



Welcome to the Soil News

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In this issue...

From the Editor

Editorial - How soil science in New Zealand has evolved

Related Society Notices

NZSSS Awards

News from the Regions

Conferences and Training

Audio visual

News from the European Soil Data Centre

Abstracts

Obituary - Allan Edward Hewitt



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

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The NZSSS has a Facebook page and Twitter handle (@NZ_Soil_Soc). If you are already a user, please follow us. You can also keep an eye out for new NZSSS posts by checking the feed from our

[website](#)

Officers of the NZSSS 2020-2022

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From the Editor

Welcome to this issue of Soil News.

You may notice a few subtle format changes to this issue. With the help of a colleague who is a Word formatting expert, these have been improved, as the template had several challenges. You should notice an improvement when using hyperlinks from 'In this issue'. We have also enabled you to download Soil News from a web link (as had been done a while back), to avoid anyone missing out via email attachments. Apologies to anyone this may have caused issues for!

Editorial - How soil science in New Zealand has evolved

This month's invited editorial is from Jeff Morton. Jeff has extensive experience in farm soil fertility and nutrient management research, formerly with MAF, AgResearch and Ballance Agri-Nutrients, and now with MortonAg.

How soil science in New Zealand has evolved

It is interesting to reflect on how the focus of soil science in New Zealand has changed over the last thirty years. Back in the early 1990's the large amount of research carried out to determine the nutrient requirements of pastures and crops had largely matured with many of the answers found. And with the advent of the user-pays funding model this development threatened to inhibit the progress of this branch of science. But at about that time concern for the quality of freshwater started to grow and suddenly there was a new role for soil scientists in New Zealand agriculture.

The soil science community needs to be commended for the way that they have identified the key issues and carried out the science to come up with practical solutions to reduce the transfer of nitrogen, phosphorus, sediment and pathogens

from grazed pasture into waterbodies. Overseer nutrient budget, a world class decision support model was developed from some of this research to quantify nutrient losses over a range of farm systems. However proven science results are never of maximum value until they are used to cause positive change, both environmentally and economically. As always, carrying out the science is relatively easy compared with the extension needed to achieve the uptake of the results. For most learning, a small proportion of the early adopters will self-change through reading, consultation with the right people and trial and error. But most practitioners need a more hands-on approach through involvement with like-minded people such as fellow farmers and input from consultants to successfully change. Up until recently the main means of communicating the changes in management or mitigations that are needed on farms have been Farm Environmental Plans that mainly rely on the farmer to apply the advice that has been given. A very encouraging recent trend has been the formulation of many Farmer Catchment Groups which help to facilitate the interaction between farmers that is required.

In the past, one of the advantages that our farming industry has had compared to most other countries has been the joint involvement of farmers, consultants and scientists in successfully integrating the results of science into different farm systems. What one would hope to see is this happening in the Farmer Catchment Groups. There are no better teachers to learn about managing complex whole farm systems from than farmers who do it but they also benefit from learning about new science findings and what other farmers are doing that could help. A good use of rates collected by the Regional Councils could be to encourage this three-way learning model by subsidising the fees of the rural professionals?

Related Society Notices



Planning for the NZSSS 2022 Conference is well underway and we are all looking forward to connecting again in-person.

It is with pleasure that we announce that the **Call for Abstracts is now open!**

Marlborough provides a great backdrop for our conference this year – home to a diverse mix of primary production, including forestry, sheep and beef production, intensive dairy systems, horticulture and viticulture.

We welcome a broad range of abstracts around our conference theme 'Soil: Aotearoa's Most Precious Resource - Past, Present & Future' that cover the full spectrum of soil science across NZ.

Individual (*oral and poster*) submissions are invited in the following **subject areas (themes)**: Please submit an abstract only if you intend to attend and present your abstract in person.

- Carbon sequestration
- Catchment management
- Climate change/environmental change/biodiversity loss
- Contaminated land and waste issues
- Land fragmentation and versatile soils / Productive land sprawl (NPS-HPL)
- Forestry
- Loss of productive soil
- Nutrient management
- Pedology
- Soil health/quality
- Soil security
- Soil technology
- Soil legacy
- S-MAP / S-MAP data and mapping

- Regenerative agriculture
- Viticulture

[For submission instructions and guidelines head to our website, https://www.soilscience.org.nz/conference](https://www.soilscience.org.nz/conference)



NZSSS Awards

Nominations are open and are due by 31 July 2022

Nominations for the awards offered by the Society for 2021 are currently open and will be closing on **31 July 2022**. The awards are listed and key details regarding nomination requirements are provided in the table below. Please take special note of the newly-established Early Career Researcher award, as well as the Soil Judging Stipend.

Please contact Brendon Malcolm, the NZSSS Awards Convenor, for full award details (contact details below). Please do take a look at the NZSSS awards on offer for 2022 and consider submitting a nomination **by 31 July 2022**.

Award	Presented	Nominations close	Nominee eligibility	Nominator eligibility
<i>NZSSS Fellowship</i>	Annually	31 July 2022	Nominees must be active members of the Society at the time of nomination.	Nominations must be made by two Full Members, or Life Members of the Society.
<i>The Grange Medal</i>	Biennially (conference year)	31 July 2022	Open to both non-members of the Society as well as members, fellows, or life members of the NZSSS.	Nominations must be made by two or more active members of the Society.
<i>The Blakemore Award</i>	Biennially (conference year)	31 July 2022	Open to technicians/support staff who have been employed in the field of science for at least three years.	Any two active members of the NZSSS can nominate an eligible candidate from a university, CRI, or other organisation (e.g. a Regional Council).
<i>The Leamy Award</i>	Biennially (conference year)	31 July 2022	Open to the author or authors of the most meritorious New Zealand contribution to soil science, published in the previous three calendar years.	Any two active members of the NZSSS can nominate an eligible candidate(s) from a university, CRI, or other organisation (e.g. a Regional Council).
New <i>Early Career Researcher (ECR) Award</i>	Biennially (conference year)	31 July 2022	Open to ECR's within eight years of completing their highest research qualification	No more than 2-page written nomination by any two active members of the NZSSS.

			(Masterate or Doctorate).	
<i>The Fertiliser Association Award</i>	Annually	31 July 2022	Open to postgraduate (PhD) students in soil science about to enter their third year of study. 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.	Nominations must be received in writing from the Head of the Soil or Earth Science Department/Group at a New Zealand University. Only one nomination will be accepted from each University Department/Group.
<i>The Fieldes Award</i>	Annually	31 July 2022	A PhD thesis submitted within the previous calendar year.	The Head of the Soil or Earth Science Department/Group at a New Zealand University may nominate the best PhD thesis from their department/group.
<i>The Rigg Award</i>	Annually	31 July 2022	A Masterate thesis submitted within the previous calendar year.	The Head of the Soil or Earth Science Department/Group at a New Zealand University may nominate the best Masterate thesis from their department/group.
<i>Undergraduate Prizes</i>	Annually	31 December 2022	A third-year student in Soil or Earth Sciences.	The Head of the Soil or Earth Science Department/Group at Massey, Lincoln, and Waikato University may each nominate the best third-year student from their department/group.
New <i>Soil Judging Stipend (\$2,000)</i>	Annually	31 July 2022	Open to student teams for attendance at a conference-related soil judging competition in New Zealand or Australia. Priority will be given to the highest performing team from	The Head of the Soil or Earth Science Department/Group at a New Zealand University may nominate a team from their department/group.

			the previous calendar year.	
<i>The US/NZ Exchange Award</i>	Annually	15 April 2022 for initial submission (18 April for final submission)	Nominees are required to have at least seven years of membership in SSSA or the NZSSS. Former recipients of this Award are not eligible.	This award allows self-nominations.

Nominations and requests for further information regarding NZSSS awards should be addressed to:

Brendon Malcolm

NZSSS Awards Convenor

C/O Plant and Food Research

Private Bag 4704, Christchurch Mail Centre, Christchurch 8140 (normal post), *or*

Canterbury Agriculture & Science Centre, Gerald St, Lincoln 7608 (courier)

New Zealand

Email: Brendon.Malcolm@plantandfood.co.nz

News from the Regions

Waikato/Bay of Plenty

University of Waikato The summer has been a busy period for fieldwork for many of the University of Waikato Waiber team. Summer research students **Lee Boon** and **Renee Mckay**, supervised by **Aaron Wall** and **Jordan Goodrich**, undertook an intensive chamber sampling campaign (Figure 1) in a grazed turnip crop at the group's Owl Farm research site near Cambridge. Lee and Renee's summer project tested the feasibility of making N_2O and CH_4 emissions measurements in a paddock that was being actively grazed daily - they only got licked a couple of times! Their project aligned closely with the on-going NZAGRC funded research project to determine how grazed turnip crops affect soil carbon stocks. Aaron and **Ben Roche** also set up a second, temporary, eddy covariance (EC) system in the turnip paddock for the summer to increase CO_2 flux measurements from the turnips.

Other summer field activities included Aaron, Jordan and Ben making EC measurements of CO_2 , N_2O and CH_4 at another field site where a maize silage crop was being grown. Unfortunately, cyclone Dovi severely damaged the maize crop in mid-February (Figure 2) necessitating an early harvest. The subsequent lack of rainfall in the Waikato meant the establishment of the replacement plantain and ryegrass/clover pastures was delayed until mid-April providing the team with an interesting dataset to explore covering the two-month fallow period with a very dry soil.

In the middle of March **Louis Schipper** and Aaron Wall were invited to, and spoke at, the Owl Farm Farmer Focus day to share updates on their soil carbon research to the attendees (Figure 3). Around 65 local farmers, consultants and industry representatives were on hand, with the many questions indicating the level of interest from the agricultural community to gain a better understanding of the soil carbon space.



Figure 1: Summer research student Lee Boon taking gas samples from static chambers on a grazed area of the turnip paddock. The ungrazed turnips are in the distance.



Figure 2: Ben Roche standing amongst the damaged maize silage crop following cyclone Dovi. Prior to the cyclone damage the maize crop stood almost 4 m tall.



Figure 3: (L-R) Louis Schipper, Aaron Wall and Jo Sheridan (Owl Farm Demonstration Manager) talking to the local farming community about soil carbon during a recent Owl Farm Farmer Focus day (Photo courtesy of Owl Farm).

In April **Dr Tanya O'Neill** undertook an extensive sampling campaign at three kororā/little blue penguin colonies in the South Island. Charleston (near Westport), Oamaru and Flea Bay in Banks Peninsula were visited and penguin faeces/guano collected for a microplastic study (Figure 4). This research involves new collaborators, West Coast Penguin Trust (Westport), Oamaru Penguins (Oamaru), and Pohatu Penguins (Banks Peninsula) and samples will be processed by a keen former student of Tanya's, **Svenja David**. Svenja has conducted similar research with kororā populations at The Mount (Tauranga). Sampling was at times a nasty stomach churning business (read maggots). This work will complement an Antarctic-based study Tanya is undertaking with Professor **Sally Gaw** of Canterbury University and this summer she and a team of four will visit Cape Bird to study the role of penguins as vectors for contaminant transfer from the marine to terrestrial environment.

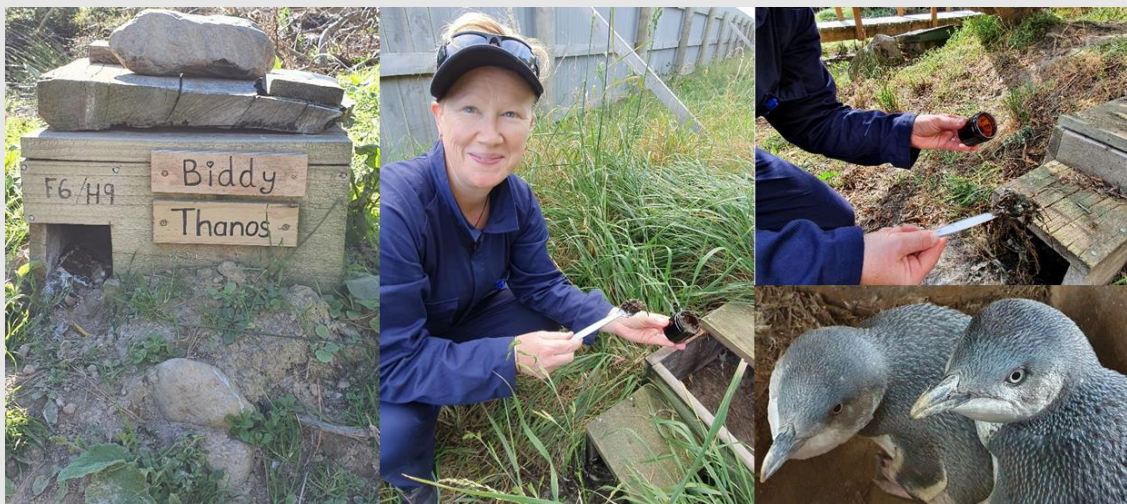


Figure 4: Tanya O'Neill holding her breath (and lunch) while sampling little blue penguin guano from nesting boxes in a current field campaign. The majority of birds skilfully *aim*

their guano out of their box entrance, see Bidy and Thanos' box on the left (Photos courtesy of Guanos Ltd).

Lincoln Agritech

Critical Pathways Programme

Collection of reliable, continuous nitrate data from our NICO sensors has been problematic at some sites due to weed growth and subsequent sediment build-up in and around the deployment tubes, which are located on the stream banks. This has been a problem particularly at our Waitapu Stream field site, as shown in Figure 2, where stream-bank access is difficult. A novel solution has been engineered by the team, using a boogie board as a floatation device for in-stream deployment of the NICO sensor (Figure 1, Figure 2). Fingers crossed this deployment option provides more reliable data and reduced maintenance.



Figure 1: New boogie board deployment device with NICO nitrate sensor.



Figure 2: Waitapu stream measurement site, showing Geolux radar, new in-stream NICO location and previous NICO tube location, attached to the bank. April 2022.

Braided Rivers Programme



Figure 3: Shaun Kingsbury (left, LAL) and Mathias Østbjerg Vang (Aarhus University) configure the NMRI equipment at the Selwyn River field sites, April 2022.

The Braided Rivers Programme has been using a variety of geophysical measurement techniques including a novel NMRI (Nuclear Magnetic Resonance Imaging) system (Figure 3). In collaboration with our colleagues from Aarhus University in Denmark, we have used the device to quantify mobile water content in the subsurface to give an idea of lithology and aquifer layers in the reasonably shallow (<30 m depth) subsurface. The black coil is set up in a square and then connected to the control boxes, which then collect the data.

Manawatu Plant & Food

Brent Clothier was the first overseas this year when he participated in a New Zealand Trade and Enterprise delegation Expo 2020 Dubai. The objective of the trip was to learn from local agritech experts and learn more about the challenges of farming in the UAE's harsh desert climate and the innovations being deployed to tackle them. It was also an opportunity to highlight the research projects in UAE Plant & Food Research is partnering with to investigate opportunities to irrigate with saline water and optimise irrigation for date palms. Check out the press releases from this visit in the links below.

[New Zealand G2G on LinkedIn: #NZG2G #government #newzealand](#)

[7 New Zealand agritech companies and research institutes touch down in the UAE \(nzatexpo.govt.nz\)](#)

[Software could help to save up to 80 per cent of water used on UAE farms \(thenationalnews.com\)](#)

Manaaki Whenua - Landcare Research

Our senior pedologist and Research Priority Area Leader, Gerard Grealish left Manaaki Whenua at the end of February. Gerard joined Manaaki Whenua - Landcare Research in May 2016. He contributed greatly to our national S-map soil mapping, soil data and spectroscopy programmes, engaging stakeholders, and developing soil mapping protocols and guidelines for soil mapping. He also undertook soil mapping of Marlborough region for S-map, and has led the integration of new proximal sensing and soil measurement technologies into the contemporary soil characterisation and mapping pipeline. We thank Gerard for his many contributions to soil pedology, S-map and Manaaki Whenua.

We welcomed Linda Hill, Zach MacDonald, Shane Cox and Coby Kerr into laboratory roles in our environmental chemistry and soil physics laboratories.

Massey University

Update from the Farmed Landscapes Research Centre

Many manuscripts from the 34th Annual FLRC Workshop have now been published on the website, as part of the digital proceedings. Refer to them here <https://www.massey.ac.nz/~flrc/>. More will be added as they are submitted.

And one for your diaries! **The 35th Annual FLRC Workshop is to be held at Massey University, on 8th to 10th February, 2023.** Keep an eye on the website over the coming months. If you would like regular email updates (or have changed jobs or email address), please contact Christine at C.L.Christensen@massey.ac.nz to ensure your details are up-to-date in our database.

Canterbury and Otago

Manaaki Whenua - Landcare Research

New building formally opened

Manaaki Whenua - Landcare Research (MWLR) marked an exciting direction in its research future today with the formal opening of its new buildings built to foster collaboration and better science outcomes.



Minister of Science, Research and Innovation, Hon Dr Megan Woods and MWLR board chair Mr Colin Dawson formally open the new buildings.

On a beautiful Selwyn autumn day, MWLR welcomed back Minister of Science, Research and Innovation, Hon Dr Megan Woods, to cut the ribbon to formally open the buildings. Dr Woods first turned the soil on the project in 2019.

Addressing assembled visitors and staff, Dr Woods highlighted how important our scientists are at a time in history when disinformation is so prevalent.

“The need for our scientists and researchers to act as a critic and conscience is of utmost importance, whether it is rebutting climate change scepticism, testing received wisdom or challenging unfounded interpretations of history.”

For newly appointed MWLR board chair Mr Colin Dawson, the formal opening was his first opportunity to tour the campus and meet the Lincoln-based staff.

“The name of the building, Te Rauhitanga, translates as Our Gathering Place. This signifies Manaaki Whenua’s commitment to working together, across the science sector, across the globe, and with our partners and communities in Aotearoa.

“And we will all need to work together to address the increasingly difficult challenges faced by our natural environment and society,” he said.

Mr Dawson said the building opening also coincided with a Te Tiriti o Waitangi focused pathway the organisation is taking with regards to its biological collections and databases. “It is important that we commit to some action, and that are activities are consistent with that commitment.”

Dr Richard Gordon, CEO of Manaaki Whenua, said the shared workspaces were areas designed especially for collaborative project work to embrace shared research activities.

“The building project was carefully designed to maximise the organisation’s science excellence and science impact for New Zealand. We drew up some key overall ambitions for the building, especially making sure our scientists and support staff could thrive in these new facilities. That in turn, we are confident will lead to better science outcomes for New Zealand, better integration between us and our stakeholders, and better engagement with the public.”



The new Rauhītanga building at MWLR’s Lincoln site

As the Crown Research Institute responsible for our land environment and biodiversity, Manaaki Whenua’s role and responsibility to New Zealand is to ensure all New Zealanders have the knowledge, understanding and tools to truly live in harmony with our land: enjoying its many gifts, preserving its unique diversity, and enriching it through our creativity, care, industry and culture.

AgResearch

Nicole Schon, Tania Waghorn and Derrick Wilson (AgResearch) have been visiting Katikati in a SFF funded project with Project Parore. The project is investigating the effects of dung beetles on dung decomposition and gastrointestinal nematode survival. Field trials were established in spring 2021, summer and autumn 2022 to determine the impact of dung beetles across different seasons. Replicated treatments with different abundances of dung beetles (*Copris incertus*) were established and destructively sampled after 4 weeks. It has been interesting to see the dung beetles in action, the size of their dung balls and effect on dung decomposition. Results are still being collected to determine their effects on gastrointestinal nematodes.



Photos showing the A) homgenising of dung prior to B) application into enclosures. C) Dung beetles added to the dung pat. D) Dung balls after 4 weeks in spring and E) dung decomposition in the control and F) high dung beetle treatment.

Conferences and Training

22nd World Congress of Soil Science

The 22nd World Congress of Soil Science (WCSS) is being hosted by the British Society of Soil Science (BSSS) on behalf of the International Union of Soil Science (IUSS) at the Glasgow SEC 31 July - 5 August 2022. The WCSS will have scientific and policy sessions and presentations, exhibitions, keynote speakers, and outreach events and is expected to attract an international audience of over 1,500 soil scientists, professionals, and policy makers. Alongside the main event there are soil tours, a soil judging competition, and arts and culture programme. It is the main event in the calendar for those with an interest in soil science. This is the premier global Soil Science event and a wonderful opportunity to meet soil scientists from around the world and to gain a global view of current progress in soil science. If you are planning to attend please can you let Megan Balks

(megan.balks@earthbrooke.co.nz) know as we will need someone from New Zealand to represent us at the IUSS Council meetings.

WCSS22 Website- [22nd World Congress of Soil Science - Glasgow 2022 \(22wc.org\)](http://22wc.org)

15th Australasian Environmental Isotope Conference

In-person conference: [14-16 November 2022](#)



The 15th AEIC will be held from 14-16 November in Ballina, New South Wales. The AEIC historically brings together a diverse group of scientists to 'talk isotopes (and everything else)'. We welcome abstracts from scientists working with, or aspiring to work with, isotopes (stable and unstable) to understand the world around them. Talks should align to one or more of the conference themes, which include many soil-relevant topics such as ecology, biogeochemistry, global change science, and provenancing.

Visit our website (<https://conferences.com.au/2022aeic/>) for details on abstract submission, registration, and student travel grants. If you would like to be added to the conference mailing list, please contact the chair at naomi.wells@lincoln.ac.nz

Key dates

01 August	Abstract submission closes
01 August	Student travel scholarships due
01 October	Early bird registration closes
13 November	Welcome reception
14-16 November	Scientific programme
17 November	Field trips to Byron Bay hinterlands

Audio visual

Soil and environmental related webinars and audio-visuals are presented below.

Our Land and Water has a series of webinars. There is a range of topics including regenerative agriculture and adapting to drought.

<https://ourlandandwater.nz/tag/webinar/>

Manaaki Whenua - Landcare Research LinkOnline Webinar Series. Short webinars to deliver key research outcomes or share the science challenges.

<https://www.landcareresearch.co.nz/events/linkonline/>

News from the European Soil Data Centre

ESDAC datasets

The European Soil Data Centre (ESDAC) offers access to many, mostly EU-wide datasets. These include the European Soil Database, data on soil threats (soil erosion, soil organic carbon, landslides, soil biodiversity, diffuse contamination, etc.), LUCAS point data and derived products, soil functions. All datasets are free to download. ESDAC is an integral part of the European Soil Observatory.

<https://esdac.jrc.ec.europa.eu/resource-type/datasets>

Soil Biodiversity Conservation literature and legally binding instruments

This meta database includes a review of 54 articles addressing soil biodiversity conservation at the EU or Member States level. In addition, we present Member States policy documents which address Soil Biodiversity Conservation. These can be either strategies for soil protection at the Member State level or legally binding instruments (binding/hard law) implicitly and explicitly addressing threats to soil biodiversity. More information can be found in the published study. The meta database is available:

<https://esdac.jrc.ec.europa.eu/content/soil-biodiversity-conservation-literature-and-legally-binding-instruments>

Vacancies: <https://esdac.jrc.ec.europa.eu/vacancies>

Workshop on “[Soil erosion for Europe - Emerging challenges](#)” 20-22 June 2022

The European Soil Observatory [WG on Soil Erosion](#) organises a 3-days workshop “Workshop on soil erosion for Europe - Emerging challenges”, on 20-22 June 2022. This is a call for presentations at this workshop. If you are interested to present your work relevant to the proposed sessions, please send your proposal with a tentative title (and 5-10 lines of abstract) to one of the nine Session Chairs. Below is the flyer:

https://esdac.jrc.ec.europa.eu/public_path/EUSO/2022%20June%20Workshop.pdf

Publications from Soil group in 2021

In 2021, the JRC Soil group published 25 papers in peer review journals. The section on Publications in Journals include more than 307 published papers from the Soil Group in the JRC. Most of the papers refer to the last 8 years (2013-2021). In many cases the papers document the datasets published in ESDAC.

<https://esdac.jrc.ec.europa.eu/resource-type/publications-journals>

Global rainfall erosivity projections for 2050 and 2070

We present a comprehensive set of future erosivity projections at a 30 arc-second (~1 km²) spatial scale using 19 downscaled General Circulation Models (GCMs) simulating three Representative Concentration Pathways (RCPs) for the periods 2041-2060 and 2061-2080. The future rainfall erosivity projections were obtained

based on a Gaussian Process Regression (GPR) approach relating rainfall depth to rainfall erosivity through a series of (bio)climatic covariates. In the new study, we estimate a potential average increase in global rainfall erosivity between 26.2 and 28.8% for 2050 and 27-34.3% for 2070 compared to 2010 baseline. The results of 102 simulations and 6 aggregated datasets are available:

<https://esdac.jrc.ec.europa.eu/content/global-rainfall-erosivity-projections-2050-and-2070>

Abstracts

Effect of irrigation on soil physical properties on temperate pastoral farms: a regional New Zealand study

Context Many regions in the world have undergone rapid land use change and intensification of agricultural land, such as through irrigation expansion, upgrading irrigation systems, and changing grassland, stock, and nutrient management practices. With more intensive land use, changes to soil properties can occur, such as soil compaction and changes in soil water storage. The effects of modern sprinkler-irrigated pastoral farming on soil physical properties are not well quantified internationally, particularly for temperate climates.

Aims This regional study evaluates the effect of irrigation on soil physical properties in topsoil and subsoil, under modern pastoral grazing and sprinkler irrigation, across Canterbury, New Zealand.

Methods Paired sites were sampled, consisting of a spray-irrigated paddock (field) and an adjoining part of the same paddock that was dryland (unirrigated), with other management the same for each pair.

Key results Under irrigation there was a shift towards a greater abundance of smaller pores. This was reflected in macroporosity and readily available water capacity being significantly lower under irrigation, while semi-available water capacity and unavailable water held below permanent wilting point both increased.

Conclusions These differences reflect increased compaction under irrigated grazed pasture, particularly under dairy grazing, consistent with findings in similar studies. This study quantified changes in both the topsoil and subsoil but showed that most differences were confined to the topsoil (30 cm depth).

Implications For irrigation management, our study indicates the lower readily available water capacity on irrigated pasture is significant, with farmers potentially having to irrigate more frequently. Adopting deficit irrigation could minimise impacts of compaction.

Drewry JJ, Carrick S, Penny V, Dando JL, Koele N 2021. Effect of irrigation on soil physical properties on temperate pastoral farms: a regional New Zealand study. *Soil Research*. On-line early. 12 p. <https://doi.org/10.1071/SR21254>

Spring pasture renewal involving full inversion tillage and a summer crop can facilitate soil C storage, improve crop yields and lower N leaching

Soil organic carbon (SOC) sequestration in pastoral soils could offset net greenhouse gas emissions by reducing global atmospheric carbon dioxide (CO₂) concentrations and, thereby, slow climate warming. Long-term pastures typically have topsoils (0-10 cm) rich in SOC, with subsoils (10-30 cm) storing less than half as much SOC. In New Zealand, lowland farmers are advised to renew (reseed) their pastures every 7-10 years to improve pasture production. Renewal typically involves desiccating the old pasture followed by shallow tillage (or direct drilling) to establish a short season forage crop as a weed break, then direct drilling new pasture species. Minimum till at renewal maintains the vertical stratification of SOC, limiting the scope to increase SOC stocks under new pasture. During the spring of 2016 and 2017, two independent trials were established, on an Alfisol (trial 1) and on an Andisol (trial 2), to assess the effects of establishing a summer Brassica crop with either full inversion tillage (FIT; 30 cm furrow depth, as a one-off or infrequent (every 25-30 years) management), shallow tillage or no-till (direct drill) on SOC stocks and crop/pasture agronomic performance. In autumn, new pasture species were direct drilled into the stubble of the summer forage crop. Changes in SOC vertical distribution, plant growth, herbage quality (at both trials) and nitrogen (N) leaching (trial 1 only) were monitored. At both trials, FIT effectively buried SOC below 0-10 cm depth and increased crop yields compared to no-till treatment. After re-grassing pasture production was similar among all treatments. In trial 1, N leaching losses were 42% lower under FIT than under no-till. These results highlight the potential agronomic and environmental benefits of pasture renewal including FIT. Economic and N cycling benefits depend on the timely inclusion of a crop phase.

Calvelo-Pereira R, Hedley MJ, Hanly JA, Beare MH, McNally SR, Bretherton MR 2022. Spring pasture renewal involving full inversion tillage and a summer crop can facilitate soil C storage, improve crop yields and lower N leaching. *Soil and Tillage Research* 219, 105347. DOI: 10.1016/j.still.2022.105347

Obituary - Allan Edward Hewitt

In memory of Dr Allan Edward Hewitt - a multi-talented soil scientist

Sadly, Allan Hewitt passed away on Thursday March 24th, 2022.

Allan is remembered fondly by his colleagues in soil science throughout New Zealand and his Manaaki Whenua co-workers especially those in our Dunedin and Lincoln offices.



Allan's formative years were based in Canterbury, growing up on farms in the Little River and Greenpark areas. Allan recalled how his interest in soils began in rural Canterbury when he was fascinated by the different colours evident in a road cutting.

After completing a BSc (Hons) (Geology) at the University of Canterbury and a Post-Graduate Diploma in Agriculture Science (Soil Science) at Lincoln University, Allan joined the DSIR Soil Bureau in Dunedin in 1974. Bill Lee

recalls first meeting Allan on a field trip to Red Mountain, NW Otago, in the mid-1970s: "I was studying soil/plant relations and was very excited to have a real soil scientist around. The week we spent digging and describing soils on the ultramafic scree was the start of an enduring friendship with Allan and Liz". This recollection nicely reflects Allan's 'friendship' based approach to his career. Over the years Allan was involved in a great variety of projects, often multi-disciplinary, out of which Allan built an admirable diversity and breadth of friendships of which many of us have fond memories.

During Allan's years in Dunedin, he was responsible for several southern based projects, including the innovative soil map of the Waipori Farm Settlement, which partly laid the foundations for the emerging concept of soil-landscape modelling, and arguably the most accurate and comprehensive soil map ever published, 'Soils of the Cromwell Gorge'. This survey is now safeguarded from re-examination and reinterpretation by occupying the floor of Lake Dunstan, behind the Clyde Dam! When mapping the soils of the Cromwell Gorge, Allan inserted a sketch showing the complex landscape and the different soils. For his own amusement, he included another sketch alongside showing a dam and a lake with no soils evident - labeling them "Before" and "After". He thought they would be edited out as it was at a time when having a sense of humour was not a professional requirement in the DSIR, but somewhat to his embarrassment they remained in the final document. Allan was also

involved in several North Island team surveys, and Pacific Island work mapping one of the Tongan Islands with Hugh Wilde.

Between 1979 and 1982, Allan worked on his PhD at Cornell University. His thesis, 'Decisions in the establishment of soil series' was a precursor to his work on reviewing and establishing the 'New Zealand Soil Classification' (NZSC), now in its 3rd edition. He returned to DSIR Soil Bureau as a District and then Regional Pedologist, before becoming Senior Pedologist and Research Leader at Manaaki Whenua- Landcare Research, until his retirement in 2015. He moved from Dunedin to Lincoln in 2001.

Allan made an outstanding scientific contribution to soil classification, land evaluation and soil mapping, both in New Zealand and overseas. The NZSC has become the accepted source for naming, characterising, mapping, sampling, and reporting for the national inventory of soils in New Zealand. International recognition of the NZSC is evidenced by full translation into Spanish and subsequent adoption of many of its features in the new Soil Classification for China. When on the International Soil Science committee, Allan queried the term "Man-made soils" being suggested. He discovered that in fact most of the soils of the world are dug by women (Asia, Africa), and he ensured this was acknowledged.

The classification (Fig. 1), launched at the New Zealand Society of Soil Science (NZSSS) Conference in Rotorua in 1992, was the culmination of over 10 years of work by Allan and others that began in 1983 when the New Zealand Soil Bureau decided not to adopt "Soil Taxonomy" as the principal means of soil classification.

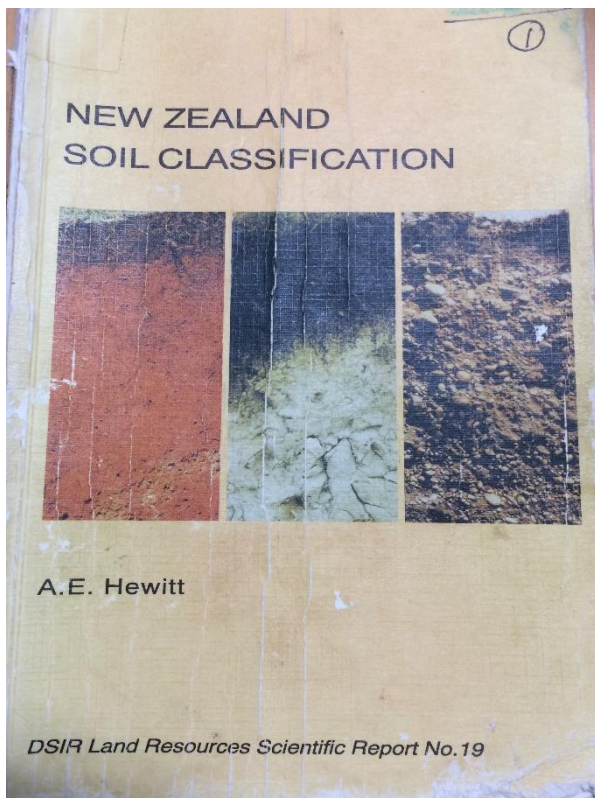


Fig. 1. Cover of well-used first edition of NZSC that was published in 1992.

At all stages during development, draft copies of the emerging NZSC (including version 1.0 in 1987 and version 2.0 in 1988-89) were sent to interested soil scientists throughout New Zealand for review and testing, and specialists were asked to contribute by defining diagnostic features for specific soil classes. David Lowe remembers pedology students at Waikato University testing the draft versions during David's annual Northland field trip. The names used for the orders during the developmental stages were regarded as informal and not up for discussion at that point because Allan wanted "to avoid useless argument".

In 1987, Allan was brave enough to state that his forthcoming classification "will deliver the goods to those concerned for the stewardship of New Zealand soils" (*NZ Soil News* 35, p. 243). All agree that Allan

delivered on his promise. He assiduously documented the progress of the classification through seminars and reports (including regular updates in *NZ Soil News*), and subsequently published two reviews in 1993 to document its basis and rationale: “Soil classification in New Zealand - legacy and lessons” (*Australian Journal of Soil Research* 30, 843-854) and “Methods and rationale of the New Zealand Soil Classification (*Landcare Research Science Series* 2). In doing this, Allan had worked quite closely with Ray Isbell, CSIRO, who was developing a new “Australian Soil Classification” at the same time (published in 1996). Later, Allan summarized the NZSC as a new appendix for the second edition (1998) of Les Molloy’s book “Soils in the New Zealand landscape”. A detailed history of the journey of soil classification in New Zealand is being prepared by Phil Tonkin, and will be featured in a future edition of *NZ Soil News*.

To meet the demands for digital descriptions of soil characteristics needed by land management industries, regional and national policy organisations for planning consents and research and education, Allan promoted the extension of the NZSC into New Zealand’s spatial soil information system (S-map) (<http://smap.landcareresearch.co.nz/home>). This national ongoing initiative built on the turn-of-the-millennia Topoclimate Southland and GrowOtago regional projects, where Allan played a pivotal mentoring and correlation role. It is a tribute to the collaboration and dedication between Allan, Linda Lilburne, Trevor Webb and Ian Lynn that S-map was kept alive in its early years. Allan also considers one of his most important contributions was to the development of a large computer database of soil profiles throughout New Zealand, now known as the National Soil Database Repository (NSDR).

In the 2000s Allan also played a significant role in the pan-CRI SLURI programme, helping pioneer the concepts of soil natural capital and ecosystem services, the influence of which we see today in the shaping of national land policy, environmental reporting, and the business case that has underpinned Government support of S-map.

Allan’s lifetime contribution to soil classification has provided the foundation for training an entire generation of under-graduates, emerging scientists, and farmers with the critical skills for soil and land management across New Zealand. The wide use of Allan’s soil classification has enhanced the reputation of New Zealand for its research and teaching in soil science.

Allan’s impact on soil classification, as well as soil science more broadly has been recognised nationally with prestigious awards, including the NZSSS’s Norman Taylor Lecture, and the Leamy Award (for “most meritorious New Zealand contribution to soil science”). Roles have also included the President of NZSSS (2010-12) and invited keynotes at soil science conferences in Australia, Europe and the United States. His interest in soil classification and soil taxonomy served him well. As a member of international soil taxonomy committees, he visited all the world’s continents, except Africa, and some 18 countries including Brazil, and Japan. He has also managed to wrangle a summer field season in Antarctica.

Allan was awarded the prestigious Lincoln University Bledisloe Medal at the 2019 Graduation ceremony on 3rd May 2019. The Bledisloe Medal is awarded to a former student or past or current staff member of Lincoln University who, in the opinion of the Lincoln University Council, has made an outstanding contribution in his or her chosen field, advanced New Zealand's interests, and/or brought credit to Lincoln University.

Allan contributed prominently within the wider community and was highly regarded for his integrity and as a mentor. With his quiet and dignified manner, Allan listened carefully and was always willing to offer valuable advice. Allan was very personable and highly regarded by his colleagues and friends. He was a lay preacher, and heavily involved in church boards, especially when based in Dunedin. For more than 20 years Allan was a home group host and mentor to many students. There are several emerging and leading scientists benefiting from Allan's support, wisdom, and faith in their ability during their formative years. He also cared for the gardens of several elderly ladies. Since moving to Rolleston in 2001 he spent his free time developing a large garden from a bare stony paddock (classic Lismore shallow and stony soils). Allan was a skilled landscape painter and has often used soil as a medium for his art. Some of his paintings were on display at the NZSSS Meeting in Hamilton in 2014 and exhibited in Christchurch in 2021. He used paintings to illustrate soil-forming processes and the development of associated soil profiles in New Zealand and elsewhere for his N.H. Taylor Memorial Lecture in November 1996 ("Are New Zealand soils distinctive? A subterranean view of New Zealand ecosystems", *NZ Soil News* 45, 7-16, 1997), and generously donated copies of his fine artwork to David Lowe to use in his lectures at Waikato University.

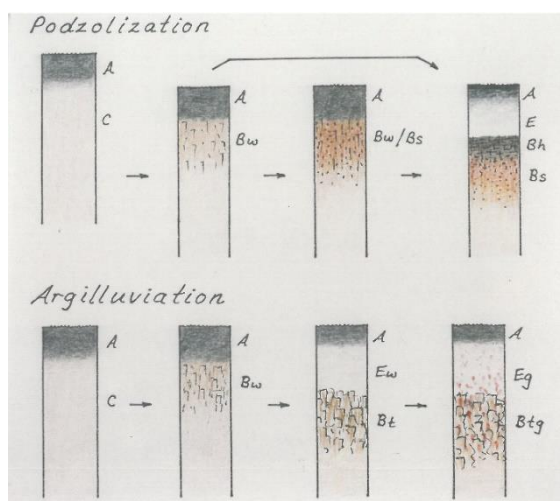


Fig. 2. Allan's contrasting processes and profiles used in his 1996 Norman Taylor Lecture (NZ conditions tend to favour podzolization)

Following his retirement in 2017, Allan continued to actively mentor the next generation of New Zealand's pedologists in his role as Research Associate at Manaaki Whenua - Landcare Research. Allan's final publication was the "Soils of Aotearoa New Zealand" (Springer, 2021), co-authored with Megan Balks and David Lowe from the University of Waikato. It reflects Allan's

deep understanding of why our soils are both similar and yet different from those elsewhere and features his lovely painted soil profiles. It is a very significant milestone in soil science in New Zealand. The late Jim Eagles for *Kete Books* commented (14 October 2021) that the book is "... an extremely significant work which seems certain to quickly become the standard text on the subject." Richard Rennie, in the *New Zealand Farmers' Weekly*, reported (January 2022): "For the first time in a generation, anyone with a connection to soils and their management has a new text to reach for - one that is likely to set a reference benchmark not only in New Zealand, but internationally."

For Allan, soil pits or road cuttings were his joy and happy place, his library and databank, even his art. Pedological pits were his window through which he began to understand the creation of the landscape. For Allan soils were informative for understanding landscape, they were the product of time and conditions, often long past, and they were a vulnerable resource for humans to use with care.

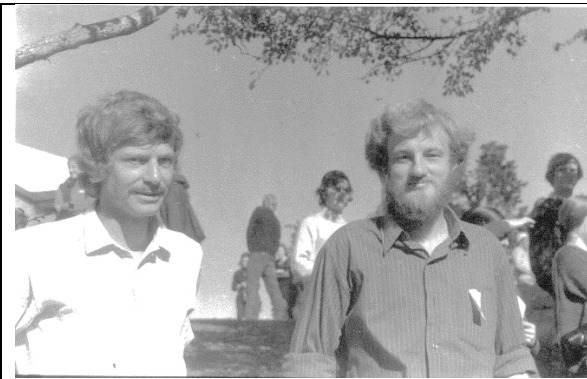
Soil horizons for Allan were where knowledge of the landscapes become apparent. He was fascinated with the colour, texture, and composition of soil profiles, and many of us have fond memories of Allan in a hole, dressed in his field jacket with pockets containing tools for assessing colour, texture and composition, limbs covered in soil, and Allan's beaming smile as he wrote his observations into his notebook. In the evenings he would often draw sketches of landscapes, showing his ideas on how the soils were linked by origin or process. Crucially, for Allan soils were beautiful, features to be studied and enjoyed, as his paintings show.

Allan's deep lifelong commitment and passion for all things soil is very nicely summarised by the age he ascribed to himself in a biography provided for the IUSS: *Mature, active, moderately weathered, partly eluviated, 0.06 ka!*

Allan was the dearly loved husband of Liz, cherished father of Sarah and Tim and "Grandmandad" of Elijah and Alice.

Contributions to this obituary kindly provided by Jackie Aislabie, Bill Lee, Ian Lynn, Sam Carrick, David Lowe and Megan Balks

A snapshot photo collage of Allan's Career (Indicative layout: Sam to provide individual photos to soil news editor for formatting)



Ian Lynn (left) and Allan in their Uni years



Allan (front left) deep in discussion with NZ pedologists during development of the NZSC



Allan presenting during the 1990 NZSSS Otago conference



Allan examining a Ultic soil in Northland in the 2000's



Allan with Malcolm McLeod (left) and Fiona Shanahun in Antarctica in the 2000s



Allan in deep thought in the Dry Valleys, Antarctica



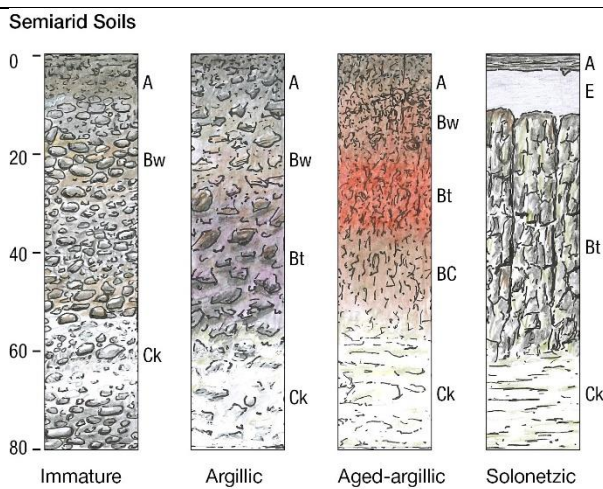
Allan at the Massey joint NZSSS and AUSSS conference, Massey 2008



Allan with the Manaaki Whenua soil scientists at the Hamilton 2014 NZSSS conference, all proudly wearing the beautiful crocheted beanies from Jackie Aislabie. Each represents one of 15 NZ Soil orders - Allan's is a Semi-arid from his beloved Central Otago.



Allan explaining the intricacies of Allophanic Brown soils at Craieburn, just before Allan retired (Ian Lynn left, Jim Payne right)



One of Allan's retirement projects was to hand-draw representative soil profiles for all NZ soil groups. These beautiful renditions have already been featured in the "Soils of Aotearoa New Zealand" book, S-map online soil fact sheets, as well as an artistic feature in the new Manaaki Whenua building at Lincoln



One of Allan's soil art paintings, first presented at the 2014 Hamilton NZSSS conference, and incorporating actual soil in the paint.



Another of Allan's soil paintings, featured in a Soil Art exhibition held in a Christchurch gallery to coincide with World Soil Day 2021 (together with art

from Megan Balks and Jorgen
Esperschuetz)



"Dust to Dust" featuring our Fragic
Pallic soils



Allan's art also stretched to landscapes,
in this case Craigeburn Valley

**Deadline..... for the August 2022 issue of Soil News is Friday
12th August 2022**

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