UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Pūrongo Toitū te Taiao
2021 UC Sustainability Report

manaaki tangata, manaaki whenua

Hei Whakaupoko i ngā Kōrero | Executive Summary

This report uses the Sustainability Chapter of the University of Canterbury's Strategic Vision 2020-2030 as the basis for measuring UC's progress against its sustainability targets. Overall, considerable progress has been made. In addition, work continues on those business as usual sustainability work programmes not captured in the Strategic Vision (which captures mainly new work programmes). The Sustainability Programme Board oversees this work programme, which is led by Professor Jan Evans-Freeman. In 2021, Professor Evans-Freeman took up a new role as Pro-Vice-Chancellor Sustainability, a first for a New Zealand university.

COVID-19 once again had a significant impact on the University's operations and environmental footprint. This contributed to reductions in greenhouse gas emissions, mainly through a drop in coal burned and in flights taken. Student engagement remained strong through online channels, and engagement overall was extremely strong with a primary focus for the year being on the delivery of the SDG Summit Series.

Significant work took place on carbon reduction and management, with three streams of work being developed simultaneously: carbon reduction, carbon sequestration and climate resilience.

Finally, approval was granted for a new Bachelor's degree: the Bachelors of Social and Environmental Sustainability (BSENS), which will commence in 2022.

Ngā mihi| Acknowledgements

Tari Toitū te Taiao | Sustainability Office would like to thank these individuals for their help and reporting contributions: Professor Jan Evans-Freeman, Matt Morris, Chloe Sutton, Isabella Stainthorpe, Rory Lennox, Elysia Harcombe, Dr Frances Charters, Rob Oudshoorn, Tony Sellin, Jenny Ladley, Leanne Keenan, Kavit Sharma, Professor Jim Briskie, Ashley Dai.

Photography: Erica Austin, Thung Chutrchaivech, Corey Blackburn, Malcolm McRae, Chloe Sutton, Fiona Glennie, Andrew Chen.

Facilities Management approved this report on 2 May 2022.

UC's Senior Leadership Team approved this report on 10 May 2022.

UC Council received this report on 1 June 2022.

Message from the Tumu Whakarae | Vice-Chancellor Cheryl de la Rey

Kia ora,

I am delighted to present the eleventh annual UC Sustainability Report. These reports have evolved significantly since our first in 2011, and it is pleasing to see the progress we have made in that time. The decade in between has been marked by several challenges, both locally and internationally. In response, we have seen the galvanising of communities to build fairer, more resilient and more sustainable futures.

Sustainability is a key focus in the University of Canterbury's Strategic Vision 2020-2030, and 2021 saw some important milestones achieved. Notable was the appointment of Professor Jan Evans-Freeman as Pro-Vice-Chancellor Sustainability, to lead the implementation of the University's Sustainability objectives.

A major focus of our sustainability office during 2021 was the successful delivery of the remaining events in the 2020-2021 Aotearoa Sustainable Development Goals Summit Series. This brought together all the universities and many other tertiary education institutions, along with mana whenua and Māori organisations, central and local government bodies, third sector (community sector) groups, businesses, youth, and others. The goal was to galvanise momentum towards Aotearoa New Zealand achieving the SDGs. These events, like many, were held online due to the ongoing and rapidly changing situation with the global COVID-19 pandemic.

COVID-19 has put enormous pressure on many staff and students, and of course our wider communities. Although challenging, we have learned some new ways to do our work and the achievements in this report are a reflection of the commitment and passion of our UC community. Among the numerous achievements, there was an increase in courses offered against the SDGs and UC's new and innovative multidisciplinary Bachelor of Social and Environmental Sustainability degree will be accepting its inaugural student intake in 2022.

Notable in research is that UC and the University of the South Pacific have partnered to help Pacific countries understand the impact of climate change and how indigenous knowledge can be deployed to help Pacific communities adapt. To advance the University's Carbon Net Neutral goal, a highly complex, multi-year project for the removal of coal combustion for space heating was approved, and there was progress on

replacing the university vehicle fleet with new electric vehicles and also the use of artificial intelligence to gain deeper insights into infrastructure utilisation and performance.

I would like to take this opportunity to thank the University community for their hard work and commitment to the sustainability kaupapa, in building a fairer, safer and greener world.

Ngā mihi
Professor Cheryl de la Rey

Message from the Pro-Vice-Chancellor, Sustainability

It was my pleasure to be appointed as New Zealand's first Pro-Vice-Chancellor Sustainability in October 2021.

My role is to embed the University's Sustainability Plan into all aspects of our work, focussing on three areas: Teaching and Learning, Research and Campus Operations. In 2021 we commenced an analysis of our courses and degrees to understand which ones include sustainability as a topic or principle, and late in 2021 it was decided to introduce ten new PhD scholarships for research focussing on one or more of the 17 United Nations Sustainable Development Goals. Plans continued for the coal boiler conversion and the introduction of campus heating by using ground source heat pumps.

In 2021 the University joined several overseas networks, including, uniquely in New Zealand, the United Nations Race to Zero, closely linked with COP26, whereby we publish our carbon reduction plans internationally. Globally, many universities are increasingly concerned with reducing their own carbon footprint and contributing solutions to climate change. Canterbury is leading the way with many of our initiatives we present in this report.

Ngā mihi
Professor Jan Evans-Freeman
Pro-Vice-Chancellor, Sustainability

1

Whakamahuki o te Mahere Toitū te Taiao | UC Sustainability Planning Overview

1 Whakamahuki o te Mahere Toitū te Taiao | UC Sustainability Planning Overview

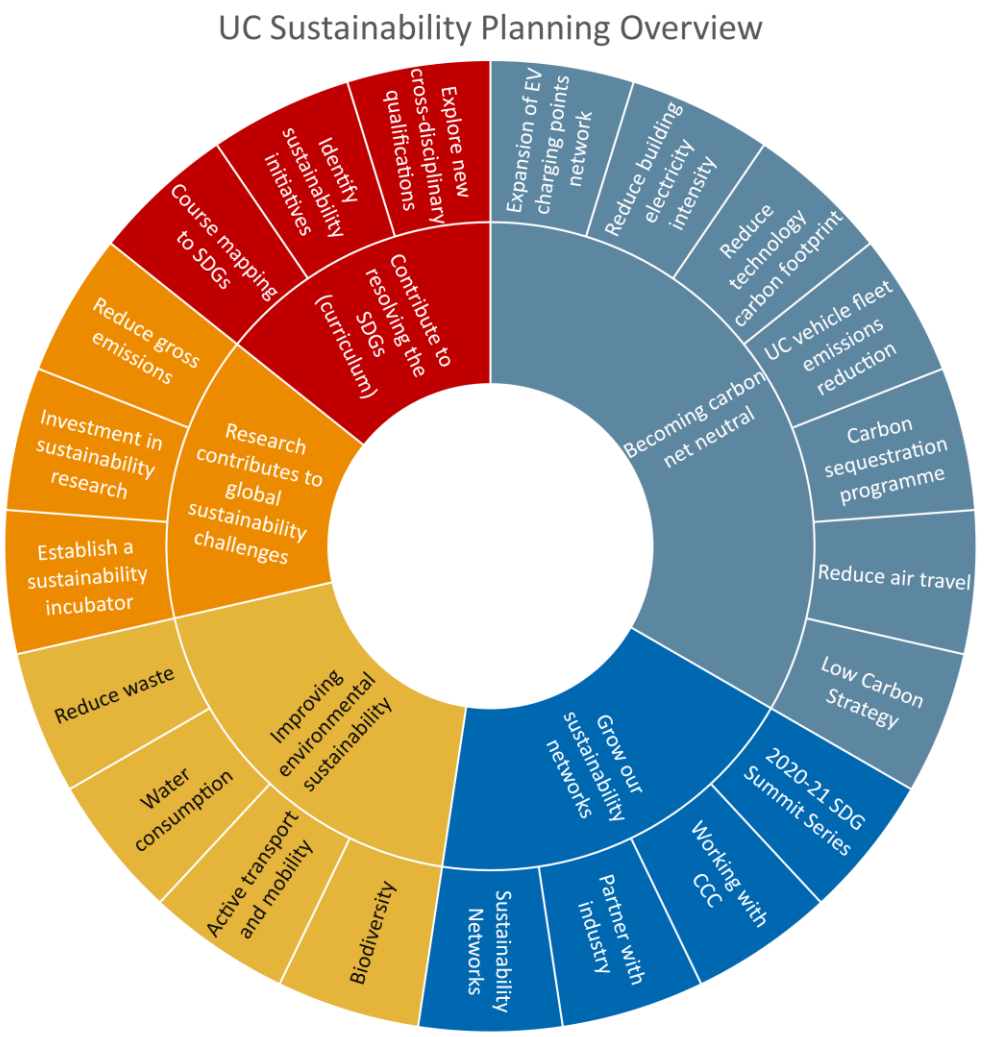
Summary of recent developments

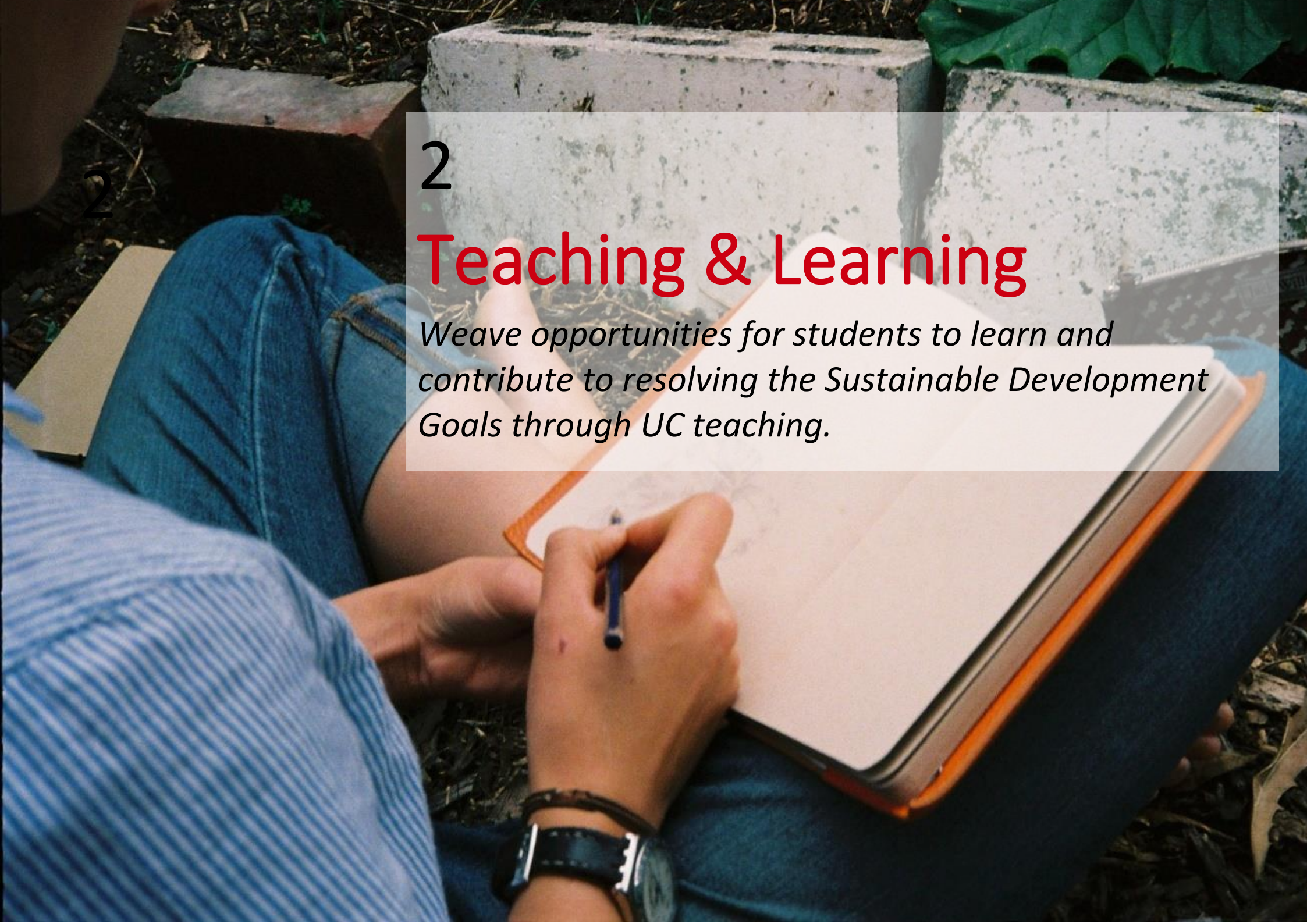
2018: UC Sustainability Framework introduced
2019: Sustainability Working Party develops implementation plan for sustainability.
2020: Sustainability Policy adopted (superseding the Framework)
Sustainability Plan confirmed
Sustainability Programme Board confirmed
2021: Pro-Vice-Chancellor Sustainability appointed

UC Sustainability Plan summary

- Weave opportunities for students to learn and contribute to resolving the Sustainable Development Goals through UC teaching.
- Ensure that UC research contributes to resolving global sustainability challenges.
- Establish a Carbon Neutrality Initiative that will ensure that UC will be carbon net neutral by 2030.
- Measurably and substantially improve the environmental sustainability of UC.
- Engage with local, national and global networks.

An overview of the Sustainability Plan is shown here.





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Teaching & Learning

Weave opportunities for students to learn and contribute to resolving the Sustainable Development Goals through UC teaching.

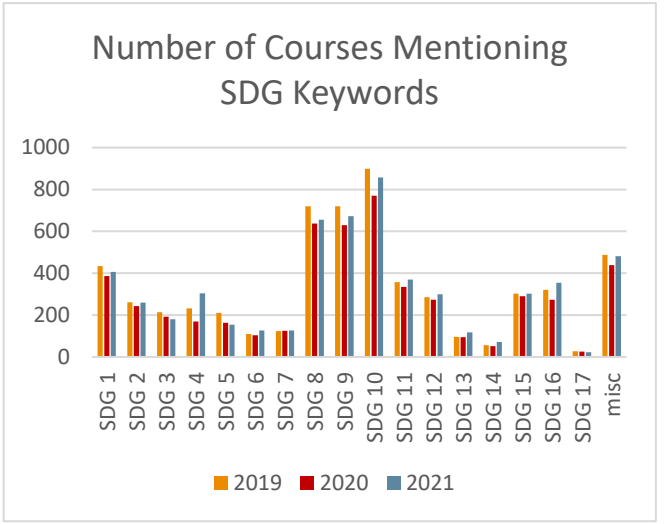
2. Contribute to resolving the SDGs (curriculum)

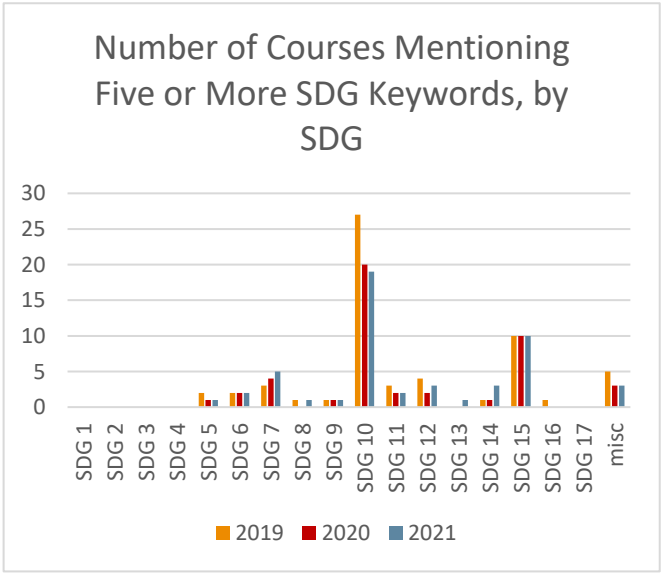
Develop system to identify and record SDG related courses

Previously UC has used a set of keywords (developed by Sustainable Development Solutions Network and Australasian Campuses Towards Sustainability) and ran them against UC course descriptions, to identify which courses support the SDGs. The task now is to refine and improve this measurement system. An investigation undertaken by Right Partnerships in 2020 concluded that no simple solution for measurement is currently available. In the meantime, UC is continuing to use the system we have used for the previous two years: a piece of software that searches the aforementioned keywords on course descriptions provided in the Course Information System.

There has been a small increase in courses offered against SDGs from 2020. As mentioned last year, there is a propensity for false positives in this system, so we have also presented data for those courses mentioning at least five different keywords for each SDG. Once again, this demonstrates that UC's teaching is strongest against SDG 10: Reduced Inequalities and SDG 15: Life on Land.

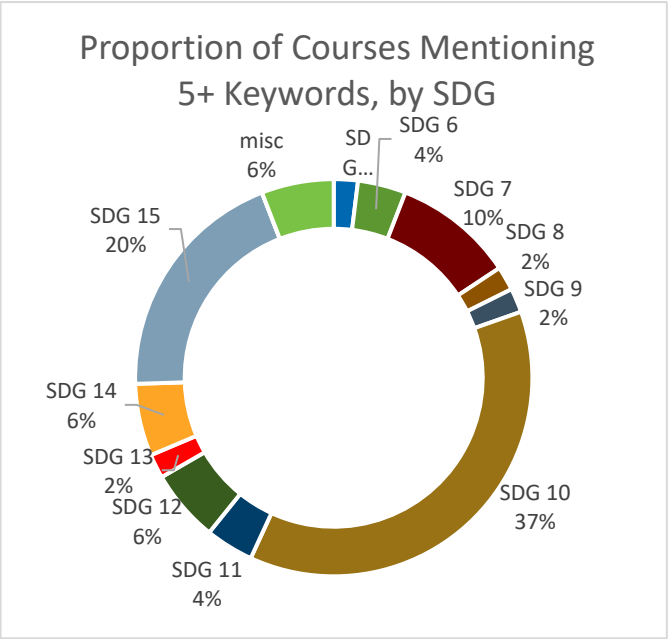
In addition, we have once again presented those courses mentioning the most SDG keywords in their course descriptions.





NUMBER OF KEYWORDS MENTIONED IN CIS	COURSE CODE	COURSE NAME
20	ILAP630	Law of the Sea
20	LAWS364	Law of the Sea
20	MAOR172	Science, Maori and Indigenous Knowledge
19	BIOL274	Principles of Ecology
18	LLAW300	Pacific Legal Studies
17	FORE447	Environmental Forestry
17	POLS443	Science, Technology and Environmental Policy
16	GEOG402	Resilient Cities

14	ENNR405	Ecologically Engineered Designs
14	ENGR621	Energy, Technology and Society
14	ENME418	Engineering Management and Professional Practice for Mechanical Engineers
14	BIOL384	Marine Ecosystems
14	BIOL427	Global Change Biology
14	FORE111	Trees, Forests and the Environment
14	SCIM101	Science, Maori and Indigenous Knowledge



New courses

Bachelors of Social and Environmental Sustainability (BSENS)

UC's new Bachelor of Social and Environmental Sustainability (BSEnS) explores the biggest global problems we have caused by injustice towards the environment and to communities, from pollution and climate change to world hunger.

This multidisciplinary degree equips students with skills and knowledge to make a sustainable difference to some of these big social and environmental challenges. Drawing from socioecological insights woven together from diverse courses including politics, Indigenous studies, environmental law, history and ethics, governance and leadership, sociology, economics, business studies and communication, graduates of the BSEnS will gain an understanding of how human behaviour, investment decisions and socio-cultural practices impact the world we live in.

Being the first of its kind in Aotearoa New Zealand, this degree will help to build a sustainable and equitable future in business, policy, and global society.

After successfully passing through CUAP in 2021, the BSEnS had its first intake from February 2022.

Bachelor of Environmental Science with Honours (BEnvSci(Hons)

UC's new four year Bachelor of Environmental Science with Honours (BEnvSci (Hons)) fosters students' passion for the environment, and empowers them to create a better world. This innovative degree was developed in response to employer demand for greater specialisation in Environmental Science and in consultation with Ngāi Tahu.

This interdisciplinary degree equips students to respond to environmental challenges in a rapidly changing world. Alongside core knowledge and skills in bio-physical sciences, graduates of the BEnvSci(Hons) will gain an understanding of Indigenous and global issues, Aotearoa |New Zealand's environmental management systems, bicultural relationships, communication, and professional conduct. Understanding of the interface between Mātauranga Māori and scientific knowledge systems within a Ki Uta Ki Tai | mountains to the sea approach is embedded across the programme.

The Bachelor of Environmental Science with Honours (BEnvSci(Hons)) is a unique offering in Aotearoa| New Zealand. Following CUAP approval in 2020, the degree received Environment Institute of Australia New Zealand (EIANZ) accreditation in 2021. Our first cohort of students started in February 2021.

3

Research Programme

Ensure that UC research contributes to resolving global sustainability challenges.

The University of Canterbury's Strategic Vision 2020-2030 identifies three areas of work in its sustainability research stream:

- Reducing gross carbon emissions
- Investing in key areas of research that might assist UC to solve global sustainability challenges
- Establishing a research student sustainability incubator.

A project was undertaken in 2021 by the new Sustainable Projects Coordinator to develop UC's first SDG Report. Among other things, the report provides a snapshot of some of the research projects underway at UC that contribute to the SDGs. This report can be found here.

In 2021, Senior Leadership Team decided to offer ten PhD scholarships to advance research relevant to the SDGs. These become available in 2022.

In addition, the Communications team now tag media stories about UC research relevant to the SDGs, which should be easier to report in the future. An example of the ground-breaking, sustainability-related research being conducted is below. More stories like these can be found here.

Case Study: New Pacific-NZ partnership to research climate crisis action

The University of Canterbury and University of the South Pacific, with support from the Ministry of Foreign Affairs and Trade, are partnering on a unique research project to help Pacific countries and the global community understand how climate change will impact the Pacific, and how indigenous knowledge can help Pacific communities to adapt.

The Pacific region is one of the most vulnerable regions in the world, but the Pacific people also have a long history of resilience to environmental changes and natural hazards.The three-year, $4.6 million project addresses a lack of research into community resilience and response mechanisms, and the ways indigenous knowledge can work with social sciences and natural sciences to inform a range of responses, from government policies to community plans. The findings, from 16 countries, will highlight Pacific solutions to Pacific experiences, sharing these experiences across the region and the world.

Pacific, New Zealand and international researchers will carry out the research with an interdisciplinary approach that includes Pacific and culturally-relevant methodologies. The research will capture community-based approaches and innovations in responding to the climate crisis and how these responses impact on national, regional and global trends and policies.

Professor Steven Ratuva, Director of the Macmillan Brown Centre for Pacific Studies and University of Canterbury team-lead, says trans-disciplinary innovation is needed to explore the multi-layered impacts of the climate crisis on the environment and people in the Pacific and beyond. “The project is a unique opportunity to weave science, social science, humanities and indigenous ecological knowledge in creative, innovative and transformative ways to respond to the ongoing climate calamity.” The research will add to the global understanding of climate change in the Pacific region and will contribute to the United Nations Framework Convention on Climate Change Global Stocktake in 2023. It will also provide valuable data and information to Pacific governments’ international agencies, regional organisations, civil society groups and Pasifika peoples.

Professor Elisabeth Holland, Professor of Ocean and Climate Change and Director Pacific Centre of Environment at the University of the South Pacific says the project responds to increasingly urgent calls from our Pacific Leaders and people to address the climate crisis. “It is truly a first of its kind synthesis of research on both Climate Change and the ocean in the Pacific. This ‘by the Pacific for the Pacific’ project provides the opportunity to amplify community voices in the ongoing national and international discussions.”

4

Becoming Carbon Net Neutral

Establish a Carbon Neutrality Initiative that will ensure that UC will be carbon net neutral by 2030.

4. Becoming carbon net neutral
Establish a carbon neutrality initiative to ensure that UC will be carbon net neutral by 2030.

UC's approach to carbon neutrality and climate change initiatives, although broad-ranging and multi-faceted, can be summarised as being made up of three distinct lines of work:

1. Carbon reduction
2. Carbon sequestration and/or off-setting
3. Climate change resilience and adaptation

During 2021, work progressed in all three of these areas.

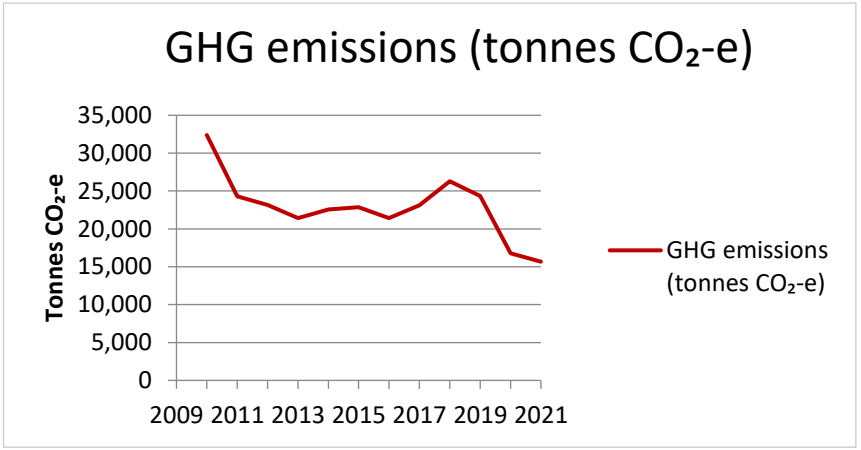
Carbon reduction

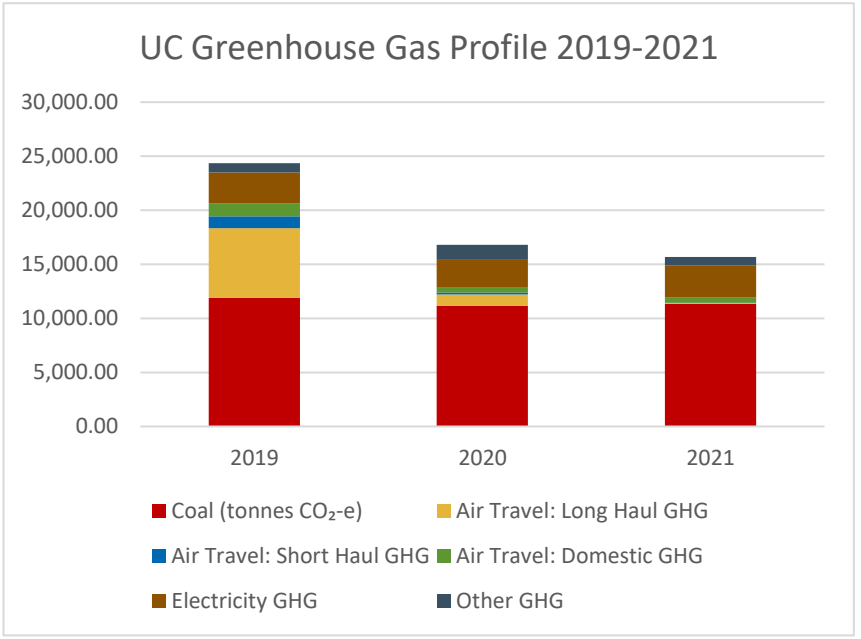
The first area, reducing our carbon footprint as much as we believe is possible at this time, will see UC reducing its carbon emissions to approximately 6,000 tonnes by 2030. Doing this involves the following projects:

1.1 Low carbon energy strategy programme (removing coal, improving insulation and using ground source heat pumps)

Significant progress on the long-standing project to remove coal from the Ilam campus (which constitutes about 80% of the coal burnt at UC) was made during 2021. Additional funding for the $24m project of $2.1m was secured from the Government, bringing total Government funding to over $8m. This includes removal of a coal boiler and implementation of a ground source heat pump for the Science Precinct. With this in place and a final option having been determined, the conversion from coal to biomass is now underway.

It must be noted that even combustion of biomass will be phased out over time, as building upgrades continue to occur across Ilam campus, enabling carbon neutral ground source heat pump technology to be more widely deployed.

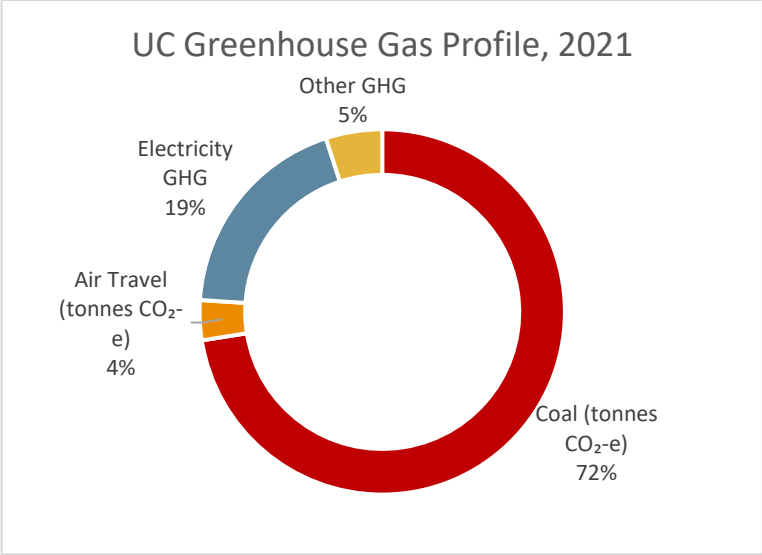




1.2 Reducing UC fleet vehicle emissions
Work progressed in 2021 to assess fossil fuelled Fleet vehicles that should be optimised for replacement with new electric fleet vehicles in 2022.

1.3 Reducing building electricity intensity
LED Lighting projects were undertaken in: Puaka James Hight, Erskine, Wheki and John Britten. In 2021 we researched the market for campus capable A.I. (Artificial Intelligence) Building Performance Analytics Controls to optimise building HVAC plant ready for procurement and installation in 2022.

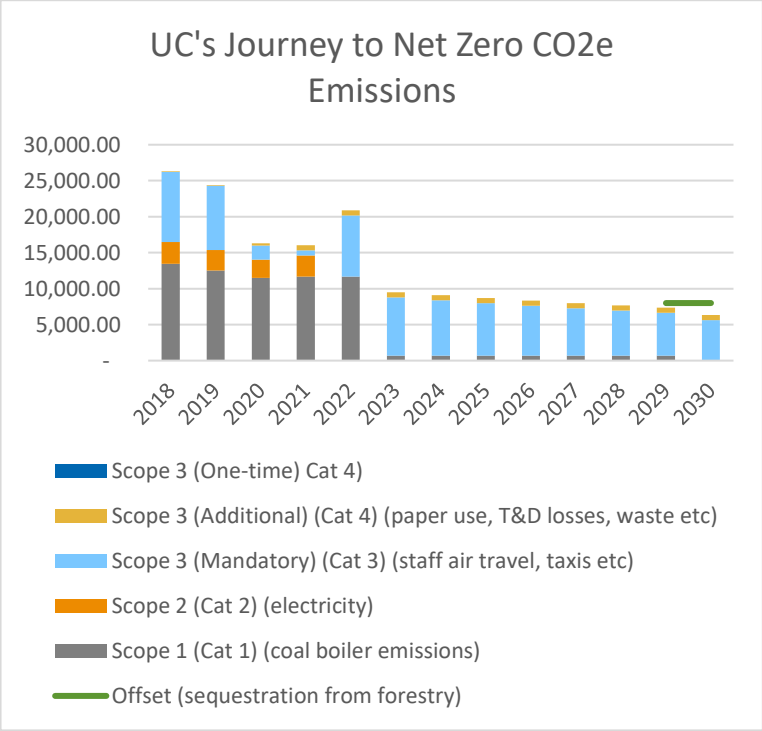
1.4 Expansion of EV charging network
In 2021 new EV charging facilities were assessed to accommodate the new Fleet EVs arriving in 2022.



Carbon sequestration and/or off-setting

For many years, UC has had 97ha of Mt Barker Forest registered in the New Zealand Emissions Trading Scheme. An independent analysis commissioned by Facilities Management concluded that bringing the balance of existing forest at Mt Barker into the ETS would allow UC to be carbon net neutral by 2030. This is strictly on the assumption that UC also implements all of the proposed carbon reduction measures first. If this is not done, UC will not be able to achieve carbon net neutrality without either opening more lands for carbon sequestration projects or purchasing offsets.

We commenced registration of the remaining area of Mt Barker into the ETS at the end of 2021.



Climate change resilience and adaptation

In early 2021, UC signed off the Climate Change Risk Register that had been commenced the previous year. This provides an initial overview of known risks and will remain a living document.

The Risk Register points to a need to better understand the ability of UC's built and natural infrastructure to withstand the predicted effects of climate change. As such, a project was initiated to do just that, and the first part of this exercise will be undertaken in 2022.

5 Environmental Sustainability

Measurably and substantially improve the environmental sustainability of UC

Transport Planning

Cycle Planning

The twice-yearly count of bicycles on campus was again conducted in 2021. This seemed to indicate a decrease in the number of bicycles on campus during the survey period. As such, no new cycling infrastructure plans were developed.

Our Dr Bike service continued for part of the year, but was suspended when Christchurch entered L2 COVID-19 alert level (which was for much of term time). COVID-19 challenges also affected cycling community events, such as Aotearoa Bike Challenge, the UC Bike Breakfast, and Biketober.

One on-campus change identified by 2020 Travel Survey respondents is the introduction of cycling workshops. This would involve help with improving skills and confidence, particularly attractive for non-cyclists who are willing to travel sustainably but are scared to do so. 4% of staff and 5% of students chose this as the most important change to encourage cycling. More specifically. 15% of staff bus users and 10% of student bus users identified this as the most important change. This result suggests that many bus commuters are not confident enough to cycle due to a lack of skills. With 13% of staff bus users having no driver's licence, sharing the road may be intimidating, particularly when users do not know the road rules. There is opportunity here for UC and UCSA to implement workshops that consist of both theory and practical classes. These will be explored in 2022 for possible implementation in 2023.

Electric Vehicles

Plans were finalised in 2021 to expand UC's EV fleet in 2022.

Car-Parking

A Parking Plan was developed and approved in 2021. This plan details a range of actions to be taken to improve the equity and sustainability of current vehicle parking arrangements.

Waiutuutu/Okeover Stream

Implementation of the UC Waterways Plan is ongoing. The approach of the Waterways Advisory Group and Facilities Management with campus waterways is to improve them using the following hierarchy of strategies:

1. improve base flow (water quantity).
   This was achieved in 2020.
2. reduce contamination (water quality).
   A baseline assessment was conducted in 2021
3. improve habitat.
   Sediment removal was undertaken in 2020 for the first time, and is scheduled to be repeated in 2022.

Monitoring

Various classes and projects have carried out water quality monitoring on campus since 1979. However, previous monitoring has often been sporadic and the data collected was scattered across different groups within UC. This prompted the creation of the 2018 Waterways Monitoring Framework (WMF), which produced a standardised monitoring program to track changes to streams on campus.

The WMF and a GEOG309 report prepared for the Sustainability Office in 2021 identified several key parameters for long-term monitoring (Figure 1). The first round of sampling following this framework was carried out in October 2021 across six sites throughout Waiutuutu-Okeover stream; this will be repeated every three months in subsequent years. While there are reasonable quantities of existing data on the ecology of the Waiutuutu-Okeover Stream, most of the other crucial parameters have data from only a few years. The long-term monitoring will help us to understand how the key monitoring parameters vary under stormwater, air conditioning discharge and spring-fed flows, and therefore the impact that these different flow contributions each have on stream health.

Stream health monitoring framework as proposed in a GEOG309 report (2021), by students J. Bird, J. McMecking, R. Painter, Z. Shadbolt, and B Woods.

Stream Flow

Adequate stream flow is important for water quality, as it impacts other parameters such as turbidity and dissolved oxygen. Stream flow is measured as the volume of water (m^3) that flows through a stream every second. In 2021, flow along the stream increased from 0.013 m^3/s in the headwaters to 0.088 m^3/s by the

greenhouses on the edge of campus, as water outlets from air conditioning etc. empty into the Waiutuutu-Okeover Stream.

Temperature
Temperature controls a number of important aspects, including what can live in a stream and how fast things grow. Temperatures below 20°C are ideal, while Waiutuutu-Okeover Stream has consistently remained at an average of 15°C since 2000.

Water Clarity and Turbidity
Turbidity describes how much suspended solids are in the water, which affects both visibility for aquatic animals and the beauty of the water. It is measured in NTUs, with water below 5 NTUs being not noticeably cloudy. Turbidity has decreased from 1.5-2.4 NTUs in 2002 to 0.67-2.05 NTUs in 2021, in dry weather conditions; the expected increase in turbidity during storm events has not yet been captured in our data.

Chemistry
Dissolved oxygen
Oxygen is essential for fish, eels and insects to survive. Dissolved oxygen can be measured via what percentage of the water is oxygenated; typically, healthy systems contain at least 80% dissolved oxygen. Dissolved oxygen has fluctuated between 70-90% since 2010, although all these measurements were taken during the day when dissolved oxygen is likely to be higher due to photosynthesising algae.

Heavy metals
Urban streams are often polluted with heavy metals that runoff, mostly untreated, from surrounding roofs, roads and other impermeable surfaces during storm events. In high concentrations, heavy metals can impair the growth of or kill aquatic life. Previous sampling in 2009 revealed copper exceeded threshold value while lead and zinc were below threshold values. Heavy metal samples were collected in October 2021 and are currently being processed for both total and dissolved heavy metal contaminants.

Ecology
A diverse collection of macroinvertebrates - insects, beetles and other creepy-crawlies - call streams their home. Some macroinvertebrates can survive in poor stream conditions whereas others require pristine conditions to survive. These differences in pollution sensitivity allow us to assess stream health by monitoring the presence of

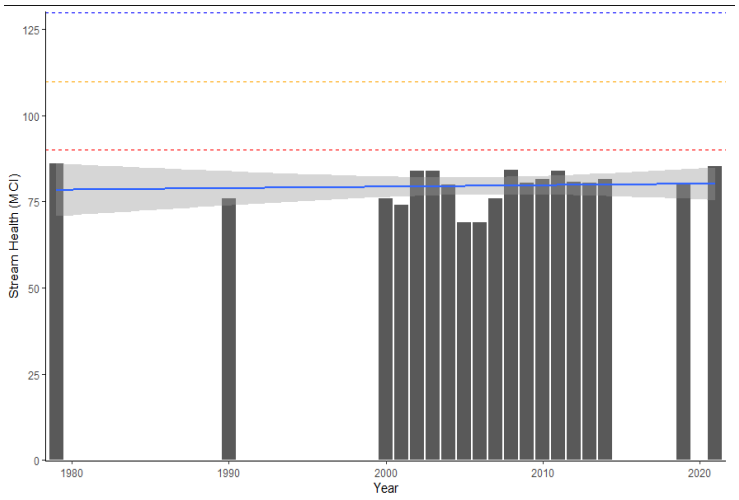
Macroinvertebrates found within Waiutuutu-Okeover stream, University of Canterbury, 2021. *Polycentropodidae polyplectropus,* a free-living caddis fly (left) and *Conoesucidae Pycnocentria,* a cased caddis fly (right).

Trace element	Threshold values (µg/L)	Actual sampled values (µg/L) in 2009
Copper	1.8	5.55
Lead	5.6	0.41
Zinc	15	7.64
Cadmium	0.4	Undetectable

Total concentrations of heavy metals in Waiutuutu-Okeover stream in 2009, averaged across 13 sites, compared to baseline thresholds according to a 90% protection level as suggested by Environment Canterbury's Land and Water Regional Plan (2019).

different species. For example, in a healthy stream we would expect to find pollution sensitive species, while a degraded stream will likely be dominated by pollution tolerant species.

The pollution tolerance of the macroinvertebrates present is summarised by the Macroinvertebrate Community index (MCI), which ranges from <90 (severe pollution) to >130 (pristine). Based on this index, the water quality in Okeover has very slightly improved since 1979; however, this is consistently below the threshold for severe pollution set in the National Policy Statement for Freshwater Management (2020). Unfortunately, these results fail to meet the biodiversity target set in the 2019-2024 UC Biodiversity Plan; to increase in-stream MCI values from scores representing a moderately polluted stream to ones suggesting mild pollution.



Average MCI scores taken across six sites in Okeover Stream, University of Canterbury, from 1979 to 2021. Gaps between bars represent years where data was not available. The red, orange and blue dashed lines represent threshold values for pollution categories (<90 = severe pollution, ≥90 and <110 = moderate pollution, ≥110 and <130 = mild pollution, ≥130 = pristine conditions) as outlined in the National Policy Statement for Freshwater Management (2020).

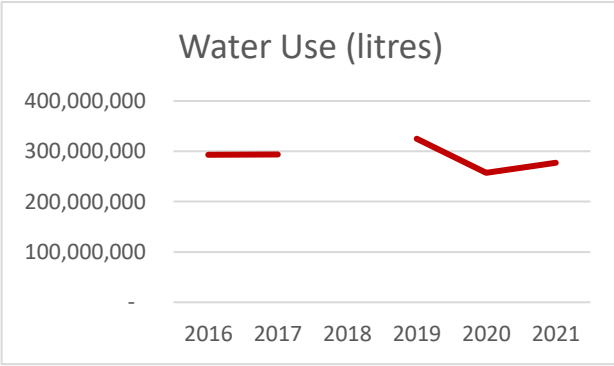
Summary and next steps

Current data suggests poor aquatic life within the Okeover stream. However, current gaps in the data restrict our ability to assess long term trends in water quality and understand the key sources of water pollution. Over time, consistent monitoring of the parameters described above will fill these gaps and provide a better picture of the health of Okeover stream. This knowledge will also guide future catchment improvements to reduce water pollution within the Okeover. Specifically, the following improvements will be made:

- Installation of grab samples throughout Okeover to collect samples during storm events, particularly to monitor changes in heavy metal levels during the 'first flush' of heavy rain.
- Installation of long-term dissolved oxygen and temperature loggers to capture maximum and minimum values over time, which better represent stressors on aquatic life.
- Begin testing water samples for *E. coli*.

Water Use

Use of potable water increased again in 2021 after a drop in use the previous year. That drop in 2020 was most likely caused by campus closures resulting from COVID-19 lockdowns, and it is likely that the 2021 figures also reflect such disruptions. UC is building its annual potable water annual consumption data record. Recent years have seen some minor interruption to that metering data, however it may be assumed that 2019 represents a good base year, given the higher number of buildings in use that year compared to earlier measured years.



Birdlife

Since 2016, a second year Biology class has been monitoring bird life on Ilam Campus, under the supervision of Professor Jim Briskie. This monitoring gives us a snapshot of numbers of species, and numbers of birds, which helps us to see whether our efforts to enhance biodiversity – particularly of indigenous species – are successful or not. There are some considerable variations in counts over the years, which is to be expected from a count of this type. However, we can see that indigenous birds have increased on campus since 1990 when the original bird survey was undertaken.

A validation, and extension, of this survey work was undertaken by student Isabella Stainthorpe. Her report, 'Surveying the General Avian Population and the Feral Pigeon Population on the University of Canterbury Campus, Summer 2020/21', provides the most extensive analysis of birdlife on campus since Dodunski's 1990 study. Stainthorpe found that 'the number of native birds on campus has more than tripled, and 5-7 more native species have… colonised campus, in the 30 years since Dodunski's study'.[1]

'the number of native birds on campus has more than tripled, and 5-7 more native species have since colonised campus, in the 30 years since Dodunski's [1990] study'

Stainthorpe found that 'the highest diversity of native birds was centred along the two waterways that pass through the central Ilam campus and in other small pockets of campus that are dominated by plantings composed largely of native species…'[2] Importantly, however, she also noted that:

> it is possible that native birds survive on campus only through immigration from other populations, and because of low local recruitment, are unable to establish self-sustaining populations. This is referred to as a sink population. My data on nest success of native and introduced birds suggests that although failure rates appear high (about 50% of nests failed), these rates were similar between native and introduced birds, and are similar to rates found in non-urban populations without predator control. The predation rate above which a population is no longer viable is not known for most native birds, and it likely differs between species and with mortality rates at other life stages. Given that most nest failures were due to predation (probably by rats, although a dead possum was noted on one survey on the central Ilam campus), increased control of introduced predators on campus is likely to be beneficial to native

[1] Isabella Stainthorpe, 'Surveying the General Avian Population and the Feral Pigeon Population on the University of Canterbury Campus, Summer 2020/21' (University of Canterbury), 22.
[2] Ibid, 37.

birds. Ideally, to determine whether predation is currently limiting native birds on campus, it would be necessary to implement increased predator control along-side further surveys of nest success and population estimates.[3]

She made seven recommendations, which are quoted here verbatim:

1 Target the planting of native vegetation in the areas of campus that are currently dominated by exotic trees to improve habitat for native birds (i.e. improve the current 'dead zones' such as Kirkwood and Dovedale villages, and carparks).
2 Include a variety of native plant species in any new plantings so as to ensure a variety of food resources (nectar, fruit) are available to native birds.
3 Ensure areas of campus currently dominated by native vegetation are not disturbed or converted to other land uses.
4 Increase predator control across campus, but especially in areas of native vegetation and along the waterways across campus as these are the areas currently supporting the highest density of native birds.
5 As campus is currently acting like an 'island' of native habitat and open space, surrounded by high density of housing, native birds may be unable to colonise campus or disperse between other areas of suitable habitat (e.g. Riccarton Bush). Encouraging the creation of 'habitat corridors' between the UC campus and other native reserves by liaising with local home owners to plant more native vegetation on their properties and to control local populations of predators (including restricting movements of pet cats).
6 As some native birds require other vertebrates as prey (e.g. kingfishers feed on native lizards, shags feed on native fish), surveys of these prey are needed and plans put in place to encourage their populations as well, including the possibility of reintroducing native species once additional native habitat is restored (Stainthorpe, 2020).
7 The general bird surveys (atlas, and nest success) be repeated in the future at regular intervals (e.g., every 1 or 2 years) in order to assess changes in native bird numbers and the size of the native breeding population, to determine whether any preservation measures (i.e., predator control, native vegetation plantings) are being effective.[4]

[3] Ibid, 37
[4] Ibid, 38

In 2022 the UC Biodiversity Committee is being reconvened, and will consider these recommendations.

Biodiversity data - Ilam Campus

	1990	2016	2017	2018	2019	2020	2021-22
Birds							
Native species							
Pūtakitaki,Paradise shelduck[5]	0	0	9	1	11	10	0
Kererū, New Zealand pigeon (Hemiphaga novaeseelaniae)[6]	0	0	0	0	0	0	0
Tauhou, Silvereye (Zosterops lateralis)	24	151	28	71	70	28	181
Pīwakawaka, Fantail (Rhipidura fuliginosa)	7	11	12	8	27	15	18
Riroriro, Grey warbler (Gerygone igata)	1	18	20	53	9	7	11
Korimako, Bellbird (Anthornis melanura)	0	3	19	3	12	11	8
Warou, Welcome swallow (Hirundo tahitica)[7]	-	4	26	21	21	37	25
Karoro, Black-backed gull	0	0	2	32	27	13	6
Tarāpunga, Red-billed gull	0	0	0	6	27	7	0
Spur-winged plover	0	0	0	4	0	0	1
Papango, NZ scaup[8]	0	0	0	2	3	0	0

[5] The survey in 2021-22 covered the summer period (earlier surveys ran in spring); waterfowl were largely absent from campus during the summer except in extreme south-east corner on Avon River, where a large flock of moulting waterfowl were seen. This is typical behaviour when moulting as waterfowl become flightless and seek a secluded area, highlighting importance of some areas of campus having low levels of human disturbance

[6] No native pigeons were observed during survey period, but at least 1 bird has been seen on several occasions from 2016-2019 Other species: two other species likely occur on campus: (1) little owl; this species heard singing at night in SE part of campus, and (2) kingfisher; seen a couple of times calling from a tree on SE part of campus near Avon River. Neither detected during survey period.

[7] Dodunski (1990) did not count welcome swallows though she noted some were present

[8] 4 New Zealand Scaup (2 pairs) seen in 2020 but only in river in Ilam Gardens across the road and so did not fall into campus survey

Tarapuka, Black-billed gull	0	0	3	0	0	0	0
Little shag[9]	0	0	0	0	1	0	0
TOTAL NATIVE	**32**	**187**	**119**	**201**	**208**	**128**	**250**
Introduced species							
Redpoll (Carduelis flammea)	7	27	10	18	5	5	61
Chaffinch (Fringilla coelebs)	3	11	37	32	22	14	4
European starling (Sturnus vulgaris)	12	12	7	57	50	31	44
Blackbird (Turdus merula)	104	192	161	333	352	224	169
Song thrush (Turdus philomelos)	37	34	19	61	61	19	25
Dunnock (Prunella modularis)	29	61	37	72	78	34	55
House Sparrow (Passer domesticus)	710	287	383	377	411	455	236
Greenfinch (Carduelis chloris)	23	18	55	50	36	24	48
Goldfinch (Carduelis carduelis)	57	141	31	18	37	8	41
Australian magpie (Gymnorhina tibicen)	3	0	2	0	0	1	2
Rock dove (Columba livia)	0	175	114	188	138	214	153
Hybrid species							
Grey duck/mallard (Anas superciliosa/A. platyrhynchos)	39	54	19	54	37	45	32

[9] Seen for first time in 2019, in Avon River.

2021 Waste Profile

As expected, there were some increases in waste to landfill during 2021 over 2020 (when campus was locked down for an extended period due to COVID-19). Pleasingly, it did not revert to 2019 levels and is still much lower than the high of 2015. On the other hand, the amount of coal ash dropped sharply, even as the amount of coal burned increased. This was due to modifications to the boiler that saw improved combustion. All other categories remained fairly consistent, with the exception of greenwaste. The increase here is likely caused by a wetter season resulting in heavier material.

2020 and 2021 both saw the lowest amount of landfill per 100 students and staff in over a decade (most probably due to campus closures due to COVID-19). However, total tonnages are expected to increase as the roll grows, prompting new plans (see below).

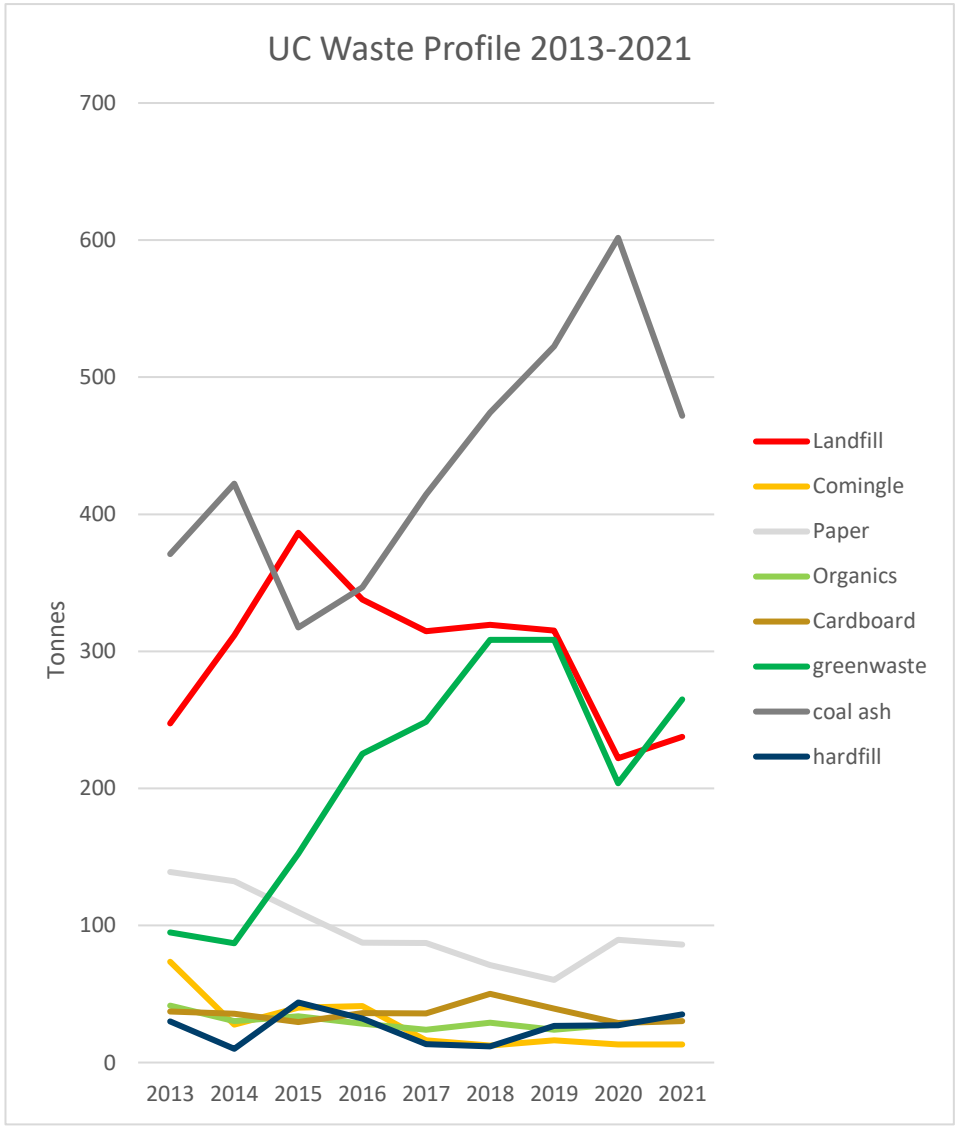
2021 Waste Audit

A waste audit was conducted during 2021. This audit took three weeks and analysed the contents of bins from three areas on campus: Undercroft, Production Kitchens (in the Undercroft) and Meremere. The results provide an indication of how people are using the UC waste system, but as they are from three areas they cannot be taken as comprehensive.

The audit identified contamination rates for each of the three waste streams analysed. These need to be seen in the context of the scale of each of those waste streams, where landfill is a far larger stream than comingled recycling, for example.

Nevertheless, it is apparent that while the organics bins are relatively uncontaminated, just under a third of comingled recycling is contaminated at source (this is later sorted out by hand).

Landfill remains UC's biggest problem, not only because it is the largest category by weight, but also because it is the most contaminated with items that could be diverted. One third of the contents of our landfill bins is organics, while an astonishing 15% is made



up of the compostable plates and cups that were first introduced *to reduce waste to landfill*. Therefore, 48% of waste put in our landfill bins could actually be composted.

Changes to Waste System

Given the scale of our landfill issue compared to our comingled recycling waste stream, this constitutes by far the largest opportunity for improvements. Therefore, several programmes have been put in place to meet this need which will commence in 2022. These include a comprehensive waste sort of the comingled recycling stream at the external provider's yard rather than a simple sort by UC staff at the UC yard. Our expectation is that this will result in a higher level of comingled recycling being reported next year, along with a reduced landfill figure. In addition, more bins will be placed around campus for compostable packaging: an expansion of the service introduced on a trial basis several years ago.

Revised Waste Plan

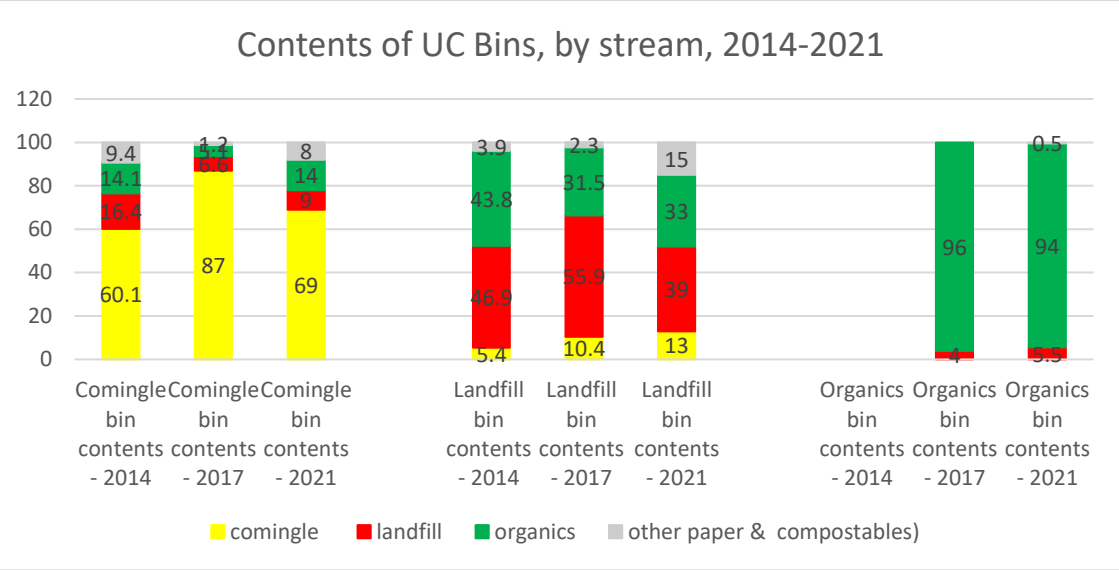
To assist this work, five high level targets have been proposed:

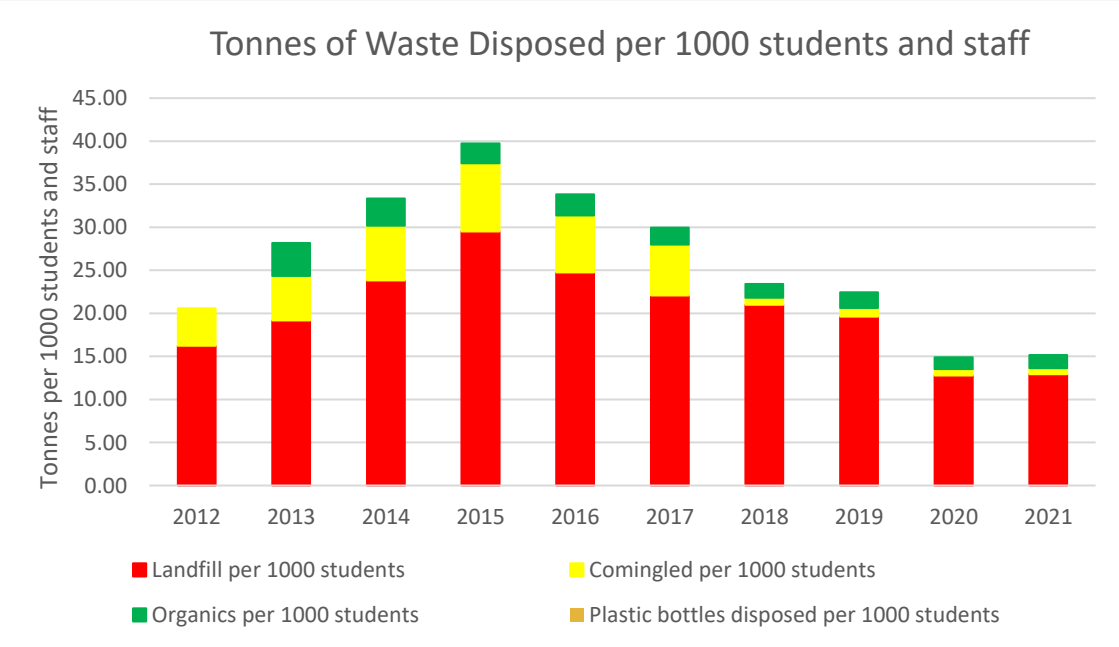
Target 1: Contamination of landfill stream to be no greater than 25% (measured by annual audit), by 2024.

- Work with café and food truck vendors to ensure they understand and comply with waste system
- Review café purchasing
- Ban polystyrene cups and clamshells
- Signage and campaign around compostable packaging to be enhanced
- Increase number of compostable packaging bins around campus

Target 2: Contamination of comingle stream to be no greater than 25% (measured by annual audit), by 2024.

- Recycling signage upgraded





- Implement communications plan, including video content

Target 3: Retain or improve on 94% clean organics stream (measured by annual audit), by 2024.

- Continue education campaign around organics
- Work to upgrade this system as new options become available, including exploring and costing all logistical issues associated with any possible change.

Target 4: Clean landfill rate drops by 25% (measured against EFTS), by 2030.

- Enhanced focus on waste education and promotions

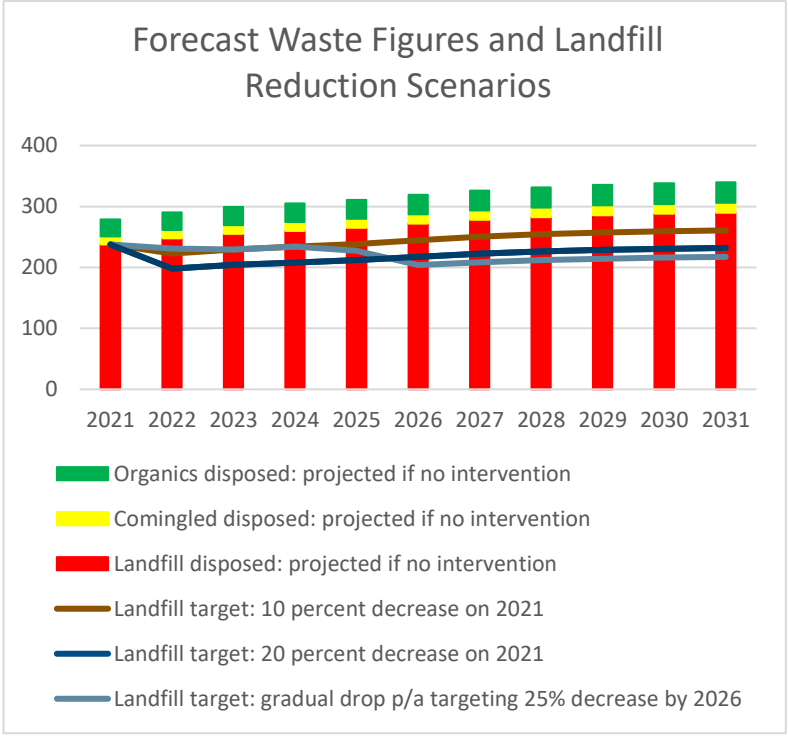
Target 5: Single use plastic bottle disposal drops by 20% (by 2025) and 50% (by 2030) (measured by annual audit against EFTS).

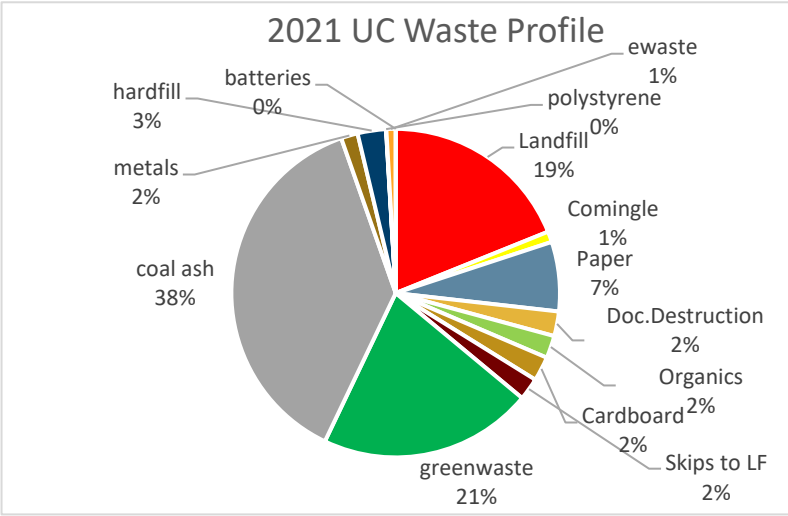
- Look to promote cans over plastic bottles
- Scope ban on plastic bottles
- Consider communications plan to help reduce plastics coming in from off site.

Ash will diminish by over 85% as UC switches from burning coal to burning wood (an interim measure as we upgrade all buildings to utilise non-combustion renewable heating solutions).

Waste Engagement

Despite restrictions on gatherings in 2021, we ran a social media campaign for Plastic Free July. This achieved a reach of 18,900 on social media. 120 students attended our Plastic Free July DIY Workshop, which was run in collaboration with Te Rua Makerspace/UC Library.






Choose the Future
Reduce waste
UC
UNIVERSITY OF CANTERBURY
DO MORE
REDUCE
REUSE
ROT
ROT
RECYCLE
RECYCLE
RUBBISH
DO LESS
Blue bin: Compostable Packaging
Landfill
Anything else that can't be recycled. No food/organics or liquids.
Recycling
Please empty containers of all food and liquids first. Unsure? Put it in the landfill bin.
Organics
Only
Organics
Please remove all packaging first
Fruit and Peels
Tea Bags
Sandwiches
Cakes
Meat

6

Grow our Sustainability Networks

Engage with local, national and global networks

6. Grow our sustainability networks

Sustainable Development Goals Summit Series, 2020-2021

In 2021 the Sustainability Office completed the SDG Summit Series, planning for which commenced in 2019, and delivery of in 2020. This block of online events was the third part in a larger programme of events that started in 2018 (at Victoria University of Wellington) and will continue to 2030.

An overview of outcomes of the 2020-2021 Summit Series is below, and the full report can be found here.

A key element of this series was related to understanding how the SDGs intersect (or don't) with Te Tiriti o Waitangi. An important panel discussion on this topic can be viewed here. Delivery of the Series would not have been possible without strong involvement of mana whenua Ngāi Tūāhuriri, particularly through the excellent MCing of Corban Te Aika.

- The University of Canterbury and Lincoln University co-hosted the 2020-2021 Aotearoa SDG Summit Series. In this they were supported by Ara Institute of Technology and Christchurch City Council.
- It consisted of five online events
- In total, 1356 people registered for these events, with over 950 people actually attending
- 83 speakers
- 16 project showcase presenters
- 12 guests on the main stage at the final, Virtual Summit
- 160 individuals and organisations signed the SDG Summit Declaration on the day. This has now grown to 199 individuals and organisations
- 936,733 people were reached (including impressions) across the entire Summit Series (Sept 2020 – October 2021) through social media channels, including those of the partner organisations
- Almost 5,000 website clicks in August 2021, around the time of the online pivot announcement.

The infrastructure around the SDG Summit kaupapa is now much stronger than before. More information about the Summit, including videos of all the presentations, can be found on the Summit website.

On 1 November the co-hosting organisations (the University of Canterbury and Lincoln University) handed over their materials to the next host, the University of Waikato.

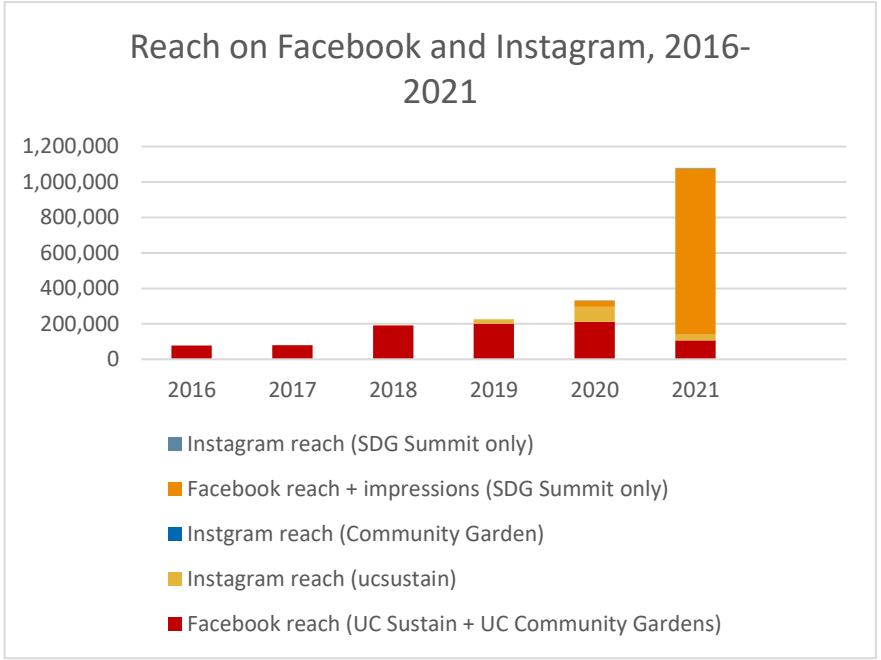
End of year celebrations for the Sustainability Office team

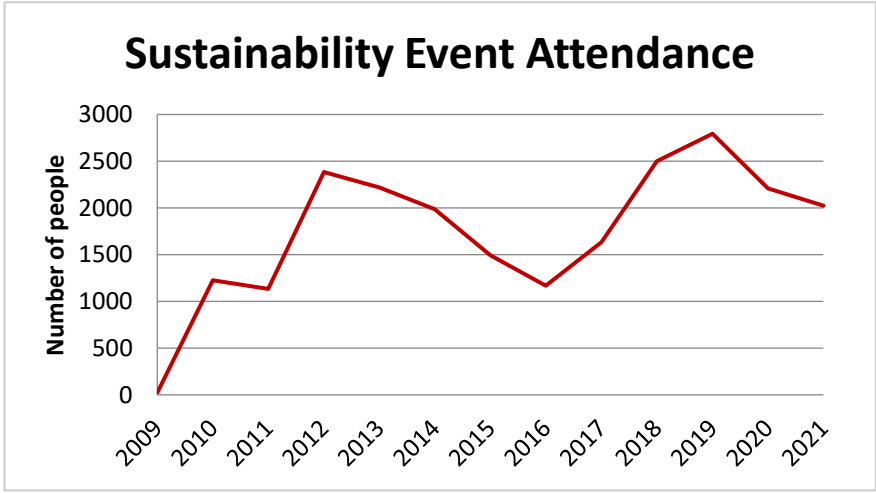
Sustainability Events and Student Engagement

2021 saw the SDGs and UC's commitment amplified, with the 17 Goals consistently woven through our communications and engagement programme. We had low emphasis our fair trade campus due to ongoing challenges in the reporting process. Waste and carbon reduction has been identified as a high priority engagement focus for 2022 onwards.

Our team of highly engaged student volunteers navigated lockdowns and advocated for the return of popular sustainability events, allowing us to successfully deliver our Plastic Free July workshop and Clothes Swap, attended by 100+ students respectively, many at the beginning of their sustainability journey. Another highlight from our events calendar was a series of sustainable living workshops in Waiutuutu Community Garden.

2021 saw us engaging with a total of 2025 students and staff in our events on campus, and reaching over one million people across our social media channels. Stronger relationships have been established with the UCSA and Clubs network, allowing us to reach a broader student audience with collaborations taking place for SDG Summit volunteer recruitment, Recycling Day, Fashion Revolution Week and Sustainability Markets.





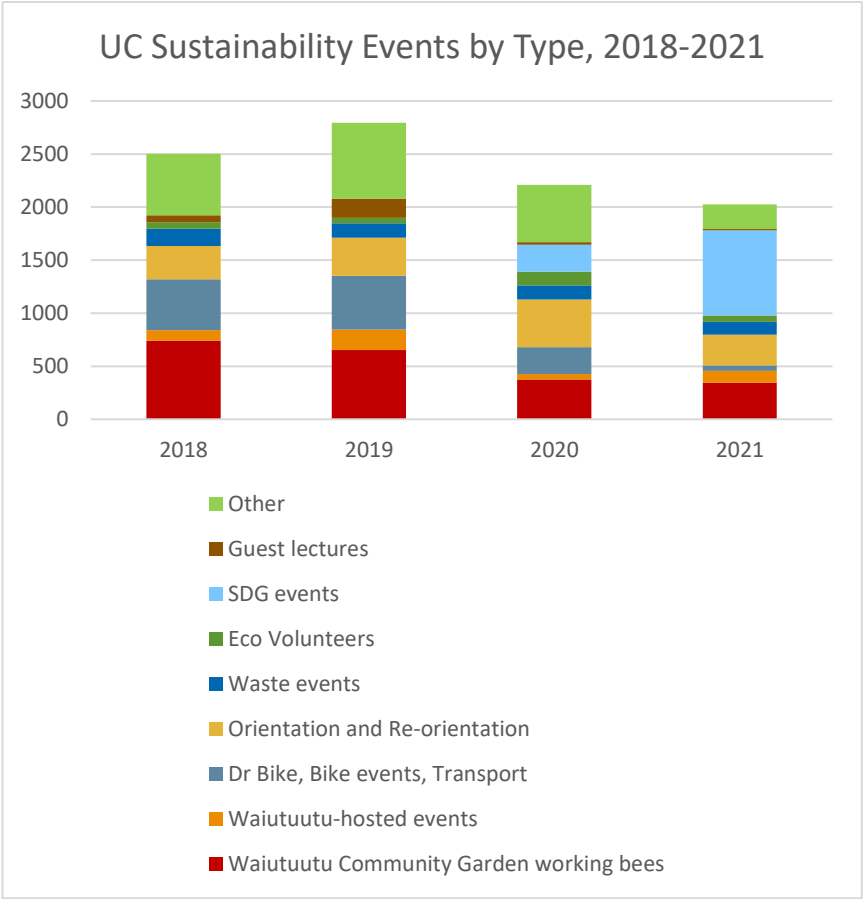
Our 2022 engagement calendar reflects our new reality for event planning by building in online events and COVID contingency plans into our programme, to allow for the continued energy and enthusiasm surrounding campus sustainability. A strong communications plan supports the 2022 engagement calendar with a focus on waste, carbon reduction, biodiversity and waterways.

Eco Volunteers

Our Eco Volunteer program remains a key part of engaging, inspiring and activating our student community, with 574 students now signed up into our wider program. 60 of these students are also recognised as Eco Volunteers through UC's Co-Curricular Record. From this wider group, deeper relationships have been built with a core team of 30 student champions working on a variety of projects, events and activities.

Campus-wide advertised volunteer opportunities for the planned in-person Sustainable Development Goals Summit welcomed a new cohort of student volunteers, many of whom had not engaged in the work of the Sustainability Office before. These students are highly engaged and show a huge energy for sustainable action on campus, particularly around waste minimisation and management.

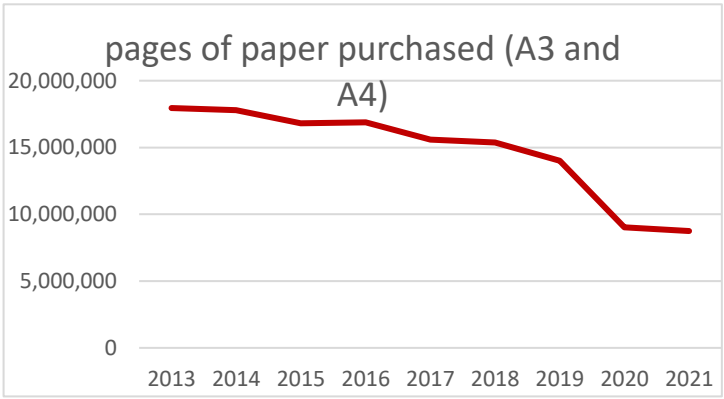
Plans for 2022 include investing more energy and resources into our student champions, through planning sessions and targeted SDG workshops to empower and upskill our core volunteering team.



Paper purchasing

We continue to monitor paper purchasing across the University, and are pleased to note that this has continued its downward climb.

Paper use is used partly as a proxy for understanding the willingness of our community to reduce materials consumption, and it is also an example of the way our approach to partnerships, including purchasing arrangements, are used to generate positive change in the supply chain.



Tāpiritanga | Appendices

Sustainability Indicators

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Facilities & Operations												
electricity (kwh)	24,497,911	22,016,328	25,712,319	25,543,040	25,803,113	25,414,231	25,229,741.00	28,033,970.00	31,500,913.00	26,943,852.00	26,937,348.00	29,313,934.00
GHG emissions (tonnes CO_2-e)	32,392	24,318	23,145	21,419	22,590	22,870	21,436.53	23,099.64	26,309.97	24,359.66	16,800.00	15,672.00
coal burned (tonnes)							10,359.90	10,731.40	12,831.83	11,883.46	11,145.54	11,363.38
Air Travel (tonnes CO_2-e)	6,309	4,098	5,160	4,913	5,334	4,846	4,941.00	5,396.94	6,276.00	5,733.10	4,770.14	5,310.96
Air Travel: Long Haul GHG							7,218.34	8,094.88	9,567.89	8,766.94	1,698.81	553.71
Air Travel: Short Haul GHG							4,836.96	5,765.56	6,916.63	6,452.28	1,069.07	72.69
Air Travel: Domestic GHG							1,042.16	1,058.01	1,153.55	1,102.06	182.51	11.19
Air Travel (kms)							1,339.21	1,271.31	1,497.71	1,212.60	447.23	469.83
Electricity GHG							41,912,916.00	46,919,292.00	52,027,773.00	49,034,888.00	11,585,212.00	2,458,593.00
Other GHG							3,072.24	3,465.66	3,059.47	2,854.95	2,565.95	2,972.51
waste to landfill (tonnes)	219.79	197.11	233.44	256.14	312	386.47	337.77	314.61	319.41	315.08	221.998	237.585
comingle waste adjusted for 2018 proxy weight per bin		43.53	36.06	61.32	73.52	27.56	40.12	41.27	16.31	12.38	16.19	13.224
IT Recycling Service (tonnes)				26.07608	25.66912	18.5535	18.6285	23.20	31.88	20.58	16.7	11.42
water use (litres)							292,875,000	293,571,240		324,943,000	277,195,533	277,195,533
cycle stand count			2513	1749	1749	2004	2458	2364	2870	3860	3731	3731
dr bike - bikes fixed					100	100	115	140	71	85	-	-
native birds							187	119	201	208	128	250
Partnerships and Engagement												
pages of paper purchased (A3 and A4)				17,953,500	17,787,750	16,808,500	16,894,075	15,599,275	15,373,630	14010185	9020250	8746250
fair trade fresh coffee (% units)							39	100	98	100.00	100	100

fair trade coffee and milo (% units)							18	73	80	79.00	78	83
fair trade tea (% units)							10	94	94	94.00	96	80
fair trade sugar (% units)			0%	5%	3%	5.00%	5	13	11	14.00	11	0
sustainability event attendance	1227	1135	2383	2221	1985	1495	1167	1634	2501	2794	2175	2025
blog views combined						2,700	9160	7087	6,801	8047	6822	5194
blog views - sustainability office									1,635	1827	2370	2010
Tū ki te tahi blog views									1296	2071	360	1515
Insider's Guide blog views									3,870	4149	4092	1669
instagram followers									743	1025	1421	1559
Instagram followers (garden)												156
instagram reach (UC Sustain)							0	0	106	25337	86308	32705
facebook total reach (main)							76880	80363	174,487	190,987	196,226	92,988
facebook total reach (garden)									16,225	8976	14367	13857
facebook reach (SDG Summit only)							0	0	0	0	33972	936,733
facebook likes (main)		305				1,428	1736	2075	2361	2850	3193	3573
facebook likes (garden)		48				451	581	679	752	850	1010	1149
facebook (rideshare 2011- 2016, UC Carpool 2018)			17					16		63	65	58
facebook (eco volunteers)										119	220	307
Facebook fan count (combined pages)		370	640	872	1172	1879	2317	2754	3176	3884	4484	4722
SDG summit socials												
Facebook likes											333	663

Facebook reach											33,972	195,941
Instagram followers											92	243
Instagram reach (SDG Summit only)							0	0	0	0	771	4357
total reach											331,644	936,733