunnan, we also identified the possible collaboration between PFR and College of Natural Resources and Environment (CNRE) of NWAUFU in the areas of water and environment by discussing with the Associate Dean of CNRE, Dr Zhi Li who also attended the NZ - China Workshop.



Discussion between scientists of PFR and NWAUFU. From left to right are Dr Mike Beare, Dr Steve Green, Dr Wei Hu, Prof Hao Feng, Prof Pute Wu, Prof Huanjie Cai, and Prof Bingcheng Si



Gift giving between Dr Mike Beare and Executive Vice President Pute Wu



Experimental facilities visiting. Discussion between Dr Mike Beare and Dr Bingcheng Si in Solution Extraction Lab (a); Fertigation experiment for maize (b), Long soil column for water and solute transport experiment (c), Soil water and nutrient monitoring system (d)



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

A selection of stories posted on the NZSSS facebook page (@NZSoilSciSoc)

New Zealand Society of Soil Science
24 August at 23:39 · 🌐

<https://www.sciencedaily.com/releases/2017/08/170824090108.htm>



Survival of soil organisms is a wake-up call for biosecurity

Tiny creatures in soil that attack plants have the ability to survive for at least three years stored in dry conditions, showed a recent study. Furthermore,...

SCIENCEDAILY.COM

<https://www.sciencedaily.com/releases/2017/08/170824090108.htm>

New Zealand Society of Soil Science
23 August at 01:55 · 🌐

<https://www.sciencedaily.com/releases/2017/08/170822111033.htm>



Orange is the new green: How orange peels revived a Costa Rican forest

In the mid-1990s, 1,000 truckloads of orange peels and orange pulp were purposefully unloaded onto a barren pasture in a Costa Rican national park

SCIENCEDAILY.COM

<https://www.sciencedaily.com/releases/2017/08/170822111033.htm>

New Zealand Society of Soil Science shared a link.
12 August at 12:01 · 🌐



Soil carbon scheme a world first

Farmers in Victoria and South Australia take part in a carbon credit scheme for their soil

ABC.NET.AU

<http://www.abc.net.au/news/rural/2017-08-11/carbon-farmers-criticise-government/8796256>

New Zealand Society of Soil Science shared Global Soil Week's post.
18 July · 🌐

Global Soil Week
18 July · 🌐

A reflection on #soils after #GSW17 // #ThemeSoil



A Wheelbarrow of Soil - Reflecting on the Future of Soils from Global Soil Week 2017

There is an emerging realization that soil, and linked land use and management challenges, are fundamental to achieve sustainable development including in...

IEEPSU

<https://ieep.eu/news/a-wheelbarrow-of-soil>

Novel methods to understand environmental controls of soil moisture

Wei Hu

New Zealand Institute for Plant & Food Research Limited, Private Bag 4704, Christchurch 8140, New Zealand

The soil moisture controls have received increasing attention in the pedological and hydrological communities. In a real world, environmental factors are usually cross-correlated and concurrently affect soil moisture distribution at different scales and locations with different magnitudes. Traditional methods such as correlation analysis usually fail to capture the real world of soil moisture processes.

To overcome the disadvantages of existing methods, Dr. Wei Hu from PFR and his Canadian colleague developed two statistical methods including decomposition of space-variant temporal anomaly of soil moisture using empirical orthogonal function (TA model) (Hu and Si, 2016a) and multiple wavelet coherence (MWC) (Hu and Si, 2016b). The TA model, originally developed to estimate spatial distribution of soil moisture at a scale of interest, can be used to unveil the effect of one factor by removing the effects of other cross-correlated factors. The MWC method can be used to examine scale-specific and localized multivariate relationships. The Matlab codes for these two methods are available on line or from authors upon request.

Recently, Dr. Wei Hu and his colleagues published two case studies (Hu et al., 2017a, 2017b) presenting how these two methods can be used to better understand soil moisture controls. Pearson correlation between environmental factors and original soil moisture misunderstood the roles of many factors (e.g., grass yield, elevation, and aspect) on soil water dynamics at a watershed on the Chinese Loess Plateau, whereas the new method based on the TA model reasonably indicated that more water was usually lost at sites with higher elevation, higher grass yield, and sun-facing slopes (Hu et al., 2017a). In a hummocky landscape of North America, spatial distribution of soil moisture is stable over seasons (Hu et al., 2017b). However, wavelet analyses using bivariate wavelet coherence (BWC) and MWC showed that different topographic indices affected spatial distribution of soil moisture in different seasons (elevation in spring and aspect in summer) due to different dominating hydrological processes. These varying hydrological processes also resulted in the distinct role of soil organic carbon (SOC) content in different seasons: a positive correlation in the spring and a negative correlation in the summer. The MWC identified a combination of depth to CaCO₃ layer (or elevation) and SOC in spring and a combination of cos(aspect) and SOC in summer that controlled soil moisture distribution at different scales and locations, respectively. It is worth mentioning that the roles of cos(aspect) and SOC in summer were not unveiled by the traditional Pearson correlation analysis.

The novel methods can be used in the wide fields of earth science (e.g. soil science, ecology, hydrology, physical geography, geology) and agricultural science to untangle the complex relationships among multiple factors at different scales.

[1] Hu, W., Si, B.C., 2016a. **Estimating spatially distributed soil water content at small watershed scales based on decomposition of temporal anomaly and time stability analysis.** Hydrol. Earth Syst. Sci., 20, 571–587, 2016.

Abstract: Soil water content (SWC) is crucial to rainfall runoff response at the watershed scale. A model was used to decompose the spatiotemporal SWC into a time-stable pattern (i.e., temporal mean), a space-invariant temporal anomaly, and a space-variant temporal anomaly. The spacevariant temporal anomaly was further decomposed using the empirical orthogonal function (EOF) for estimating spatially distributed SWC. This model was compared to a previous model that decomposes the spatiotemporal SWC into a spatial mean and a spatial anomaly, with the latter being further decomposed using the EOF. These two models are termed the temporal anomaly (TA) model and spatial anomaly (SA) model,

respectively. We aimed to test the hypothesis that underlying (i.e., time-invariant) spatial patterns exist in the space-variant temporal anomaly at the small watershed scale, and to examine the advantages of the TA model over the SA model in terms of the estimation of spatially distributed SWC. For this purpose, a data set of near surface (0–0.2 m) and root zone (0–1.0 m) SWC, at a small watershed scale in the Canadian Prairies, was analyzed. Results showed that underlying spatial patterns exist in the space-variant temporal anomaly because of the permanent controls of static factors such as depth to the CaCO₃ layer and organic carbon content. Combined with time stability analysis, the TA model improved the estimation of spatially distributed SWC over the SA model, especially for dry conditions. Further application of these two models demonstrated that the TA model outperformed the SA model at a hillslope in the Chinese Loess Plateau, but the performance of these two models in the GENCAI network (~250 km²) in Italy was equivalent. The TA model can be used to construct a high-resolution distribution of SWC at small watershed scales from coarse resolution remotely sensed SWC products.

[2] Hu, W., Si, B.C., 2016b. Technical Note: **Multiple wavelet coherence for untangling scale-specific and localized multivariate relationships in geosciences**

Hydrol. Earth Syst. Sci., 20, 3183–3191, doi:10.5194/hess-20-3183-2016, 2016.

Abstract: The scale-specific and localized bivariate relationships in geosciences can be revealed using bivariate wavelet coherence. The objective of this study was to develop a multiple wavelet coherence method for examining scale-specific and localized multivariate relationships. Stationary and nonstationary artificial data sets, generated with the response variable as the summation of five predictor variables (cosine waves) with different scales, were used to test the new method. Comparisons were also conducted using existing multivariate methods, including multiple spectral coherence and multivariate empirical mode decomposition (MEMD). Results show that multiple spectral coherence is unable to identify localized multivariate relationships, and underestimates the scale-specific multivariate relationships for nonstationary processes. The MEMD method was able to separate all variables into components at the same set of scales, revealing scale-specific relationships when combined with multiple correlation coefficients, but has the same weakness as multiple spectral coherence. However, multiple wavelet coherences are able to identify scale-specific and localized multivariate relationships, as they are close to 1 at multiple scales and locations corresponding to those of predictor variables. Therefore, multiple wavelet coherence outperforms other common multivariate methods. Multiple wavelet coherence was applied to a real data set and revealed the optimal combination of factors for explaining temporal variation of free water evaporation at the Changwu site in China at multiple scale-location domains. Matlab codes for multiple wavelet coherence were developed and are provided in the Supplement.

[3] Hu, W., Chau, H.W., Qiu, W.W., Si, B.C., 2017a. **Environmental controls on the spatial variability of soil water dynamics in a small watershed.**

Journal of Hydrology. 551, 47–55, doi:10.1016/j.jhydrol.2017.05.054.

Abstract: Soil water content (SWC) in the root zone is controlled by a suite of environmental variables. Complication arises from the cross-correlation between these environmental variables. Therefore, there is still a poor understanding on the controls of root zone SWC dynamics due, in part, to a lack of an appropriate method to untangle the controls. The objective of this study was to reveal the dominant controls of root zone soil water dynamics in a small watershed using an appropriate method based on empirical orthogonal function (EOF). For this purpose, SWC of 0–0.8 m layer in a small watershed on the Chinese Loess Plateau was used. The space-variant temporal anomaly (R_{tn}) of SWC, which is responsible for the spatial variability of soil water dynamics, was decomposed using the EOF. Results indicated that 86% of the total variations of R_{tn} were explained by three significant spatial structures (EOFs). Sand content and grass yield dominated the EOF1 of R_{tn} and elevation and aspect dominated EOF2 and EOF3 of R_{tn} , respectively. Moreover, their effects on soil water dynamics were time-

dependent. The EOF analysis showed that three independent groups of factors (i.e., soil and vegetation dominated earth surface condition, elevation related near surface air humidity, and aspect regulated energy input) may drive the variability in soil water dynamics. Traditional correlation analysis, however, indicated that SWC was greater at higher elevation and sun-facing slopes, which distorted the soil water dynamics controls. Although original SWC-based partial correlation basically supported our findings, the results highly depended on the controlling factors selected. This study implied that R_m rather than original SWC should be preferred for understanding soil water dynamics controls.

[4] Hu, W., Si, B.C., Biswas, A., Chau, H., 2017b. **Temporally stable patterns but seasonal dependent controls of soil water content: Evidence from wavelet analyses.** Hydrological Processes, doi: 10.1002/hyp.11289.

Abstract: Scale- and location-dependent relationships between soil water content (SWC) and individual environmental factors have been widely explored. SWC is controlled by multiple factors concurrently; however, the multivariate relationship is rarely explored at different scales and locations. Multivariate controls of SWC at different scales and locations in two seasons within a hummocky landscape of North America were identified using bivariate wavelet coherency and multiple wavelet coherence. Results showed that depth to CaCO_3 layer which was correlated with elevation over all locations at scales of 36–144 m and $\cos(\text{aspect})$ provided the best individual factor for explaining SWC variations in the spring (May 2) and summer (August 23), respectively. Although spatial patterns of SWC were temporally stable, different topographic indices affected spatial distribution of SWC in different seasons (elevation in spring and aspect in summer) due to different dominating hydrological processes. These varying hydrological processes also resulted in the distinct role of soil organic carbon (SOC) content in different seasons: a positive correlation in the spring and a negative correlation in the summer. Multiple wavelet coherence identified a combination of depth to CaCO_3 layer and SOC in spring and a combination of $\cos(\text{aspect})$ and SOC in summer that controlled SWC at different scales and locations, respectively. This indicated a combined effect of soil and topographic properties on SWC distribution and a clear need for these two factors in developing scale-dependent prediction of SWC in the hummocky landscape of North America.

Waikato/Bay of Plenty

Lincoln Agritech

Denitrifying bioreactor installed to treat tile drain discharges

A series of autumn storms had thrown some spanners in the works, but in July the Hamilton team ultimately succeeded in commissioning a pilot-scale denitrifying bioreactor on a Hauraki Plains dairy farm (Fig. 1). Led by Aldrin Rivas (LAL) and Greg Barkle (Aqualinc), this project forms part of ESR's 'Groundwater Mitigations' research programme. The bioreactor has an effective volume of approx. 60 m³ filled with locally sourced untreated pine woodchips. We continuously monitor flow, electrical conductivity, bioreactor temperature, and rainfall at the site. Inlet and outlet waters are proportionally sampled for nitrogen and carbon species and a range of other analytes. This comprehensive monitoring programme will enable us to assess the effectiveness of the bioreactor in attenuating nitrate and to ascertain whether there are any negative side effects.



Figure 1 Construction of the denitrifying bioreactor: a) excavation of the pit, b) geomembrane lining, c) filling with woodchips, d) control box installation.

Strong kiwi presence at LuWQ2017 in The Hague

195 participants from 29 countries met in late May in The Hague, Netherlands, for the Land Use and Water Quality 2017 conference, which is an international and interdisciplinary conference on the cutting edge of science, management and policy to minimise effects of agriculture and land use changes on the quality of groundwater and surface waters. While kiwis had already been well represented at the

two previous conferences (2013 in The Hague, 2015 in Vienna), many participants noted both the quantity and quality of presentations from New Zealand – almost 20 in total! In keeping with the scope of the conference, kiwi participants came from Regional Councils (Taranaki, Hawkes Bay), universities (Massey, Canterbury), research providers (AgResearch, Lincoln Agritech, ESR), industry (DairyNZ, consultancies), and NGOs (Fish&Game). The pdf files for most oral and poster presentations are available at <http://www.luwg2017.nl/>

Waikato University

Three new research cakes were baked – each one representing a new piece of work (published or started) in the WaiBER group (<https://waiber.com/research-cake/>)

Reducing nitrous oxide emissions



This cake summarises [a recent published paper](#) from **Sheree Balvert's** PhD research looking at whether secondary metabolites found in brassica crops can decrease nitrous oxide emissions from cow urine applied to soils. Nitrous oxide is a potent greenhouse gas and there is a great deal of interest in finding ways to decrease these emissions.

The left of the cake represents soil amended with these secondary metabolites (glucosinolate hydrolysis products) where the molecular structures of some of the compounds are drawn with white icing, and the right side is control soil. The

length of the vertical noodles represent the nitrous oxide emissions measured from each treatment, short noodles = lower emissions (not to scale). So, overall Sheree's study identified some plant derived compounds that have promise for reducing greenhouse gas emissions from agriculture.

Temperature monitoring in Antarctica



This cake shows the measurement of climate data in the Wright Valley, Antarctica and forms the basis of **Annette Carshalton's** Masterate thesis. The grey poles represent 5 climate stations distributed up the valley. The red piping under each tower represents the temperature fluctuations. Annual summer temperature is portrayed by the size of each of the climate towers (smaller being colder). As expected there was an altitudinal trend with colder temperatures on Mt Flemming compared to the temperatures see in the bottom of the Wright Valley on the coast.

4 parts per thousand



Louis Schipper was involved in a recent commentary in Nature Climate Change on the 4 per mille initiative. This initiative encourages carbon storage in soil to offset greenhouse gas emissions. On the left is what 4 per mille looks like: the dark chocolate buttons are soil C and the white buttons are the 4 per mille accumulation, actually it is about two/three year's accumulation (hard to weigh out such small amounts).

On the lower right is some competing use of residues which are needed to increase soil carbon – fuel for cooking or construction of shelter. Above right is incorporation of residues in soil – hopefully improving soil quality and supporting potentially production.

AgResearch, Ruakura



In June **Stuart Lindsey** travelled to Nanjing China to present to an international dairy forum (Pictured left).

Jiafa Luo and **Surinder Saggar** (Landcare Research) have started a field trial to determine nitrous oxide emissions from beef or dairy cattle excreta deposited on lowlands and medium hill-country slopes. In this trial fresh cattle urine and dung were collected and applied. The trial is being conducted at four sites: Northland, Waikato, Manawatu and Otago, to provide the necessary climatic and soil variation, while also being representative of the physical location of dairy and beef cattle within New Zealand.



Photos:

*Left: **Bill Carlson** applying treatments*

*Below: **Alison Rutherford** collecting gas samples*



Landcare Research

Suzanne Lambie is leading a multi-disciplinary team looking at the best options for land use following harvest of *Pinus radiata* on the East Region of New Zealand. The team includes Michael Marden, Andrew McMillan, Raphael Spiekermann, Tarek Soliman, Patrick Walsh, Shaun Awatere and Miko Kirschbaum. They will be using identification of the most erosion prone land, economic and biophysical modelling in combination with wānanga and engagement with the local community to determine if natural regeneration or conversion to mānuka plantations for honey production are the better options for erosion control than *Pinus radiata*. The project is funded by the Sustainable Land Management and Climate Change Research Programme and will run from July 2017 until June 2020.

Manawatu

Massey University

Aaron Stafford has completed and submitted his PhD entitled 'Distribution of cadmium (Cd) in long-term dairy soils, its accumulation in selected plant species, and the implications for management and mitigation'. This study involved assessing the spatial and depth variability of Cd within two long-term dairy farms (in the Waikato and Canterbury regions) and quantifying the influence of factors such as soil type and land management history on soil Cd variability. Further to this, the research project also investigated Cd accumulation in a diverse range of forage plant species that are now used within livestock grazing systems. The purpose of this was to understand the relative risk to livestock Cd accumulation from grazing these forages, as well as to determine the influence of site (soil characteristic), environmental (soil moisture) and mitigation (manipulation of soil pH) factors on soil Cd phytoavailability and accumulation. Aaron was supervised by Dr's Chris Anderson, Mike Hedley and Jeya Paramsothy.



Aaron Stafford putting in the effort (left) and one of the trial sites with forage plant species (below).



Jeyakumar Paramsothy (Jeya) recently attended the ICOBTE 2017 conference in ETH Zurich, Switzerland and gave an oral presentation on 'Cadmium risks to soil, crop and livestock productivity in New Zealand agricultural system and strategies for mitigation'. Jeya also received an opportunity to visit an underground rock laboratory in Swiss Alps (Grimselpass Region), which provided insights into the research on deep geological disposal of radioactive waste in crystalline host rocks.

Lucy Burkitt and **Jay Howes** recently spent 3 weeks in Europe looking at how other researchers are tackling the issue of reducing agriculture's impact on water quality and attended the Land Use and Water Quality Conference in The Hague. They spent time in Ireland observing the impressive high frequency water quality and on farm monitoring being conducted as part of the Agricultural Catchments Program being run by Teagasc and spoke with researchers at the Irish EPA about their new plan to improve water quality across the country. They also visited the Eden Catchment Project in the UK and observed their catchment monitoring, on farm mitigation research projects and heard about the extensive farmer engagement which is embedded in this project. The conference provided an opportunity to present Massey University research findings and meet and engage with a wide range of researchers and practitioners from across the globe. There was a strong delegation of Kiwi's (16) attending the conference, for the first time. The final few days were spent with the Catchment Science and Environmental Management group at Aarhus University, discussing issues around nitrogen and phosphorus loss from agriculture and observing their studies with biofilters, intelligent buffers and constructed wetlands to intercept nutrients leaving Danish farms.



Left: Teagasc Soil Scientist Noeleen McDonald and Agricultural Catchments Program Technician Mick Fleming speaking with Jay Howes

Right: Nitratax and Phosphax sensor used for high frequency nitrate and phosphate monitoring of water quality as part of the Agricultural Catchments Program in Ireland





Left: Constructed wetland at the edge of an agricultural field in Denmark

Lucy Burkitt recently organised a mini Tuapaka Hill Country Research Symposium to present current findings from their soil, water quality and animal science research to date. There were a variety of presentations on water quality monitoring, sediment and nutrient loss from hill country cropping, GIS and climate data, dissolved organic carbon changes following hill country cropping and selecting supplement feeding areas to reduce surface sediment and nutrient loss. Presenters included Lucy Burkitt, Dave Horne, Mike Bretherton and students Grace Chibuike (PhD) and Petra Fransen (Masters). The interest in hill country research was evident by the attendance of about 50 participants representing regional councils, fertiliser companies, consultants, Beef+Lamb NZ, farmers and researchers, with many travelling from across the lower North Island to attend.

Ranvir Singh travelled to Denmark to attend and present at the International Conference on Innovative Solutions for Sustainable Management of Nitrogen 'dNmark2017' (see the link: <http://sustainablenconference.dnmark.org/>). In Denmark he also visited Professor Brian Kronvang and his team at the Aarhus University and took this opportunity to participate in the plenary and expert panel meetings (open to the conference participants) of the Task Force on Reactive Nitrogen (<http://www.clrtap-tfrn.org/>). At the dNmark2017 conference, Ranvir gave an oral and a poster presentation of on-going research work at Massey University to better understand and model nitrogen flow pathways and its attenuation in sensitive NZ agricultural catchments. This led to good discussions with other researchers, particularly from Denmark working on measuring and modelling of nitrogen attenuation in Danish agricultural catchments. Ranvir spent two days with Brian Kronvang (who this year had attended the FLRC Workshop at Massey University) at the Aarhus University and visited water quality monitoring and research sites in Danish agricultural catchments. The research team are increasingly focused on assessment and mapping of 'natural' nitrogen attenuation capacity and development of 'edge-of-field' techniques such as integrated drainage-wetland system, wood-chip bioreactors and intelligent saturated buffer strips to 'built' nitrogen attenuation capacity in Danish agricultural catchments. This aligns well with research priorities and programs at Massey University, to develop solutions and techniques for targeted water quality management in sensitive agricultural catchments.



Ranvir Singh with Professor Brian Kronvang discussing water quality monitoring and research in Danish catchments.

Landcare Research

Our soils group recently welcomed **Michael Blaschek**, pedometrician, to our team in Palmerston North. Michael obtained a PhD from the Faculty of Mathematics and Natural Sciences from Kiel University, Germany, on the topic "Digital soil mapping at different spatial scales using machine learning algorithms and multivariate geostatistics in a Mediterranean basin". Michael is now working with **Carolyn Hedley** and **Pierre Roudier** in soil spectroscopy and digital soil mapping projects, to research new methods for mapping soil attributes at different scales. Carolyn has recently been selected as a member of the Scientific Committee of the IUSS Working Group on Proximal Soil Sensing, and Pierre as Scientific Committee member for the recent Pedometrics 2017 conference held in Wageningen. Here, Pierre presented on some digital soil mapping research activities ('Mapping soilscales using soil co-occurrence networks'; 'Algorithms for quantitative pedology'; 'How universally is soil carbon increasing in New Zealand's hill country?').

Surinder Saggar organised a workshop for the recently funded Global Partnership in Livestock Emissions Research (GPLER) project "Mapping and managing urine patches to reduce nitrous oxide emissions". Attendees representing AgResearch, Massey University, Pastoral Robotics Limited, Landcare Research, Teagasc (Ireland) and DPI (Australia) spent 2 days planning this new 3-year project. The work focuses on accurately measuring, mapping, and modelling the location, size and shape of urine patches to facilitate targeted nitrous oxide emissions reduction by further developing Spikey® (a NZ-designed machine that detects and treats freshly-deposited urine patches). The project will: i) develop a purpose-built Spikey for Research herein termed "Spikey-R" that will not only identify the location of urine patches but also provide information on urine patch configuration to assist in targeting appropriate cost-effective approaches to reduce nitrous oxide, ammonia and nitrate losses; ii) evaluate its performance against aerial sensing technology in mapping variable urine patch shapes and sizes; iii) determine the effect of urine patch dispersion on emissions; and iv) estimate the potential for mitigation treatments to reduce emissions from grazing systems in New Zealand and other Global Research Alliance countries.

On invitation from Chinese Academy of Agriculture Sciences Surinder Saggar travelled recently to the first International Workshop on Agriculture Ecosystems and Environments where he gave a Keynote address highlighting main research directions for Agriculture GHGs and Soil Carbon, and chaired a session on Agroecosystems and GHG emissions, at Nanning, China. This participation has the potential of future collaboration with China mainly in hosting Post graduate and Post-Doctoral researchers involved in Greenhouse Gases and soil carbon research funded by China.



Plant & Food

Karin Müller spent May and June in Europe in the frame of the European-funded RISE project 'PROTINUS' (<http://www.protinus.ird.fr/>). First stop was Aalborg University in Denmark. During the secondment Karin conducted solute transport experiments with water-repellent sandy soils and continued developing new protocols for the analysis of X-ray CT images together with PROTINUS colleagues from Aalborg and Aarhus University. Karin had the opportunity to take part in a field trip and admire some beautiful soils and sites in Denmark. The team buried teabags under different land use to determine degradation indices for Danish soils. This work is contributing to the global network on soil awareness (<http://www.teatime4science.org/>). We decided to extend this mission to New Zealand during this summer. Watch this space!

Then Karin travelled to the next PROTINUS network partner, Padova University in Italy. In the meantime, 64 intact soil cores, collected in April at FAR's long-term irrigation and cultivation trial in Chertsey, had arrived in Italy. The cores were equilibrated prior to scanning the entire core with micro-X-ray CT at a resolution of 30 μm . The team started analysing the resulting approximately 250 GB of data, which will be continued during Nicola dal Ferro's reciprocal visit in Hamilton this spring. Subsequently, the soil cores were used to determine the soils' gas diffusivity and air permeability.

Two very enjoyable months in Europe, which were not only productive but also packed with culture. The highlight was a visit of the Arena in Verona with colleagues from Padova University.



Top left: Set-up for solute transport experiments with intact soil cores at Aarhus University, Denmark. Top right: 120-year old cultivation trial in Denmark. Middle: Beautiful soil profile – time for a rest and a cup of tea during the field trip through Denmark.



Left: The Arena in Verona.

Right: Francesco, Giovanni, Karin and Nicola in anticipation of Aida.

Canterbury

Plant and Food Research, Lincoln

Dirk Wallace joins PFR as a scientist to replace Abie Horrocks. **Stephanie Langer** joined us recently, adding to the Soil Physics team. **Sam Wilson** has joined us on contract, to cover for Gina van der Klei, who is on parental leave with baby Phoebe.

In June, the Foundation for Arable Research held their Conference “Growing Sustainable Futures” at Lincoln University. On Thursday 29th June, Trish Fraser and Steve Thomas hosted about 150 farmers and industry representatives at the Plant & Food Research Lysimeter Facility, who were on a field trip as part of this conference. Steve and Trish showed them around the facility and discussed “The role of lysimeters in understanding N and irrigation losses from cropping systems”.



Trish Fraser and Steve Thomas address some of the delegates to the FAR conference

We've had a very wet winter in Canterbury, with July alone measuring over 120 mm of rain. It seems that just as the soil is starting to dry, another dump of rain occurs. This has been very frustrating for Brendon Malcolm and his team with their work in the FRNL program. Trials at LURDF on the effects of cover crops on nitrate leaching mitigation following fodder beet grazing have been compromised. The

planned treatment to back fence cows during grazing to minimise soil damage was abandoned as the soil became too wet. The plan is still to sow green feed oats to mop up surplus nitrogen but regular rain has prevented this to date. Cover crops have been sown at the Ashley Dene farm on the lighter soils, but nevertheless in very wet conditions.

A bit late – but we got this up earlier in the year from the 2015 international year of soils <https://zenodo.org/communities/nzsss2015/?page=1&size=20>

Lincoln University

Congratulations to **Roshean Woods** who successfully defended her PhD: “*The Effect of Alternative Forage Species and Gibberellic Acid on Nitrate leaching*”. Roshean was supervised by Professors **Keith Cameron, Hong Di, Tim Clough** and **Grant Edwards**. Her research project was conducted as part of the ‘Forages for Reduced Nitrate Leaching’ (FRNL) research programme funded by MBIE and DairyNZ. Roshean is currently working for the agricultural consultants AgriMagic, based in Christchurch.

Congratulations also to **Peter Carey** who was also successful in defending his PhD “*Crop recovery of urinary nitrogen following simulated winter forage grazing*”. Peter was supervised by Professors K.C. Cameron, H.J. Di, G. Edwards, and Associate Professor J.L. Moir. Peter is currently working for the Centre for Soil and Environmental Research.



Congratulations to **Minakshi Mishra** (left) who won the “Best presentation by a Young Professional” at the NZ Land Treatment Collective’s (NZLTC’s) annual conference in Christchurch in 2017. Minakshi Mishra is a final year PhD student at Lincoln University, studying soil microbiology. Her study aims to identify the potential of two native New Zealand plants species, *L. scoparium* and *K. robusta*, known for their specific antimicrobial properties, against biowastes pathogens. She received a scholarship to attend the NZLTC conference. Minakshi found that it was a great opportunity to meet people from a variety of different fields who are together

working hard to create a change in the perception around the beneficial use of biowastes. It was also a great opportunity to present her results in front of scientists and professional people from a range of stakeholder groups and public sector authorities.

Building on the enthusiasm from the Wanaka Competition last year, two student teams from Lincoln are busy raising funds and practicing their soil description skills for the upcoming 5th National Australian Soil Judging Competition in Queensland, in September. So far, they have raised funds from a quiz night and have received sponsorship from the NZ Society of Soil Science and several local organisations.

The Soils Department has a new social media presence. The blog is designed to be a dynamic site with up to date information on the activities and people in the Department. It aims to connect with a broader (and possibly younger!) audience; using a range of posts on soil related topics to help promote a wider understanding of soil science in society. Check it out here: <https://earthwordsblog.com/>

Scion (Rotorua / Christchurch)

After a long absence, Scion is proud to be back in Soil News. The last few years have seen a tangible increase in support for soil research across the forestry sector, which has enabled the establishment of many new projects. Successful interim results from a number of these projects has driven further enthusiasm for putting the science into practice, and currently several large operational scale trials are in development. This interest in soil and soil management has also been a driving factor in the establishment of a new generation of long term forestry trials that Scion has developed, which have only been possible with considerable sector support.

Staff and Students

The Scion soil science staff are very happy to announce two recent additions to the team. **Steve A Wakelin** has joined Scion as the Research Leader overseeing Systems Ecology, and **Amanda Matson** has been appointed to the Soil Plant Ecology team.

Steve joins Scion from AgResearch, and will be applying his expertise in soil microbial ecology to help improve forest growth and nutrient use efficiency. The leadership role Steve has taken on will help keep soil research in the spotlight in the forestry sector. Amanda has studied soils around the world, and her PhD focussed on arboreal soil – the soil that forms in trees from decaying litter. Amanda has already contributed to a number of projects, and is pursuing new research regarding factors influencing nitrogen mineralisation in planted forests. Steve is based out of Christchurch, while Amanda is based in the main Scion facility in Rotorua.



Amanda Matson examining arboreal soils – not often you need ropes to dig up soil samples

Marta Gallart (University of Canterbury) recently defended her Ph.D thesis examining the interactions between different genotypes of radiata pine, ectomycorrhizal fungi and the ability of the trees to utilise nitrogen present in the soil in different organic and inorganic forms. This work contributed directly to efforts by Scion to improve the efficiency of nitrogen management.

The Growing Confidence in Forestry's Future (GCFF) MBIE Programme

This programme is designed to increase the productivity of all forests, across all of New Zealand. Enhancing the beneficial impacts of soil on forest performance has been a key component of this project since its inception, as has assessment of the impacts of forest management on soil properties. The scope of the funding (annually 3.75M from MBIE, 1.6M from the sector plus significant additional sector funding for specific projects) has enabled the development of integrated projects that combine data describing the microbial community, nutrient pools and flux, physical properties and molecular analysis. This provides a much greater understanding of how soils are shaping the planted forests of New Zealand, and how soil management can become an effective and sustainable tool for forest managers.

Some soil based highlights of this work are:

Accelerator Trials

This trial series is the flagship of the GCFF programme. These very large trials are designed to remove the limitations to productivity over the life of the rotation until the biological growth maxima of the trees is reached. Manipulation of soil is a key factor in overcoming these limitations, and various treatments involving altering soil properties have either been undertaken or are planned.



Plot layout at the Ashley Forest Accelerator Trial site. This trial was established in August 2017 over approximately 11 hectares.

Site Modification Trials

This trial series has been developed to identify soil amendments that stimulate beneficial soil microbial activity. Five sites were established in 2015 and treatments to alter soil microbial community properties have begun. Metrics being examined include nitrogen mineralisation rates, carbon substrate utilisation and shifts in the abundance of particular genes of interest. This data will be analysed with health and growth data from the sites. Early results from one treatment have already led to the development of a 65 ha trial by a sector partner.

Site Specific Nursery Management Trials

The properties of forest soils can differ markedly, but the treatment of seedlings in the nursery does very little to account for this. This can result in poor establishment rates and slow early growth. To address this issue, a national trial series has been established over 46 sites with differing soil properties, then stocked with seedlings produced using a variety of methods. Measurements of tree growth will help identify what nursery practices produce seedlings that are most suited to specific soil properties. This data will then help nurseries modify management strategies so that the seedlings they produce are better adapted to the forests where they will be planted.

Maintaining forest soil function over multiple rotations

Nutrient removal during the harvest of a mature forest stand is substantial, and can be exacerbated by the harvesting method used. However, few long term studies of the effect of different harvesting intensities on the ability of soil to supply nutrients throughout the life of the next rotation of trees. Under the GCFF programme, Scion has been able to conduct comprehensive end-of-rotation soil assessments at three such long-term study sites. These sites were established roughly 28 years previously, and included a range of treatments imposed by different levels of organic matter removal at harvest. The collection of soil physical, chemical and biological activity data has determined that the effect of these treatments can have significant long term implications for soil function during the life of the next rotation, which can manifest as reductions in tree growth. The details of these assessments will be published shortly in a range of papers that explore various observations made during the analysis of the soil data.

All presentations made at the 2017 GCFF conference are now available online, featuring several that present new information on the soil science Scion has been conducting. Please visit <https://gcff.nz/news-and-events/gcff-2017-conference-presentations/> to explore these. Included amongst these is a presentation by Associate Professor Brian Strahm (Virginia Tech), who visited Scion for the first half of 2017. Brian worked closely with the Scion soil science team on various matters related to his expertise in soil nitrogen and responses to nitrogenous fertiliser applications in planted forest ecosystems. His presentation explores some of the issues he has encountered working in the Southeastern and Pacific Northwest planted forests in the USA, and also identifies a number of parallels with forest soil management in New Zealand.

How to sample forest soils 101

Loretta Garrett is the star of three short videos that provide practical information on how to effectively collect soil samples in planted forests. In recent times a number of forest companies have approached Scion for soil sampling training in order to conduct sampling campaigns in their estates. These videos were developed to help augment this training, and can also be used as a good first step for anyone else interested in sampling the soil under their trees. The videos are available at <https://gcff.nz/publications/videos/>

Other notices of interest

From the Desk of Rattan Lal

Viewpoint 6.2017

1st June 2017

Sub: Soil: The Global Icon

Fellow Soil Scientists,

Soil is the essence of all terrestrial life, and critical to the delivery of major ecosystem services for human wellbeing and nature conservancy. Yet, the term “soil” does not arouse the much deserved excitement or the “wow” moment among general public, civil societies, policy makers, and others. Indeed, the term “soil science” should be more awesome than the proverbial “rocket science” term. On the contrary, the term soil is prone to the MEGO (My Eyes Glaze Over) syndrome. Thus, there is a strong need for a global icon that symbolizes the importance of soil as the elixir of terrestrial life, provider of food, moderator of climate, filter and reservoir of renewable water, habitat for germplasm, inspiration for aesthetical and spiritual activities, source of pharmaceuticals and other materials, archive of planetary and human history, among others. As an example of an icon, the WWF has been extremely successful in using the panda as an iconic symbol. What iconic symbol can represent major ecosystem services of soil, while being simple and easy to be comprehended by the general public? Thus, identifying and promoting such a symbol would be a great leap forward. An imaginative option is that based on a statement by Carl Sagan, an American Astronomer (1934-1996).

Sincerely,

Rattan Lal, Columbus, Ohio

President, International Union of Soil Sciences

Land Monitoring Forum (LMF) Special Interest Group

The LMF, representing land and soil monitoring by regional authorities, held its bi-annual meeting back in March. The work of the forum can be considered as forum-wide projects that are national in scope and region specific or business as usual (e.g. soil quality monitoring) projects.

The role of administrator was passed from **Haydon Jones** on to **John Drewry**. Thanks to Haydon for all his efforts in LMF administration over the last 4 years and to John for taking over this important role.

Updates were received from the LUCCS (Land Use Capability Classification System) and S-Map groups, Environmental Monitoring and Reporting (EMaR), Land, Air, Water Aotearoa (LAWA) and National Environmental Monitoring Standards (NEMS). National consistency in land and soil monitoring and reporting is the aim for the EMaR Land, LAWA Land Module, and the Suspended Sediment Monitoring NEMS. A second Land-related NEMS for Soil Quality and Trace Element Monitoring is planned to get underway next year subject to funding being confirmed. The aims of the EMaR Land project were progressed via two Envirolink Large Advice Grant projects currently underway, one on a review of regional soil quality monitoring programmes, the other on soil conservation/farm plan/riparian works data with a view to developing national reporting and potentially effectiveness monitoring. Several Envirolink and MBIE proposals were also discussed. One potential project is a rigorous scientific analyses of the potential for using our soil quality/trace element data at a national scale to better inform public and policy perspectives. Mike Beare and Sam McNally from Plant and Food Research Ltd presented on C and N soil quality indicators. An Envirolink funded project is now underway.

Here is a list of topics covered during the “Regional update” to give an idea of the breadth of work:

Soil quality monitoring and mapping, land use classification/modelling, land cover, Integrated surface catchment models, soil moisture monitoring, load and loss estimates to receiving environments, pathways of overland flow, sediment source tracking, critical source areas, study of nutrient losses from vineyard soils, terrestrial ecosystems, wetlands, peat soils, monitoring/mapping riparian condition and extent, soil intactness/wind erosion monitoring, investigations into soil water balance/drainage losses/modelling soil hydrological properties, winter forage and multi-element geochemical baseline of southern New Zealand soils surveys

The next meeting will be held 24-25th August 2017.

Matthew Taylor

News from the Royal Society

Mentoring guidelines for researchers

Royal Society Te Apārangī has released new guidelines on mentoring researchers in Aotearoa New Zealand, *He waka eke noa: Mentoring in the Aotearoa New Zealand research community*. This project was led by members of the Society's Early Career Researcher Forum, as well as drawing on more senior researchers. The guidelines draw on the richness of Māori and Pasifika perspectives, and are designed to be of practical use in a variety of research contexts.

The mentoring guidelines are available on the Royal Society Te Apārangī website (<https://royalsociety.org.nz/what-we-do/research-practice/mentoring-guidelines/>).

The Sir Hugh Kawharu Masters Scholarship for Innovation in Science

The Sir Hugh Kawharu Masters Scholarship for Innovation in Science is awarded by the Kawharu Foundation and comprises a grant of \$10,000 for a Māori student engaged in one or two year full-time masters level study in the sciences. The Scholarship is applicable across a broad range of science disciplines including the physical, mathematical, computational, earth, environment, marine, social, health, biological, biomedical, human, and behavioural sciences. Applications for the 2018 academic year close on **15 September 2017**. Further information about the Scholarship and an application form is available on the Foundation's website: www.kawharufoundation.org.nz

European Soil Data Centre News

Global assessment of pressures on soil biodiversity

The Joint Research Centre's Soil Team is working on the first global assessment of the impacts on soil biodiversity of both anthropogenic and non-anthropogenic pressures. To reach this goal, JRC carries out a **survey** to incorporate expert judgements. The result of this survey will allow to rank the main pressures on soil life and map their distribution at the global scale. Responses to the survey are essential for determining how to weigh each pressure in the cumulative impact maps that will be produced. Therefore, your participation in this process is highly appreciated. Contact person: Alberto Orgiazzi (alberto.orgiazzi@ec.europa.eu).

Here is the link to the survey: <https://goo.gl/forms/F2MZb4hNUNGx4mCt1>

Conferences:



**Precision Agriculture
Association New Zealand**
TECHNOLOGY FOR SUSTAINABLE GROWTH

PA17 - The International Tri-Conference for Precision Agriculture in 2017

- 7th Asian-Australian Conference on Precision Agriculture
- 1st Asian-Australasian Conference on Precision Pastures and Livestock Farming
- Digital Farmer and Grower 2017

EARLYBIRD REGISTRATION CLOSING 31 AUGUST 2017

Monday 16 - Wednesday 18 October 2017
CLAUDELANDS CONFERENCE AND EXHIBITION CENTRE, HAMILTON, NEW ZEALAND

Meet, discuss, influence and learn....

Precision Agriculture Association of New Zealand (PAANZ) invites researchers, farmers and growers, service and support organisations, to join them at PA17 – The International Tri-Conference for Precision Agriculture!

REGISTRATION NOW OPEN

This conference offers more than 20 world renowned keynote speakers offering their exciting views on precision agriculture and its use.

A selection of our keynote speakers:



**PROFESSOR
DANIEL BERCKMANS**
Katholieke Universiteit
Leuven, Belgium



**PROFESSOR
DEREK BAILEY**
New Mexico State
University, USA



**PROFESSOR
RAJ KHOSLA**
Colorado State University,
USA



**PROFESSOR
MAOHUA WANG**
China Agricultural University,
China

**Confirmed speakers, registration, post conference tours and
conference details are available at www.7acpa-2017.org**

Enquiries to: ForumPoint2 Conference Partners | T: +64 7 838 1098 | E: conference@fp2.co.nz

3 – 7 September 2017

6th International Symposium on Soil Organic Matter
<http://www.som2017.org/index.php?id=14387&L=1&type=300>

10 – 12 October 2017

NZARM Conference – Managing Soil and water interaction through people and science
Transport Museum, Invercargill
<http://nzarm.org.nz/events/conferences/conference-2017-details/>

15 – 19 October 2017

2nd Global Soil Biodiversity Conference

The China Soil Microbiome Initiative (CSMI) and Global Soil Biodiversity Initiative (GSBI) are pleased to announce the second Global Soil Biodiversity Conference (GSBC2) that will be held from 15-19 October 2017 in Nanjing, China. Currently there are 15 concurrent sessions that welcome abstract submission for oral or poster presentations. JRC Soil team is chairing and presenting in the session “**CS07 Biodiversity & ecosystem functioning**”:
<http://gsbc2.csp.escience.cn/>



5 December 2017

Wai-BoP Soils 2017

One-day conference: Tuesday, 5th December, 2017
MSB1.05, Hillcrest Rd, University of Waikato, Hamilton

Call for papers and notification of attendance

The fourth one-day regional conference of Waikato-Bay of Plenty-based soil scientists and guests is to be held on **World Soils Day, Tuesday 5th December, 2017**, University of Waikato, Hamilton. Being convened by David Lowe, Louis Schipper, Megan Balks, and Tanya O'Neill of the Earth sciences programme of the School of Science, Faculty of Science and Engineering, University of Waikato, the conference provides 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.

Something for everyone and generous sponsorship

Although the meeting targets Waikato-BOP soil scientists, we welcome attendance from those in other regions who have a professional interest in soils and land (e.g., from Northland, 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-us/> (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, Landcare Research, AgResearch, NZSSS, and University of Waikato**. This year's venue is room **MSB.105** in the Management Studies Building, Hillcrest Road (see <http://www.waikato.ac.nz/contacts/map/>). The time of conference opening will be confirmed later but is likely to be early, around 8:00 am.

N.H. Taylor Memorial Lecture: all welcome



The conference is to be concluded with the N.H. Taylor Memorial Lecture for 2017 by **Professor Tim Clough** (Lincoln University). Note that if you just want to attend the Taylor Lecture, but not the conference, then you are very welcome to come along to MSB1.05 (Management Studies Building) on Hillcrest Rd, Waikato University, from around 3.30 pm for afternoon tea before the lecture starts (provisionally) at 4.00 pm on Tuesday 5th December.

Prof Tim Clough

Please email David Lowe before 7 November to present or attend

If you want to present an oral paper, **you must email David Lowe** (david.lowe@waikato.ac.nz) by **Tuesday 7 November 2017** 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. No abstracts are required. All papers will be oral presentations, probably 12 minutes in total, comprising 10 minutes for presentation followed by 2 minutes for questions or comments, strictly enforced. Presenters of papers will be notified of acceptance or otherwise a week or so after the deadline.

For catering purposes, 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 Tuesday 7 November, 2017**. 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 2017 conference on the 5th of December. Remember: "Wai-BoP Soils? Why not!"

David Lowe, Louis Schipper, Megan Balks, Tanya O'Neill

3 – 9 September 2018

<http://17wfc.csp.escience.cn/dct/page/1>

Save the date!

17th World Fertilizer Congress
of the
International Scientific Centre Of Fertilizers



Go East! Fertilizers Future!

September 3-9, 2018

Shenyang, P.R. China

Jointly organized by:



ISCIF Asia, Shenyang, P.R. China
Chinese Academy of Sciences (CAS), Beijing, P.R. China
Institute of Applied Ecology (IAE), Chinese Academy of Sciences, Shenyang, P.R. China
Bureau of International Cooperation, Chinese Academy of Sciences, Beijing, P.R. China
International Scientific Centre of Fertilizers (ISCIF), Braunschweig, Germany
Institute for Crop and Soil Science, Julius Kühn-Institut, Braunschweig, Germany
Distribution of 1st circular: August 15, 2017

<http://17wfc.csp.escience.cn>

The north-east of China has been traditionally the centre of fertilizer production and fertilizer research so that Shenyang was the predestined location to host the 17th World Fertilizer Congress. Food security and food safety are of prime interest on a global scale as are environmental aspects and soil protection issues. An increase of fertilizer rates for meeting these objectives can only be constructive if the nutrient supply is the yield limiting factor whereas a surplus can be regularly found in the nutrient balances of intensive agricultural production systems which has to be seen critically with a view to groundwater pollution with nitrates and discharge of phosphorus by surface run-off and erosion. On big livestock enterprises the contamination of slurries and manures with antibiotics poses a risk for soil and human health, which strengthens the need for alternative treatments and quality assessment of farmyard manure and recycled fertilizer products such as digestates which process these resources. The future of fertilizers will be closely linked to a significant increase in nutrient utilization efficiency which implies the use of fully plant available nutrient resources, a purely demand-driven fertilizer input and a reduction of nutrient losses to the environment. Parallel the pressure on agriculture to employ recycled fertilizer products will increase as the disposal of wastes is costly and re-utilization of nutrients politically encouraged. This makes research with respect to the innocuousness of fertilizer products an important branch in order to assess putative risks for the quality of soils and plants. Innovations in the mineral fertilizer production sector will have to focus on resource efficiency which starts for instance in case of phosphorus with mining and extraction of precious metals such as uranium and lanthanides besides the nutrient itself.

Traditionally the World Fertilizer Congress is open to all aspects related to plant nutrition, soil fertility, fertilisation and fertilizers. We invite especially contributions on **various aspects of global interest**. The major clusters are:

Novel fertilizer products

Precious rock material: phosphorus, uranium and lanthanides

Agronomic and environmental issues of recycled fertilizer products

Dropped aspects of droppings

Wastewater against starving and parched plants

Precision agriculture or when less is more

Fertilization and soil health

Fertilization and environment

In invited lectures internationally highly acknowledged scientists will present cutting-edge research and state-of-the-art facts for each of the themes. The World Fertilizer Congress brings together fertilizer manufacturers and scientists from all over the world interested in the specifics of plant nutrition and fertilization. Participants will leave the symposium having shared ideas, having contributed to the body of knowledge concerning fertilizer use, and having made friends and contacts for future research.

18 – 23 November 2018

ASA National Soils Conference 2018

The National Soils Conference 2018 will be held at the Hyatt in Canberra between the 18th and 23rd of November. The conference will have the theme *Soil: The key to past, present and future* and we expect that the conference will be a great opportunity for you to showcase your work and to network with your colleagues. There will be significant emphasis on the practice of soil science. Sponsorship opportunities will be available, and a prospectus will be sent to each member of the society.

<http://www.soilscienceaustralia.com.au/new/404-2018-national-soils-conference>

Hold the Date – Soils 2018

3-6 December 2018, Napier, New Zealand

Soils2018 will be held in Napier from 3 to 6 December 2018. This biannual conference is a must attend event organised by the NZ Society of Soil Science and OnCue Conferences, and will cover a range of topics under the theme '**diverse soils - productive landscapes**'. The wider Hawke's Bay region is home to a diverse mix of primary production, from forestry and sheep and beef production on the coastal and northern hill country, intensive dairy systems on the flat and rolling terraces abutting the ranges, to highly productive horticulture and cropping on the fertile Heretaunga and Ruataniwha plains. During the 4-day conference you'll get a chance to hear from a wide range of researchers, industry leaders, consultants and advisors, regulators and land managers on all things soil-related, anchored by a range of exciting keynotes focused on soils, food production and hot topics around water use and environmental indicators. The conference will be held at the new Napier War Memorial Conference Centre, a great venue on Napier's iconic Marine Parade that looks out on Cape Kidnappers and the city coastline. Centrally located, the NWMCC is across the road from local hotels, restaurants and the downtown shopping precinct. Around the conference you'll have a chance to connect with your colleagues during social activities at some of the Bay's well known wineries, and look at a wide range of offerings from our event sponsors. Further details will be released in the coming months, including a call for paper submissions. In the interim, we'd like to hear your ideas for the science programme – send any suggestions to Diana Selbie Diana.Selbie@agresearch.co.nz.

Rebecca Withnall and Paul Johnstone, co-convenors
Lea Boodee, On-Cue Conference