



Sustainable Development Goals

Report 2022



LINCOLN
UNIVERSITY
TE WHARE WĪHAKA O AORAKI

Foreword



Tēna koutou

As New Zealand's only specialist university focused on the land-based sector, Lincoln is unique among tertiary Institutions. At the heart of Lincoln University's teaching, research and leadership is a commitment to ensuring future generations can flourish and grow.

During the last two years, Lincoln University has experienced remarkable growth and development across a number of key areas – in student headcount, in our reputation as a specialist university focused on the land-based sector and in the impact of our world-class education and research. With a focus on inspiring our students to help grow a more sustainably productive future, Lincoln's education programmes remain at the forefront of global land-based disciplines.

Sustainability is an area where the university can demonstrate considerable global leadership. We are committed to being an exemplar of sustainable practices for land-based sectors, and to making an outstanding contribution to driving sustainable prosperity and intergenerational wellbeing in Aotearoa and beyond.

The University's Sustainability Plan is the prime mechanism for delivering on its commitment to a sustainable future for people and the planet, setting out the objectives of being sector leaders in education, research and demonstration of sustainability, and becoming carbon neutral by 2030 and carbon zero by 2050. Underpinning the University's sustainability plan are the UN Sustainability Development Goals (SDGs).

While our 2022 SDG report touches on just a small fraction of the University's sustainability efforts across education, research, student experience, operations and engagement, it demonstrates a more profound commitment to sustainability that spans all dimensions of our University, well beyond what the report encapsulates.

Ngā mihi

Professor Grant Edwards

Vice-Chancellor

Te Whare Wānaka o Aoraki Lincoln University

Our Sustainability Plan

The University's Sustainability Plan outlines the actions it is taking now to ensure the continued wellness of people, whenua and the environment, and to safeguard intergenerational wellbeing.



Vision

Lincoln University is committed to being an exemplar of sustainable practices for the land-based sector, and the ecosystems within it.



Purpose

Be sustainability leaders in education and research via a demonstration of sustainability impacting sectors we support



Aligned to the Lincoln University Strategy 2019-2028

Goal 1

To be sector leaders in education, research and demonstration of sustainability

Goal 2

To become carbon neutral by 2030, and carbon zero by 2050



Following four themes

Education Research Demonstration Campus Environment



Guided by five principles

- Principle 1** Alignment with the Sustainable Development Goals (SDGs)
- Principle 2** Sector Leaders in sustainability
- Principle 3** Self sustainable
- Principle 4** Becoming carbon neutral
- Principle 5** Value of Mātauraka Māori

1 NO POVERTY



End poverty in all its forms everywhere

Changing and enriching lives

Six Manaaki New Zealand Scholars were celebrated at a completion ceremony in June. The students had come from Indonesia, Vietnam, Ghana, Cameroon, South Africa and Papua New Guinea to study at Lincoln on scholarships administered by the New Zealand Ministry of Foreign Affairs and Trade, as part of the New Zealand Aid Programme. During their time in New Zealand, they gained leadership and practical skills to assist in areas of need at home.

LU Alumna and New Zealand Manaaki Scholarship student, Gillian Ndlovu, was named as a top 10 finalist in the World Bank “Plant Trees, Not Plastics” competition. Gillian’s work includes an initiative called BLISS (Bolstering Locally-grown towards an Innovative and Sustainable Society), established from a Global Citizen Scholarship received from the Ban Ki-moon Centre in 2021 toward achieving the Sustainable Development Goals.



Image source: <https://www.worldbank.org/en/events/2022/06/08/plant-trees-not-plastics-announcing-the-winners>

Improving the livelihoods and wellbeing of people

From November 2017 to October 2022 Lincoln University partnered with funder MFAT and key stakeholders World Vision NZ, World Vision Myanmar and Vision Fund Myanmar to develop sustainable value chains for agricultural products grown on small farms in Myanmar’s poor and isolated Tanintharyi region. Key learnings from the project were published, together with supporting tools and approaches that can be used in other poor rural regions around the world.

A notable example of reducing poverty and inequality

The Targeted Poverty Alleviation (TPA) program in China is widely regarded for its influence in eliminating the extreme poverty of 70 million rural inhabitants. However, little is known about the extent to which the TPA program narrows the income gap between urban and rural households. Research co-authored by Lincoln University Associate Professor Wanglin Ma estimates the effect of the TPA program on the urban-rural income gap, measured by the Theil index.

The findings show that the TPA program significantly reduced the urban-rural income gap. The researchers obtained robust results using the urban-rural income ratio as an income gap measure. Heterogeneous analysis revealed that the income gap reduction effects of the TPA program are largest in the underdeveloped western region, and the effect is smaller for households residing in the central and eastern regions. Effective targeting and a focus on capability building, following regional differences, make the program a notable example of reducing poverty and inequality consistent with the Sustainable Development Goals.

Animal foods a path out of poverty

Animal foods can form part of a healthy, sustainable and ethical lifestyle, despite increasing claims to the contrary. according to LU Professor of Livestock Management, Pablo Gregorini. His article *Animal source foods in healthy, sustainable and ethical diets – An argument against drastic limitation of livestock in the food system* argues that animal foods are evolutionarily appropriate and healthy for humans and points to evidence that livestock farming is integral to the overall agricultural system, contributing to biodiversity and improved plant food production while creating food security and a path out of poverty for some.

Furthermore, Professor Gregorini argues that the trend towards plant-based diets, increasingly advocated in the urban West, often requires expensive supplements and fortification, is difficult to achieve for many societies, and ignores the complexity of the food system.





End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Important implications of 3D food printing for sustainability

Lincoln Bachelor of Science (Food Science) student, Sahiti Peddisetti, was tasked with creating 3D reconstructed food products, using low-value cuts of meat and natural ingredients including plant-based protein, during a 10-week summer scholarship. Sahiti was able to produce desirable new foods in a range of shapes, textures and colours via a 3D food printer. Her research has important implications for sustainability, as increasing available protein in foods can reduce waste and fully utilise existing animal and plant-based proteins by improving their functional and nutritional value.



New gene a game changer for global agriculture

Scientists from Lincoln University and Plant & Food Research have collaborated in the discovery of a new gene described as a game changer for global agriculture. The gene allows natural reproduction by cloning in plants, allowing highly desirable traits to be carried through to the next generation rather than lost when the plants reproduce through pollination. Scientists in New Zealand have been working with scientists in the Netherlands (KeyGene and Wageningen University & Research) and Japan (at breeding company Takii) to identify ways to produce plant seeds that are genetically identical to the parent plant. The research was published in the prestigious journal *Nature Genetics*. The newly discovered gene, named PAR, controls parthenogenesis, a process whereby plant egg cells spontaneously grow into embryos without fertilisation. Normally, the PAR gene is triggered by fertilisation, but in plants that reproduce by apomixis – a type of reproduction which does not require fertilisation – the PAR gene switches on spontaneously, so the egg cells are triggered to start dividing into a new embryo.

Providing sustainable, healthy food and free water options on campus

Lincoln University is committed to providing sustainable, healthy food options for all students and staff on campus. This includes gluten-free, vegetarian and vegan alternatives. Free access to water is also provided for all students, staff and visitors on campus through drinking water taps as well as filtered hot and cold water in kitchen facilities. Lincoln's on-site cafes are open to students, staff and the public, and there is also a student dining hall, with a catering service available for events. All campus cafes and dining facilities are certified palm oil-free and use free-range eggs, herbs grown on campus by the catering department, and campus-made yoghurt to avoid plastic packaging and offer affordable meals for students. Meals in the student dining hall are provided to residents as part of the University's accommodation package. Students not living on campus can buy discounted meal tickets for buffet-style dining. The University's catering team meet with student residents at the start of each term to identify dietary requirements and cater for many different requirements including gluten-free, vegan, dairy-free and halal. Vegetarian options are included for all meals.

Research focused on food sustainability

Food Transitions 2050 is a strategic partnership initiative between five research organisations located in the Canterbury region: AgResearch, Manaaki Whenua - Landcare Research, Plant & Food Research, Lincoln University and the University of Canterbury. At the heart of Food Transitions 2050 is a Joint Postgraduate School - a virtual community of PhD students and their university/CRI supervisory teams, conducting cross-disciplinary research to explore ways of making food production and consumption more sustainable in the face of global challenges. The Food Transitions 2050 programme offers students the chance to work on cross-disciplinary research projects that combine areas such as economics, nutrition, agricultural science, and environmental policy. Intending to develop solutions for a more sustainable and equitable food system, the programme aims to produce world-class research that can contribute to policy-making at national and international levels.

The Big Feed raised 1.2 million meals

Lincoln University was proud to host the "Big Feed" on campus in December. Organised by the Meat the Need charity, a farmer-led charity determined to get nutritious New Zealand meat and milk to those who need it most, the event was broadcast across social platforms and brought rural communities together to help Kiwis doing it tough. The charity receives livestock and milk from farmers around New Zealand and with the help of its partners processes, packages and delivers these products to those "on the frontlines of food insecurity in New Zealand". The ultimate goal is "for no one to go hungry in New Zealand".

Building knowledge and understanding of food production

A new agri board game called "Grow", developed as part of a joint initiative between Lincoln University, Rabobank and the Agribusiness in Schools Programme, was launched at the Fieldays Careers Hub in December, as part of the NCEA school curriculum. Grow helps to build knowledge and understanding of food production and is used as a study tool by secondary school students across New Zealand. It touches on all the major topics included within the agribusiness curriculum and provides students with a fun way to acquire and reinforce the course content.





Ensure healthy lives and promote well-being for all at all ages

A 'living lab' offering high-tech health and fitness testing for students, staff and the community

The Lincoln Sport and Exercise Science Laboratory operates as a 'living lab' offering high-tech health and fitness testing for students, staff, and the community, including body weight composition, cardiovascular indicators, lipid profiling, lactate and maximal oxygen consumption testing and metabolic energy consumption.

Key Living Lab projects include:

- A study in collaboration with the University of New South Wales to test a simple, non-invasive way to uncover chronic kidney disease progression through using a simple exercise test with non-invasive measures (e.g. pulse wave velocity and heart rate) rather than invasive medical procedures to test kidney health
- Research with the Lincoln University Future Productive Landscapes Centre of Excellence. Head of the Centre, Professor Pablo Gregorini, believes that animal products reflect the history of our landscape, foodscapes and agricultural systems manifested through soil and plant chemistry, and thereby our health and that of the planet
- A collaboration between Lincoln University and the University of Waikato to study the effect of green seaweed supplements on health. The green seaweed used was *Ulva sp. B*, which is rich in potassium, calcium, iron, zinc, phosphorus, sodium, magnesium and vitamins B, C, E, D and K. The research looks into whether the New Zealand seaweed supplements can improve health naturally.



Promoting sport and enhanced pathways for youth

Lincoln University sponsors the Outstanding Youth category in the revamped Canterbury Sport and Recreation Awards and has been a key supporter of the Canterbury Sports Awards for more than 15 years. This ongoing support reflects an alignment of similar values and vision and recognises the contribution sport, play, physical activity and active recreation make towards building well communities, while creating quality experiences for all young people to keep them active and in the game.

Supporting wellbeing and healthy living programmes for students

Focused on growing the next generation of well-rounded industry leaders, the Lincoln University Sports and Healthy Living Initiative fosters a culture of active living and sport on campus. The partnership-driven approach of the initiative supports wellbeing and healthy living programmes for students, including increasing student involvement and experience in sports while leveraging the ability to share knowledge and industry experience through events and networking opportunities. Through the generosity of donors, a special sports fund was set up to increase recreational opportunities for students, including the funding of equipment, food and beverages

Reducing lives lost by suicide in rural communities

WellMates is a programme developed by Lincoln University to reduce the number of lives lost by suicide in rural communities. First-year students enrolled in agriculture courses at Lincoln and Massey have access to the WellMates programme where they learn the skills to stay mentally well and the strategies for returning to positive wellbeing after challenging times. Grant funding enabled the establishment of a research collaboration between Lincoln and Massey University, and allowed the introduction of the WellMates programme onto the Massey campus. The Lincoln/Massey research project will also collect data on the effectiveness of Wellmates, and whether the participants show positive changes in their resilience and mental health.





Acceleration of Māori student participation and research aspirations

Within Lincoln University's Manaaki Taura framework, the Whanake Ake programme's key focus is on the acceleration of Māori student participation and Māori research aspirations at the University. A key element of Whanake Ake is the ability to embed and deliver Mātauraka Māori across courses and programmes by increasing the capacity of Māori staff. The University aims to achieve this through the appointment of Māori teaching and research staff focused on key areas of whenua, te taiao and mahika kai, with an annual recruitment process at the start of each year. Initially, Whanake Ake will target recent Māori doctoral, early career graduates, who will be earmarked to embark on an accelerated academic career with the support of national Piki Ake and Te Kei programmes and a dedicated Piki Ake Māori Research and Academic Coordinator on campus.

In 2022 the University funded \$3,197,250 in scholarships with a significant increase in scholarship offerings to Māori and Pasifika taura. In 2022 there were 28 undergraduate scholarships valued at \$200,000 including two premier undergraduate scholarships for Māori and Pasifika, valued at \$19,000 per year for the term of their degree.



Meeting a growing need for experts in the food and fibre industries

The University extended its fees-free scheme to cover postgraduate study options for domestic students until the end of 2023. First introduced in 2020 amidst the COVID-19 pandemic, the scheme aims to help meet a growing need for experts in the food, fibre and environmental management sectors. The offer includes postgraduate certificates and diplomas, as well as taught master's degrees and the taught component of research master's programmes. Several additional study programmes originally covered by the waiver, including graduate certificates and diplomas, remained fees free until the end of 2022.

Living Laboratory: a unique approach to education and learning

The Living Laboratory initiative provides a mechanism for students to engage with, and solve, local and global challenges in areas such as environmental sustainability and business. Living Laboratory projects Revitalising the Arboretum and Future Dairy were integrated into study programmes in 2022, and a Living Laboratory project around the Future Dairy biodiversity pods continues. Lincoln University's Arboretum continues to serve as a Living Laboratory for students and to provide valuable hands-on experience for students studying ecology, landscape architecture and environmental planning.



Enabling students to study despite employment and geographic constraints

Lincoln Connected is the University's technology-enabled learning programme. The selected programmes support the knowledge and skill development of students who work or aspire to work in land-based industries. Since 2020, nine fully online asynchronous programmes and 42 online courses have been established, and in 2022, 11% of the Lincoln University student population was enrolled online. The flexibility and accessibility of online learning enable students to complete their studies around employment and geographic constraints. The success of Lincoln Connected was recognised in 2022 with awards from the LearnX Foundation. Lincoln Connected won two platinum awards (the highest accolade) in the categories of Best Learning and Talent Development Hybrid Learning (an online collaboration with the University of Otago for a live Zoom class), and Best Learning Model Online for the theoretical framework, design elements and creation of Online courses.

Fostering lifelong learning among young people

Unique in Aotearoa, Te Mātāpuna Mātātahi | Children's University is part of an internationally renowned outreach programme which aims to foster lifelong learning among young people and raise their aspirations for higher education. In June Te Mātāpuna Mātātahi | Children's University scholars visited the Lincoln University campus to engage in a range of experiences designed to broaden their interests, demystify the university environment and spark an interest in tertiary education. These activities included scholars making unique shapes from food with the 3D food printers, understanding the different flammability of plants through a plant BBQ activity and a range of other activities looking at insects, soil, sport science and more. At graduation, 830 certificates of achievement were presented to a cohort of young scholars. The exceptional result represents an increase in graduate numbers of more than 450% in just four years.



ACHIEVE GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS

Unlocking the talent of rural women

The gender balance of Lincoln's student population for 2022 has females outnumbering males. The student body's ratio of 3,563 Lincoln University enrolled students (headcount) is 54% females, 46% males and 9% listed as diverse, further cementing a trend that began in 2018. Lincoln's ability to match the career aspirations of students with the employment needs of the land-based sector is evident in its graduate employment rate of 84,2%, the highest of all New Zealand universities.



Equal employment opportunities

Lincoln University provides equal opportunity to all staff and all its policies and practices uphold the principle of equal employment opportunity. Staff appointments are made solely based on merit relative to opportunity, and all promotions, advancements, salary reviews and professional/career development opportunities are based solely on merit. The University is focused on improving employment opportunities for groups who are traditionally under-represented in either occupational groups or levels of seniority, in particular women, Māori and Pasifika people. In 2022, 50% of the Senior Leadership Team were women, with the same percentage of women represented on Council.

Empowering female migrants in Bangladesh

In a study of 653 participants who returned to and stayed in Bangladesh, from June 2019 to September 2021, around 79% of women participants have found themselves out of work since returning to the country. 53% of the women had never tried to work since returning, while 26% had been unable to find jobs. Lincoln University together with the International Food Policy Research

Institution (IFPRI), the University of Dhaka, the Australian National University and Green Ink organised a dissemination workshop of the study in May, titled “Strengthening Institutions for Empowering Female Migrants in Bangladesh.” Lincoln University Associate Professor of Global Value Chains and Trade, Nazmun Rata, said there was a need for strong reintegration policies for returnee migrants, focusing on women’s agency and psychological wellbeing.

Specialised support to help determine preferred career pathways

The University’s Career Development Programme for Professional Women Staff was launched in 2022. The programme, partly funded by a grant from Graduate Women Canterbury (GWC), provides a cohort of staff with specialised support to help determine preferred career pathways and options for development. Sixty-nine delegates attended eight workshops.

Impacting the landscape for women and girls in play, active recreation and sport

Lincoln University is a partner in the new Women in Sport Aotearoa, Ngā Wāhine Hākinakina o Aotearoa (WISPA) Insight Hub, joining other organisations such as New Zealand Rugby, High Performance Sport New Zealand, and Sport Northland. The Hub was launched on International Women’s Day and features insights and research showing how individuals and organisations across Aotearoa New Zealand and Oceania are positively impacting the landscape for women and girls in play, active recreation and sport.

Encouraging women into the wool industry

In 2022, a new scholarship programme was established to support female Lincoln University students to pursue careers in the wool industry, a traditionally male-dominated area. Honouring a passionate female high-country farmer and role model, the Ann Scanlan Scholarship is offered annually to a full-time female student entering their second or subsequent year of study towards a Lincoln University bachelor or postgraduate degree, with a focus on wool.





Ensure availability and sustainable management of water and sanitation for all

Addressing pressing global challenges

Water quality and quantity issues, such as ground and surface water contamination by agrichemicals and poor water use efficiency of irrigation, are common both in China and New Zealand. The aim of the New Zealand – China Water Research Centre is to coordinate and facilitate long-term collaborations between New Zealand and Chinese scientists from a broad range of organisations, and to develop coherent research strategies that relate to water quality and quantity issues in the two countries. The New Zealand – China Water Research Centre is hosted by Lincoln University, in partnership with AgResearch, Landcare Research, Plant and Food Research, Lincoln Agritech Ltd, the Waterways Centre for Fresh Water Management and the University of Otago. In 2022 a major online workshop was held for Chinese and New Zealand scientists to share their latest water and climate change research and discuss strategies to strengthen collaborations between scientists in the two countries. More than 50 delegates attended and 26 presentations were made. The subjects discussed included nutrient losses and water contamination, water use management, manure management, greenhouse gas emissions, climate change, nutrient cycling and microbial communities.



Collaborating to improve water management practices and outcomes

Lincoln University signed a Memorandum of Understanding with the University of Canterbury to run postgraduate degree programmes in freshwater science and management as jointly awarded courses. This arrangement is a first for universities in Aotearoa New Zealand and builds on Lincoln's longstanding partnership with UC in the Joint Waterways Centre for Freshwater Management (WCFM) agreement. Developed on the back of successful postgraduate programmes in Water Resource Management, the Waterways Centre offers two new programmes designed to address the changing demands for graduates in the water sector.

Protecting valuable water resources on campus

The University carefully measures, monitors and tracks water usage on campus and a reported figure of 154,434,000 litres of water usage in 2022 indicates an heightened awareness of consumption.

In 2021, the Lincoln University Campus Master plan was released after a broad consultation process, including with our School of Landscape Architecture. The plan is based on key principles including providing a physical learning environment, a fun and social campus, a sustainable campus for the future and enhanced biodiversity. A key driver in the plan is ensuring that both environmental and economic sustainability are considered in all landscaping decisions. The strategy drives our work on campus including a number of interventions to improve on-site water management and ecological functions. An example is the incorporation of rain gardens and swales into the network of paved routes through campus allows for the highly valuable ability to filter runoff and pollutants in the hardscape environment. Planting palettes have been designed for different areas including stormwater planting.



The University's newly completed flagship science facility, Waimarie, showcases cutting-edge building technologies and sustainability. Rainwater runoff is harvested and used in the bathroom flushing system, while water filtration and purification systems on the outside of the building coupled with other stormwater facilities help to improve water quality and reduce runoff to surrounding waterways.

The building works with and protects the valuable water resource, as well as harnessing it as a sustainable energy source for heating and cooling. In a heating/cooling system that is more energy efficient than conventional air conditioning, artesian water from an underground aquifer provides energy, working as a geothermal heat pump, before the water is returned to the aquifer. The sustainability, and heating and cooling themes continue with wool insulation from 2000 sheep and 100% wool carpets. The new building is wreathed by 417 roof and wall-mounted solar panels, bringing the University's total solar generating capacity up to 802,000kWh.

Christchurch Shallow Groundwater Quality Survey dataset

In 2022, Lincoln University researchers published a Christchurch shallow groundwater quality survey dataset. This dataset is useful as a point of comparison for future shallow groundwater surveys in Christchurch, New Zealand, for example, to investigate changes in groundwater salinity and level due to sea-level rise, increased seawater intrusion or pollution events. It could also be used by asset managers to monitor potentially vulnerable infrastructure and by civil engineers to determine the best materials to use.

Precision weeding in vineyards could save thousands of litres of water

A new project investigating precision weeding in vineyards could potentially prevent thousands of litres of herbicide use – and save thousands of litres of water – across New Zealand’s viticulture and horticulture industries. Six New Zealand vineyards are partnering with Lincoln Agritech and the Ministry for Primary Industries (MPI) Sustainable Food and Fibre Futures (SFF Futures) fund to trial high-pressure water weeding (also known as waterjet weeding). The vineyards are now working with Lincoln Agritech to rationalise the associated water use through the application of a new smart sensing device that integrates with the weeder to activate only when it senses a weed, reducing water usage by 75%.





Sustainable energy on campus

Lincoln is also the only New Zealand university to boast commercial-scale solar energy generating capability, through several large roof-mounted solar arrays installed in partnership with Meridian Energy.

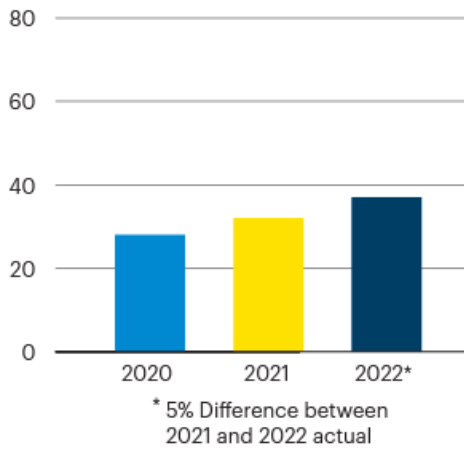
The solar installations are delivering a total of 802,000 kWh directly to the university's network – equivalent to the annual electricity requirement of 110 average New Zealand households. In addition, coal-powered heat generation will be phased out by 2024 and diesel generators by 2030. All new buildings must adhere to Green Star building standards and two major initiatives directed at reducing air travel emissions are on track to be introduced in 2023.

LU is in the planning stage of constructing a 1.5MW solar farm adjacent to the campus. The new agrivoltaic 1.5 MWp solar installation will comprise around 2,300 photovoltaic (PV) panels and produce ~2.3 GWh per year. When the Energy Farm array is operational, the combined solar installations on campus and the new farm will have the capability to deliver up to 25% of the University's total energy requirements. The new solar array will consist of rows of ground-mounted bifacial PV panels on a state-of-the-art east-west tracking system, with two different height configurations, allowing for diverse crop cultivation alongside and underneath the panel structures.

Since 2022 LU has purchased 100% certified renewable electricity which, combined with our solar generating capacity, ensures that the total electricity demand of our campus is met without producing carbon emissions. Government funding was also received to install efficient LED lighting on campus, effectively helping to further reduce carbon emissions by around 212 tonnes over 10 years.



Energy Sustainability – Renewables as % of total campus energy requirement



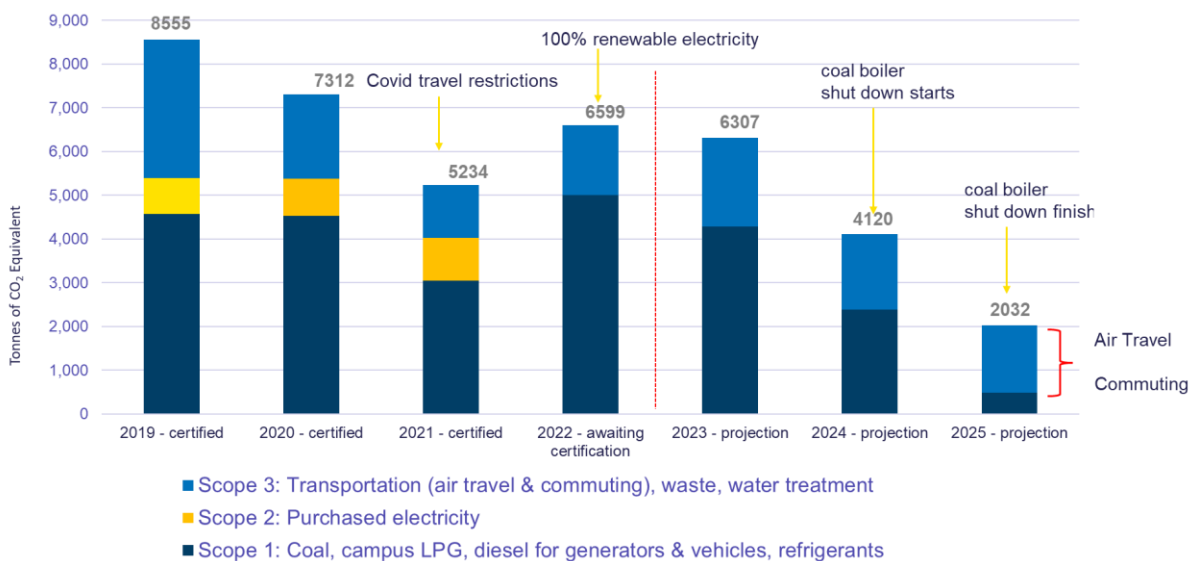
The year-on-year increase in the University's sustainably sourced electricity reflects its continuing commitment towards achieving carbon neutrality by 2030. This year's increase primarily comes from its membership in Meridian's Certified Renewable Energy Scheme.

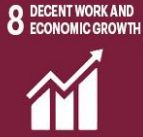
Reducing our carbon footprint

The University is transitioning its vehicle fleet to electric vehicles, showcasing a commitment to environmental responsibility and sustainability practices. Currently, around 25% of the fleet is electric, comprising six EVs and three hybrid cars. The University campus has 14 EV charging points, with additional EV-charging infrastructure planned over the next 10 years.

All operational greenhouse gas (GHG) emissions required under the international standard for carbon footprints, ISO 14064-1 (including vehicles, business travel, the daily commute of staff and students, fuel and electricity, paper, and waste), were evaluated to gain the certification.

The emissions are measured annually and the inventory is independently verified to ensure it is accurate and complete. In 2022 we have successfully reduced our carbon footprint from our baseline year by 23%, to 6,599tCO₂e.





Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Increasing the number of land-based sector graduates to meet industry demand

Given the enhanced need for employment in the current economic environment, the University is well positioned and established to continue its growth trajectory of increasing the number of land-based sector graduates to meet industry demand. Lincoln University has an employment rate of 84.2%, the highest of all New Zealand universities, and a good indication that it is providing students with a good skill-based education experience and considerable assistance when transitioning into the workforce.

The Lincoln University Post Qualification Outcomes Survey also revealed that students found work-integrated learning and/or internships extremely useful. Work-integrated learning (practical work) in the industry is important in the University students' programmes of study and provides experiences in a broad range of careers in the disciplines associated with each programme.

The proportion of Lincoln University programmes and majors that contain a work-integrated learning requirement is as high as 60 percent.



A global business with a history of employing Lincoln graduates

The University's longstanding international business partnership with Kuehne+Nagel has been strengthened following the launch of a revised and expanded internship programme for Lincoln University students in the United States. The University's Bachelor of Commerce degree majoring in Supply Chain Management is viewed as a highly desirable and relatively unique programme in New Zealand as it focuses on relevant industry contexts and mixed delivery of learning, effectively producing work-ready graduates.



K+N visitors with Associate Professor Mark Wilson and some of the potential internees.

Providing opportunities for leaders to grow

The inaugural Lincoln University Leadership Development Programme was launched in 2022. The programme was specifically designed for the University, providing managers with the opportunity to further develop and hone their leadership capabilities and skills. Importantly, it ensured a shared understanding and consistency of core leadership requirements across the University. A total of eight workshops, two workshops per staff member, were attended by 58 staff members in managerial and leadership roles.

A focus on building core capabilities and critical skills

The 2022 Staff Learning and Development programme comprises a range of courses building core capabilities and critical skills together with promoting the integration of equality and diversity into the University's operations. The programme advocates a focus on wellbeing tools and strategies, for example, the Cultural Competence series, including Understanding Unconscious Bias, Cultural Intelligence, Wellbeing workshops and leadership sessions on a variety of topics including specific recruitment training for managers. A total of 446 staff members attended 42 workshops.

Importance of research to changing climate conditions

The Intergovernmental Panel on Climate Change (IPCC) Working Group II released its latest report on Impacts, Adaptation and Vulnerability in February 2022, with NZ and Australia being the only countries with a chapter devoted specifically to their responses. The NZ-Australia insights come within the IPCC’s Working Group II report, focusing on impacts, adaption and vulnerability to climate change. The report found over 40% of the world’s population is “highly vulnerable” to climate change effects. This includes the almost one billion people residing in at-risk coastal areas. Between 2010 and 2020, 15 times more people died from floods, drought and storms in vulnerable areas, including South America and parts of Africa. Lincoln University professor in applied economics Anita Wreford was involved in the report as a Lead Author of the Australasia Chapter, focusing on agriculture and its response. Anita subsequently published two articles, “*New Zealand farmers and growers are already adapting to changing climate conditions – just not enough*” and “*NZ’s first climate adaptation plan is a good start, but crucial questions about cost and timing must be answered*” on The Conversation platform, recording a total of 16,000 reads worldwide and republishing with 16 publishers.

Game changing technology to reduce greenhouse gas emissions

A new effluent treatment system, launched in 2021 under the brand name EcoPond, was developed in partnership with Ravensdown. Set up as a demonstration site on the Lincoln University Research Dairy Farm (LURDF), the technology continued to attract demonstration visits to the farm throughout 2022. The technology reduces the methane emissions from farm dairy effluent ponds by up to 99%.

Cutting greenhouse gas methane emissions has been a focal point of a past COP26 climate summit in Glasgow, with New Zealand joining more than 100 countries pledging to reduce methane emissions by 30% over the next decade. The EcoPond system achieves its highly significant reductions in methane emissions by adding a treatment agent iron sulphate, a safe additive used in the treatment of drinking water, to effluent ponds. In addition, EcoPond slashes the amount of E.coli in the treated effluent, reduces ammonia emissions, mitigates odour and cuts phosphate leaching losses from effluent areas into waterways by up to 90%.



Fostering innovation in the wine industry

Lincoln University researchers are working on artificial intelligence techniques to help identify the quality of wine without touching a drop, helping the wine industry to automate a time-consuming and costly process. The 2022 paper, *A machine learning application in wine quality prediction*, published in *Machine Learning with Applications* (an Elsevier journal), showed that by generating synthetic data, the researchers identified important attributes which increased the accuracy of a machine learning model. This helps their progress towards developing a machine learning-based web application that wine researchers and wine growers can use to predict wine quality based on the important chemical and physio-chemical compounds, giving them the capability to “tune various variable quantities”.

The research utilised 18 Pinot Noir wine samples with 54 different characteristics (seven physiochemical and 47 chemical features), and they generated 1381 data samples. The findings were compared using four distinct feature selection approaches. Important attributes that were shown to be relevant in at least three were utilised to predict wine quality. Wine quality is one of the most significant issues in the wine industry and it is hoped this innovative tool will be a valuable asset for growers. In addition given the complexity of Pinot noir cultivation, the tool is currently being developed to include the viticulture variables as well, which would be a valuable asset for growers.

Showcasing transformational innovations and practices

The Lincoln University Dairy Farm (LUDF) continues to demonstrate at a commercial dairying scale how transformational innovations and practices can be used to lower the environmental impact and enhance the productivity of dairy. Through the adoption of a ‘10 milkings in seven days’ variable regime, the farm can demonstrate a reduction of pressure on people and cows. Since its launch, the farm has remained active over time by demonstrating ways to cut nitrogen application while maintaining production and profit. LUDF aims to maintain profitability while it forges on with transformational innovations.



10 REDUCED INEQUALITIES



Reduce inequality within and among countries

Achieving parity of participation and achievement for all students

Enhancing the university experience for students is pivotal for their development and success, enabling them to thrive and grow their potential while preparing them for future career success and impact in the land-based sector. The University's Manaaki Taurira programme embodies its kā matawhānui/vision to achieve parity of participation and achievement for all taurira by 2026.

Manaaki Taurira combines a values-led approach with strategic and systematic processes. Within an educational space, it becomes a continual process that guides and supports every student on their path to success. Embedded in the framework, the Whanake Ake programme's key focus is on the acceleration of Māori student participation and Māori research aspirations at Te Whare Wānaka o Aoraki Lincoln University. A key element of Whanake Ake is the ability to embed and deliver Mātauraka Māori across courses and programmes by increasing the capacity of Māori staff.



Providing a bicultural experience for staff, students and stakeholders.

A Lincoln Future Leader Scholar has left a meaningful legacy through her project, "*Enhancing Cultural and Te Tiriti Competency within the 2022 Future Leader Cohort*". Alice Docking's work involved assessing and developing her fellow scholars' cultural competency, their knowledge of the Treaty of Waitangi and its relevance, their understanding of the significance of engaging and working alongside tāngata whenua, and how this may influence their future work. The project fed into a wider review of the Future Leader programme to ensure graduates would be able to lead in a bicultural environment,

including the implementation of a collaborative and appropriate process that supports and informs the design of cultural competency assessments and workshop structures.

Diversity makes us stronger

In 2022, 18% of enrolled Lincoln University students were international students. The University celebrated this cultural diversity at the annual Selwyn Culture-Fest. The event brings together the many different cultures making up the community and offers an opportunity to celebrate a range of traditions, food and recreation activities. As a sponsor, the University hosted a stand that included a special activity in keeping with this year's theme of educating residents about the variety of cultures in Selwyn.

LU is dedicated to providing an inclusive environment where students are empowered to thrive and grow, and where diversity is welcomed and celebrated. In September an enthusiastic contingent of students, staff and members of the public turned out to celebrate Lincoln University's LGBTQIA+ community. They took part in a Pride Walk, official opening and ceremony to commemorate the two rainbow crossings on campus. Organised by Lincoln's LGBTQIA+ student group, SPACE, the colourful event took place near Forbes Lawn at the first rainbow crossing to be installed at the university in 2021.



A commitment to equity and diversity

Te Whare Wānaka o Aoraki Lincoln University is committed to equity and diversity and seeks to provide a safe, inclusive, respectful and welcoming environment, both physical and digital, in which students and staff are supported towards achieving their full potential. This includes robust equity, diversity and inclusion strategies with measurable outcomes. The Equity, Diversity and Inclusion Policy was approved by the Lincoln University Council in December 2022.

All members of the University community are expected to support equitable access, participation, engagement and success for all staff members and students, including Māori and those from diverse groups. The EDI Steering Group is responsible for recommending effective development, establishment and implementation initiatives of best EDI practices across the University an International student member.



Make cities and human settlements inclusive, safe, resilient and sustainable

Innovative new solutions for contested peri-urban landscapes

The University hosted a group of mayors and local authority senior executives from around the Canterbury region for a workshop entitled The Peri-Urban Conundrum – farming in a contested landscape. The collaboration between the Canterbury Mayoral Forum and Lincoln’s Centre of Excellence (CoE): Designing Future Productive Landscapes, aimed to gather insights into the current issues and future development opportunities for the rural-urban interface. The CoE, led by Professor Pablo Gregorini, focuses on developing, testing and implementing sustainable land-use systems to facilitate landscape health, while also building economic, ecological, social and cultural wealth. One of the most pressing issues facing communities throughout Canterbury and Aotearoa is how to effectively manage the rural/urban interface. Council policy seeks to balance the urban impetus for



expansion with the rural demand to retain land for agricultural production.

New infrastructure promoting sustainable transport

To encourage more staff and students to cycle to campus, the University has improved the bike storage facility on campus. The new, secure bike shed features new lighting, general power outlets for e-bikes, swipe entry access and internal security cameras. Locky Dock secure parking and charging stations for e-bikes, as well as e-scooters and conventional cycles have also been installed. The installation reflects the aim of Lincoln University's Sustainability Plan to increase and encourage more cycling to Lincoln to reduce carbon emissions from travel to campus. In addition to the free e-bike servicing, additional EV charging infrastructure and the installation of Locky Docks on campus the University has recently signed an agreement with ECan to distribute and promote concessions Metro cards to students. As the University pursues its goal to be carbon neutral by 2030, it remains

committed to researching, teaching and showcasing practices and approaches that will advance a more productive and sustainable future for Aotearoa New Zealand.

Tackling environmental issues head-on

Lincoln alumnus Tsewang Nuru Sherpa is using local solutions to take on the big issues and protect the environment in his home country of Nepal. The Master of Applied Science in Environmental Management graduate, who came to Lincoln on a Mingma Norbu Sherpa Memorial Scholarship, was featured in an article entitled *From Everest to Aotearoa* on the Wilderness website. The article highlighted his research into the Garbage Deposit Scheme (GDS), which removes the rubbish left behind on Mt Everest after expeditions, with climbers paying a 4000 USD deposit that is returned only if they bring back at least 8kg of rubbish.



Tsewang also takes on even bigger issues in opinion pieces that have appeared in the Kathmandu Post for several years. He covers climate change topics and their often overlooked effect on his homeland, such as the melting of one-third of Himalayan glaciers, local wildlife conservation issues such as the preservation of tigers, water quality and energy use. He talks about how the climate change taking place in the mountainous region of Nepal has to be understood, and "the potential impact rendered on social and ecological systems needs to be laid down".

Being a part of the solution

A Sustainability Week to promote sustainable living and eco-friendly practices was held on campus in August. Hosted by the University, Lincoln University Students' Association (LUSA) and the Lincoln Environmental Sustainability Society (LESS), the initiative included several events throughout the week to help education and promote sustainable solutions that can be adopted on campus.

Activities included an expo with information on sustainable activities, an op-shop sale to re-home clothing, complimentary breakfast for those who take sustainable transport options and a tree planting afternoon.

At the heart of Lincoln University's teaching and research is a commitment to ensuring that future generations can flourish and grow, and central to this is preserving the planet and respecting the use of natural resources.

Lincoln University, LUSA, SAGE and LESS present

SUSTAINABILITY WEEK

1-5 August 2022

SUSTAINABILITY EXPO
Find out more about sustainable transport and reducing your household waste. Featuring Metro, Hitch, LU Sustainability Plan, Facilities Management and more.
When: Monday 1 August, 11am - 5pm Where: Grounded, Forbes Building

OP SHOP SALE
Donate your old clothes and buy some new pre-loved threads. Donations collected at LUSA's office.
When: Tuesday 2 August, 12pm - 2pm Where: Grounded, Forbes Building

BUILDING ON FERTILE SOILS - AT THE NEXUS OF POPULATION/CLIMATE/FOOD (PANEL DISCUSSION)
Join SAGE for a panel discussion on the consequences of building on fertile soils.
When: Tuesday 2 August, 12pm - 1:15pm Where: Grounded Theatre, Forbes Building

SUSTAIN THE BRAIN BREAKFAST
Bike, bus, carpool or walk to campus this week and tuck into a delicious breakfast when you arrive.
When: Wednesday 3 August, 8am - 9:30am Where: Grounded, Forbes Building

PLANTING DAY
Join us for an afternoon of learning and planting! Bring gloves and gumboots if you have them.
When: Friday 5 Aug, 1:30pm - 3pm Where: Meet at Grounded to walk over to the Arboretum together.

LINCOLN UNIVERSITY
LUSA
SAGE for Sustainability
LESS
LU SA

Visit the Grounded Theatre for a selection of films showing throughout the week, or the Library to check out their display of sustainability-related resources.

Developing and demonstrating world-best agricultural practices

Lincoln University farms are crucial to its practical scientific research and engagement with the agricultural sector. The farms develop and demonstrate world-best agricultural practices, undertake environmental monitoring, conduct research into forage and herbage, test approaches to becoming carbon-neutral and predator-free and achieve complete recycling of nutrients while increasing productivity and minimising environmental impacts. The University's research farms can take on a higher level of risk than is acceptable to most farmers when testing new projects and finding new ways to operate. Regular demonstration days are held for commercial farmers to take key learnings to apply to their own properties.



Measuring and monitoring waste on campus

In a positive step towards sustainability and environmentally conscious practices, Lincoln University is collaborating with the Waste Management Company to assess and understand the quantity of food waste generated on campus. All unsold food from the student canteen and cafes on campus is systematically weighed and collected, a key process to understanding how much food waste is being generated. The collected data offers invaluable insights into patterns and reasons for food waste, enabling better waste management strategies to minimise such waste in the future. In 2022 over 13.5 tonnes of food waste was generated.

Following an upgrade to the University's waste management systems to divert as much waste from landfills as possible and help reduce our greenhouse gas emissions, two new initiatives were launched in 2022, including new food waste bins and new waste bin labels.

Contributing to a larger movement towards ethical and sustainable practices

The University's decision to consider the impact on society, the economy, and the environment, as well as supplier policies and sustainable practices, in its procurement process, reflects a commitment to responsible and ethical practices. The Procurement Policy outlines the broad principles regarding the procuring of goods, services and capital works. It supports the University's strategy, purpose, values and goals for the management of scarce resources and effectively and efficiently maintains long-term financial viability through appropriate environmental, social and economic factors in purchasing decisions.

Producing positive outcomes for productivity, resilience and environmental sustainability

The ground-breaking work of Lincoln University's Dryland Pastures Research Group was honoured at the inaugural Beef + Lamb New Zealand Awards, held in September. The awards aim to celebrate the people, innovation, technologies and management systems of New Zealand's grass-based red meat industry. The Lincoln University's Dryland Pastures Research Group won the Ballance Agri-Nutrients Science and Research Award. For the past 20 years, the Dryland Pastures Research Group has supplied the science that underpins the agronomic guidance it provides to transform sheep and beef farms on hill country throughout New Zealand.

The group's work has transformed thousands of hectares of east coast hill country from Central Otago to Gisborne; while its message has been to use legume dominance to address low nitrogen – the main impediment to production in farm systems. The group has successfully promoted their science at more than 100 field days, featured dominantly at NZ Grassland Association Conferences and created a range of resources to support farmers wanting science-based information to change farm systems. Through more than 200 peer-reviewed articles, they have developed case studies demonstrating that their science drives on-farm animal productivity, financial viability and social acceptance through a reduced environmental footprint.



Towards a more ethical, sustainable pastoral production system

Lincoln University Professor Pablo Gregorini says a paradigm shift is needed to create a more ethical, sustainable pastoral production system. He commented as part of a commended keynote speaker address at the 73rd Annual Meeting of the European Federation of Animal Science (EAAP), which took place in September. The inspirational talk was based on a summary of 10 of his recently published scientific articles challenging traditional ways of thinking about pastoral production around the world and in New Zealand. Professor Gregorini said the shift could initially come from a change in “thoughtscapes”, which he described as the “geography of our mind, where we are not observers but participants”. Alternative thoughtscales may involve perceiving animals in a wider context in terms of how they contribute to society and the landscape at large. He described landscapes as “the tables where humans and livestock gain their nourishment, i.e., ‘foodscapes’”.

Research on why people choose to buy mycoprotein products

According to Lincoln University researchers, climate-conscious consumers are more likely to buy plant-based meat alternatives such as Quorn if they think they are nutritious, safe to eat and more sustainable than meat. The researchers worked with other academics across the world to determine the biggest reasons why people choose to buy mycoprotein products. The findings have crucial implications for food marketers and non-profit organisations advertising for health and sustainability. Based on the findings, co-author and Lincoln University Horticultural Management Senior Lecturer, Meike Rombach reported that non-profit organisations could be investing in awareness campaigns and best practice advice related to sustainable, meat-free diets.

Seeds sown for farmers to grow profits and sustainability

Converting wastewater from legumes into new plant-based products could revolutionise the food industry and have crucial implications for sustainability. Lincoln University food science lecturer Dr Luca Serventi, with Dr Sung Je Lee of Massey University, are key players in a research project that looks at using waste by-products to create ingredients like stabilisers or replacements for dairy and egg-based items. The researchers aim to create a nutritious powdered product that can be processed and used in the same way as emulsifiers, foaming and gelling agents. The study requires a multidisciplinary approach, incorporating process engineering, food science, and sensory and nutritional sciences.

Launching the Farm Sustainability Fund

Lincoln University partnered with the a2 Milk Company to launch a new initiative, the Farm Sustainability Fund, to support sustainable dairy farming projects in New Zealand. The a2 Milk Company will provide up to \$500,000 to the Fund in the first year to enable fund grants for farm projects that demonstrate an integrated approach to a sustainable future and enable a positive and meaningful impact across the community and environment.





Take urgent action to combat climate change and its impacts

Educating on how low-flammability species reduce the risk of fires

Climate change is increasing the risk and intensity of fire worldwide. In 2022, Lincoln University teamed up with Fire and Emergency New Zealand to produce a public education campaign on how planting low-flammability species could help rural and urban landowners reduce the risk of fire on their properties. Lincoln University alumnus (and All Black) Samuel Whitelock (BSc Plant Science) returned to campus to film a series of videos with Associate Professor Tim Curran. The Lincoln University research team uses a specialised plant barbecue to assess the flammability of common plants. Their dataset is the largest and most reliable globally. The public education campaign includes a video of the plant barbecue in action, landscaping and gardening tips to reduce the impact of wildfire around homes, and a catalogue of low-flammability New Zealand plants.



LU expert appointed to Canterbury Climate Change Action Committee.

In March 2022, Professor Anita Wreford was appointed to the Environment Canterbury's Climate Change Action Committee. The committee was established in April 2021 to provide effective and transparent leadership on climate change and ensure a climate-resilient future for the Canterbury region. Professor Wreford's appointment as one of two independent experts will help the regional government improve its decision-making and planning around climate change adaptation.

Addressing significant issues affecting NZ's economic prosperity and social wellbeing

Since its foundation by Cabinet in 1962, the Agribusiness and Economics Research Unit (AERU) at Lincoln University has performed world-class research addressing significant issues affecting New Zealand's economic prosperity and social wellbeing. In 2022 AERU together with Westpac NZ released research that finds agile farm management will be critical in reducing emissions and adapting to climate change. It was produced as part of a wider body of work undertaken by Lincoln University for Westpac NZ looking at the impact of climate change on agriculture in New Zealand.

The Westpac NZ Agribusiness Climate Change Report assesses the risks and opportunities presented by climate change, as well as the sector's vulnerabilities and potential responses. It was designed to provide impartial information to farmers about the way climate change may affect their location and type of production, and how they can respond. The report finds there is already a range of existing management options available to assist farmers in strengthening the physical resilience of their farming systems and meeting New Zealand's 2030 agriculture climate targets, with only a few requiring an initial investment of capital. However, applying these options more widely will require the uptake of best-practice farm management. Lead author of the report, Lincoln University Professor Anita Wreford, says adaptation will be crucial, but has its limitations. She says there is scope for further research into the enduring effectiveness of adaptation practices under a changing climate.

Lincoln students help out after floods

A group of seven Lincoln students, the Handy Landys travelled up to Marlborough to help farmers in the wake of the serious flooding in the region. The group teamed up with eight local dairy farmers in the Havelock region near Blenheim and helped by digging out culverts, fencing, and clearing debris using chainsaws. The club was formed to help after natural disasters and offer labour for a day or weekend to assist farmers and reduce their stress. It aims to support rural people in times of need and help improve and advocate for mental and physical health.



Largest-ever pastoral farming study on regenerative farming practices

In 2022 the Government announced New Zealand's largest-ever pastoral farming study on regenerative farming practices. The new Whenua Haumanu programme, of which Lincoln University is a research partner together with AgResearch, Dairy Trust Taranaki with Massey University as the lead. The study has Government backing of \$26.1 million and will study the whole pastoral farming system from field to fork. It aims to scientifically build a picture that includes soil biodiversity, pasture performance, animal production and welfare, and the quality of the food produced. The programme involves several research sites with additional guidance provided by an End User Advisory Group comprised of the pastoral industry, iwi, investment and consumer groups.



Termite territory expands as world warms

Lincoln University ecologists, Associate Professor Tim Curran and Dr Azharul Alam are among 100 researchers who took part in a global study published in the prestigious publication *Science*, which has found we may have underestimated how termites contribute to and could spread because of, climate change.

Termites are critical in natural ecosystems—especially in the tropics—because they help recycle dead wood from trees. The study showed termites are very sensitive to temperature, so as the world heats up through climate change, the insect's role in wood decay will likely expand beyond the tropics. They can also thrive in dry conditions. The termites produce methane in their guts and release carbon dioxide when they break down wood, which contributes to global warming. Their results suggest that areas with high termite activity should increase as the earth becomes warmer and drier. Associate Professor Curran said by including New Zealand sites in the study they were better able to ascertain the role of termites in wood decay throughout the world. The study's lead, University of Miami tropical biologist Amy Zanne, said with temperatures warming, the impact of termites on the planet could be huge.

Study on sea ice and climate change

How much sea ice is there, how much does it drive climate change, how much is it affected by climate change, and what does that mean for the future of our planet? The answers to these questions should become clearer as a result of a \$929,000 Marsden Fund award to devise new ways of measuring sea ice. Antarctic sea ice acts as a giant solar reflector covering up to 90% of the Southern Ocean. But until recently, it's been difficult to estimate how much is gained or lost from year to year, as satellites have been able to measure only the area of sea ice, but not its thickness. Lincoln Agritech researcher Dr Adrian Tan is part of the team, led by Assoc Prof Wolfgang Rack of the University of Canterbury that will measure the largest stretches of Antarctic sea ice in history, and shed light on its role in a warming climate. They are both Principal Investigators in the research.

Adrian has developed a snow radar that, when integrated with other instruments, allows researchers to separate snow cover and sea thickness and so measure sea ice mass. It has been used on a drone, and then flown by helicopter. Now, they hope to integrate it with a fixed-wing aircraft that can survey much wider areas. They will conduct an aerial survey of up to 5000 km of Antarctica's coastline, while developing better satellite techniques to measure sea ice thickness.



Source <https://lincolnagritech.co.nz/marsden-award-to-study-sea-ice-and-climate-change/>

Biosecurity for the seaweed industry

Lincoln University Provost, Professor Chad Hewitt, is part of an international team working for improved seaweed biosecurity management, an industry that accounts for over 50% of global marine and coastal aquaculture production by volume. The rapid expansion and globalization of the seaweed production industry, combined with rising seawater temperatures and coastal eutrophication, has led to an increase in infectious diseases and pest outbreaks.

The primary international mechanisms for controlling exotic diseases associated with trade in aquaculture organisms and products (e.g., the Aquatic Code of the World Organisation for Animal Health (WOAH)) do not include seaweed and aquatic plants. Having tested biosecurity measures in Malaysia, the team is adapting the UN Progressive Management Pathway for improving Aquaculture Biosecurity (PMP/AB) to the seaweed sector. Given the limited wealth of many small-scale seaweed farmers, the development and implementation of the PMP/AB-Seaweed must be supported by government-led initiatives and new business models.



Source <https://www.nature.com/articles/s41467-022-34783-8>

Managing marine ecosystem health

Lincoln University is part of a nationwide project on ecosystem-based management of New Zealand marine resources. Working with government, Māori, industry and community the researchers intend to provide an evidence base to support policymakers, Māori organisations, iwi/hapū/whānau, industry and communities to navigate the legislative, policy and practice constraints surrounding marine ecosystem-based management (EBM) and any changes required to enable it.

Lincoln University Associate Professor Hamish Rennie and Dr Steve Ulrich identified an upsurge in requests for temporary fishing closures through rāhui (traditional customary prohibitions) and the potential for tools enabled in customary marine tenure legislation to play a significant future role in managing marine ecosystem health.



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Wildlife conservation

Lincoln alumnus Sonam Lama's fight to save the critically endangered red panda in his homeland has been recognised internationally and has been given a financial boost. The Nepalese conservationist, a Master of International Nature Conservation graduate and Mingma Norbu Sherpa Memorial Scholar at Lincoln University has won a Whitley Award worth £40,000 (NZD 77 452) from the United Kingdom conservation charity, the Whitley Fund for Nature (WFN).

He works with the Red Panda Network, an NGO dedicated to the conservation of wild red pandas which is monitoring 10 of the animals using GPS collars. The award, a world-leading prize for wildlife conservation, recognised his efforts in training 100 citizen scientists to help restore the red panda habitat as well as an investment in red panda eco-tourism to provide income for local people.



Photos supplied by Ashley Bowen and the Red Panda Network.

New research harnesses soil fungus for environmental mitigation

A major new research programme launched in Parliament in July promises to further reduce the environmental impact of New Zealand agriculture, with naturally occurring soil fungus shaping as a new hero, assisting farmers with more efficient nitrogen use. N-Vision NZ, led by Ravensdown and co-funded by the Government's Sustainable Food and Fibres Future (SFFF) initiative, aims to help farmers reduce nitrogen loss. One of the projects in the \$22 million seven-year initiative, led by Lincoln University researchers Professor John Hampton, Dr Hossein Alizadeh and Dr Wadia Kandula, will harness the power of humble natural strains of soil fungi to increase the efficiency of nitrogen use by plants.

Addressing the effects of invasive predators on Aotearoa's native flora and fauna

Located on campus, the University's partnership with Zero Invasive Predators (ZIP) is an important and longstanding one with a key focus on addressing the effects of invasive predators on Aotearoa's native flora and fauna, as well as the country's primary production base. As part of the collaboration, ZIP has access to a two-hectare fenced enclosure on University land, where they investigate predator behaviour and develop new solutions for predator elimination. ZIP offers practical support for Lincon's education programmes, including hosting research projects for students undertaking a Master's degree in Vertebrate Pest Management. The partnership also offers a highly desirable and rewarding career pathway for students, with a significant number of Lincoln graduates being recruited to the ZIP team, and others working there part-time while completing their postgraduate studies.

Government funds research into climate-resilient plant production

Lincoln researchers have been granted \$10.7 million from the Government's Endeavour Fund to research how volatile chemicals produced by fungi (FVOC) can be applied in agriculture. The University's approved Endeavour Research programme focuses on the development of FVOC products which will enable plants to more strongly resist stress caused by adverse climate conditions or disease. The research programme will be led by Professor John Hampton, with Dr Artemio Mendoza-Mendoza as the key researcher. The ultimate goal of the research programme is to have commercial FVOC products available for use by New Zealand farmers as soon as 2030.

Eliminating pests from Banks Peninsula and Kaitōrete Spit by 2050

Lincoln University alumni, students and staff are all playing key roles in an ambitious project to eliminate pests from Banks Peninsula and Kaitōrete Spit by 2050. Pest Free Banks Peninsula/Te Pātaka o Rākaihautū (PFBP) is a collaborative programme to protect biodiversity on the peninsula through the widespread eradication of animal pests.

Led by operations manager Tim Sjoberg and project manager Sarah Wilson (both Lincoln alumni), rangers laid the first traps at Kaitōrete in March. Over the next two years, they plan to cover the full length of Kaitōrete and part of the southeast corner of Banks Peninsula, before starting on the western side of Akaroa Harbour, moving the traps until they reach Lyttelton. Key to PFBP's progress is working with Lincoln research students and academics to be at the forefront of the latest technology for eliminating predators, highlighting the opportunities available for students to apply their studies to a real-world research project that makes a huge difference.



Promote peaceful and inclusive societies for all and build effective, accountable and inclusive institutions at all levels

Enabling volunteers to play a more pronounced role in disaster response

An article published by Department of Environmental Management researchers examined ten years of disaster response by the Student Volunteer Army, a student-led volunteer group. It examined their response to multiple disasters, including earthquakes, floods, fires, a terrorist attack and the Covid-19 pandemic. In distilling the key lessons of a youth-led crisis volunteer group that has mobilised for a spectrum of disasters, the paper, “A shovel or a shopping cart”: lessons from ten years of disaster response by a student-led volunteer group” contributes to theoretical understandings of how groups at a local level learn after sequential disasters and the conditions and considerations that enable such groups to effectively—and repeatedly—“meet a need” in disaster response.



Fostering cultural, educational, sporting and economic exchanges

Lincoln University School of Landscape Architecture’s practicum course students spent 2022 working in the Songpa-Gu Sister City Garden in Halswell Quarry. They constructed a Pyeongsang (raised picnic platform) and worked with a traditional Korean builder to lay the groundwork for the new Jeongja (pavilion).

The pavilion will be the first of its kind in New Zealand. The garden celebrates New Zealand and South Korean friendship with the Christchurch and Songpa-gu sister city relationship fostering cultural, educational, sporting and economic exchanges. The ribbon-cutting ceremony for the new pavilion was held on 4 June 2022, the 60th anniversary of diplomatic relations between the Republic of Korea and New Zealand.

Making a positive social change by addressing social issues in management

In 2022, the Lincoln University Critic and Conscience Award was presented to Dr Hafsa Ahmed, Lecturer in Global Value Chains Trade for the Faculty of Agribusiness and Commerce. Dr Hafsa Ahmed has referred to her own life through this statement by Simon Sinek (author and inspirational speaker): “The value of our lives is not determined by what we do for ourselves. The value of our lives is determined by what we do for others.” Hafsa’s portfolio of applied research projects is driven by future foresight to make positive social change through addressing social issues in management. Applying her expertise in change management and stakeholder engagement, she aims to enhance management education to support socially and environmentally responsible business leaders who are equipped with the skills to solve the wicked problems facing humanity. Acclaimed by her colleagues and students as an inspirational teacher and insightful researcher, Hafsa is also committed to her role as an academic to contribute constructively to public debate. Her canon includes a podcast series with Plains FM, a YouTube co-production with ANZAM called Spill the Beans and [Unquiet Women](#) – a series of 10 stories on female Asian migrants that she hopes will start a movement that empowers others.



All-white All Blacks paint shades of grey in rugby history

Research published by Lincoln University Professor Greg Ryan, *Debating Racial Hierarchy and the Exclusion of Māori from the 1928 All Blacks Rugby Tour to South Africa*, shone a spotlight on New Zealand’s contested relationship with Apartheid South Africa. The debate around race and rugby began much earlier than many realise, with the exclusion of Māori from the 1928 touring team to South Africa. The article provides an interesting background to the large protest movement of the 1980s.



Strengthen the means of implementation and revitalize the global partnership for sustainable development

Honouring contributions to economic and social development in the Gansu Province.

Lincoln University Professor Jon Hickford became the first New Zealander to be recognised with the prestigious Dunhuang Award from the People's Republic of China. The award, similar to a New Zealand Order of Merit (ONZM) but in recognition of international service, honours foreign experts who have made great contributions to economic and social development in the Gansu Province.

Gansu has been a sister city of Christchurch since 1984 and its connections began with Cantabrian, Rewi Alley, whose support of government-sponsored flood and famine work in China led to him receiving honorary Chinese citizenship in 1982. Prof Hickford's work involves facilitating regular exchanges between LU and Gansu as he uses his expertise in animal breeding and genetics to teach and supervise postgraduate students from Gansu Agricultural University in Lanzhou.



A leading universities network cooperating in the fields of Agriculture, Food, Environment and Related Sciences

The 2022 Euroleague for Life Sciences (ELLS) General Assembly, Forum and Annual Conference was attended by Lincoln University Senior Leadership. The participating universities within the Euroleague are all ranked in the QS top 100 agricultural universities. The theme of the conference was 'The interconnectedness of things' and presentations were focused on sustainable and alternative food production, environmental protection and renewable energy. ELLS is a network of leading universities cooperating in the fields of Natural Resource Management, Agricultural and Forestry Sciences, Life Sciences, Animal Sciences, Food Sciences, Environmental Sciences and Rural Development, including Agricultural Economics or Rural Sociology. The Euroleague of Life Sciences aims to support increased postgraduate student and young faculty mobility for joint research and study abroad activities, international research summer schools, and conferences.

Sharing a common vision to contribute to sustainable and global development

The University is a member of the Global Challenges University Alliance 2030, a growing network of global university partners with a common vision to contribute to sustainable and global development. GCUA 30 offers a global platform for PhD students and young researchers, providing a range of learning and networking activities. GCUA 30 has received funding from the Swedish Government to implement key activities such as a newly developed PhD mentorship programme for students and staff. Lincoln University had two academics and two PhD students participating in the mentoring programme in 2022.

Biosecurity centre a world-first

A new research centre at Lincoln University will bring together more than 100 of the world's top biosecurity researchers and stakeholders to solve some of the toughest land-based challenges. The new Centre for One Biosecurity Research, Analysis and Synthesis (COBRAS) will be the first of its kind in the world and will consolidate myriad global efforts to predict and mitigate the impact of invasive weeds, animals and pathogens into a centralised hub at Lincoln University.

The COBRAS multi-disciplinary team comprises highly-respected researchers from the domains of animal, environmental and plant health, Mātauraka Māori, economics and climate change, and is led by Distinguished Professor Philip Hulme, one of New Zealand's leading biosecurity scientists. COBRAS will also work closely with relevant Ministries, industry, regional councils and iwi, as well as international partners – for example, the Australian Centre of Excellence for Biosecurity Risk Analysis.



Industry-led student projects and collaborations

FoodSouth delivers product scale-up support for food and beverage companies from its premises on the Lincoln University campus and is the South Island hub of the New Zealand Food Innovation Network (NZFIN), a government-funded national network of complementary facilities enabling the growth and development of food and beverage businesses in Aotearoa. The FoodSouth building extension on campus was officially opened on campus in August. The University's partnership with FoodSouth is an important one as their services and expertise closely align with the highly subscribed food, wine and beer study programmes offered by Lincoln University. The partnership and co-location with FoodSouth have facilitated many industry-led student projects and collaborations over the years, and the University is committed to building on this valuable relationship.



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Find out more at www.lincoln.ac.nz