

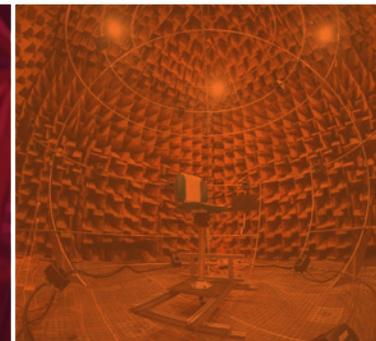


ANSWERING THE WORLD'S CALL

The University of Auckland SDG Report 2020



THE UNIVERSITY OF
AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND





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No 1
Sustainable
development
impact*



Times Higher Education Impact Rankings, number one in the world 2019



E aku nui, e aku rahi Tēnā koutou i ngā āhuatanga o te wā

The Sustainable Development Goals and their overarching principle that 'no one be left behind' have been especially pertinent to 2020. This year of an international pandemic has been a year of incredible disruption to our ways of life, a challenge to our views of what is normal, to well-being, and the global social and economic systems critical to intergenerational equity across the World.

It also been a year in which the opportunity to make progress toward the SDGs, which together seek to transform the world by meeting the challenges of ending poverty and enhancing social inclusion, while promoting environmental sustainability, peace, good governance and economic prosperity for all countries and its people by 2030, is more uncertain.

As governments address the challenge of maintaining and improving quality of life for their people during uncertain economic times, and in real terms, the divide between nations becomes greater, ending poverty, providing education for all and ensuring environmental sustainability, seem elusive. And yet, it has also been a year in which the contribution of universities to the world's understanding of the challenges posed by the pandemic and the likelihood of a sustainable future being achieved, have come to the fore.

At the University of Auckland, our staff have made major contributions to New Zealand's efforts to 'stamp out' the virus from our nation; they have responded to local and international challenges in innovative ways allowing us to maintain our core activities of teaching, research and service to the community, while continuing our focus on what is needed to achieve the longer term sustainability goals.

In this report we outline some of the many activities in our University that contribute to the achievement of the SDGs. We are not able to outline all the incredible work of our staff, students and collaborative partners across research, teaching, engagement, outreach and operations. Rather we present a selection here, reflecting an appreciation of the myriad of activities occurring within the University, and specifically those that highlight our commitment to sustainability and our contribution to a more sustainable future for all.



Dawn Freshwater
Vice-Chancellor
The University of Auckland

Vice-Chancellor's Message



End poverty
in all its forms
everywhere

Hardship Support



The University provides various grants under its hardship support initiative for students enrolled for more than two weeks. It supports students faced with financial difficulties that may be affecting their studies. In response to the Covid-19 pandemic, additional funds were made available via staff and alumni donations to support students facing a variety of unexpected circumstances including job losses and an inability to continue research under Level 4 conditions. Additional funds from the Tertiary Education Commission brought the total amount of support available to \$5.5m with over \$3.5m paid out in grants by September 2020. The Auckland University Students' Association (AUSA) Hardship Grant helps students experiencing hardship with the basic necessities of life under the categories of food, accommodation, travel and medical.

Housing for Students

The University, via its hardship support, was able to repurpose accommodation on campus that was unfilled due to international students being unable to return to New Zealand. Students who were in unsafe or unsuitable housing situations were moved into fully funded accommodation on campus. For some students this meant moving them from couch surfing, crowded homes or a difficult home life into a stable and safe environment, enabling them to continue their academic studies.

1,096

publications based on
SDSN keywords

27%

SDSN UoA National
Share of Publications

71

publications based on
UoA keywords

**figures are for 2019*

“During the lockdown, the University provided universal extensions as they knew the class was struggling. The University also supplied a laptop to me when I didn’t have adequate technology to use.”

- Education and Social Work undergraduate student, Learning and Teaching Survey 2020



Support for scholars’ dependants



The University, supported by the Ministry of Foreign Affairs and Trade, put aside specific funds to support scholars and their dependants affected financially by the impact of Covid-19. The support helped scholars who were returning to their home country on the completion of study, but who were adversely affected because of the increased cost of airline tickets and the loss of income during the lockdown periods.

Essentials supplied for lockdown



The staff at the University’s Liggins Institute came together to donate supplies and warm clothes for families in need during the Covid-19 lockdowns. Supporting the staff at Health Clinics in low-income regions of Auckland who were desperate for donations, the staff came together to call for donating second-hand clothes for all ages. Carloads of clothing, along with cleaning and hygiene supplies, were collected and donated to the Health Clinics, from where they were passed on to families in need. Going forward, the team at Liggins plans to continue this gesture periodically in order to help the Health Clinics look after families in need.

Support for students during lockdown



A joint effort between Student Engagement, Korowai Atawhai and Pacific Success at the Faculty of Education and Social work (EDSW) found a way to use data analytics to identify students who were struggling with loss of employment and additional costs of lockdown, in order to provide them with financial support. The faculty also initiated and hosted the ‘cancelled conference conversations’ programme that saw hundreds of attendees from New Zealand and beyond tune into sessions that would have been given at conferences that were cancelled. Many of the conference presenters were EDSW staff.

Breaking the poverty cycle

The systemic cycle of poverty perpetuates social and economic differences between ethnic groups in New Zealand, and traps families in poverty across generations. To break this cycle, policymakers need to know when and how to intervene, and for whom to intervene for maximal impact on health both in the shorter and longer term. University of Auckland researcher [Barry Milne](#) is leading a project investigating the health consequences of childhood poverty. This project aims to advance understanding of the causal effect of poverty

on health and, in particular, an understanding of how to intervene to reduce the impact of child poverty on health. This has implications for the nature and timing of interventions to reduce the impact of child poverty. This research is focused on improving the lives of New Zealand children to allow them to participate fully in society as adults. Further, in addressing a social problem that disproportionately affects Māori and Pacific children, it aims to help reduce ethnic inequalities.

Client Services



As essential workers on campus during Levels 3 and 2, Client Services were the public face of the University’s Libraries and Learning Services, which continued to provide students with access to study spaces and allowed students and staff to borrow physical books from library collections. Students who could not study at home easily were able to use the libraries and the information commons in a safe and managed way. Students and staff benefited from the click-and-collect service set up for readings not otherwise available online.



2 ZERO HUNGER



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



University meal box.



Grab Goodness project

Promoting healthy eating has become a major priority in recent years and the University is piloting The Healthy Eating Initiative in conjunction with the Faculty of Medical and Health Sciences. The University's Commercial Services division, which manages retail, catering and event services on campus, is working with Dr Rajshri Roy, a nutritionist and dietitian, to provide healthier food and drink options on campus. Rajshri used mixed methods to assess food environments around the University, including information on food and drink availability and promotion, data on the dietary habits of young adults, and food allergy knowledge. This resulted in the removal of a large number of carbonated drink-vending machines, and their replacement with Grab Goodness healthy food-vending machines, which also provided information on the health benefits of the food offered. There was a 30 percent increase in the proportion of sales of healthy products through the Grab Goodness vending machines. In addition, the Budgie Meal (budget meals for students) programme on campus required low-salt and low-sugar food to be served. All menus were also required to follow WHO recommendations for health eating for young people, which led to the establishment of salad bars and fruit stations.

Evidence-based advice on maternal, infant and early childhood nutrition

Pregnant women and carers of young children need accurate advice on which foods are best for healthy growth and development. Dr Sarah Gerritsen and Dr Sally Mackay, researchers from the University's School of Population Health, have revised and tested the [Maternal, Infant and Toddler Dietary Guidelines](#) for the Ministry of Health in consultation with a Technical Advisory Group chaired by Professor Clare Wall. International evidence on best practice was interpreted for the New Zealand context using data on maternal diet and infant feeding from the [Growing Up in New Zealand](#) contemporary longitudinal study of 6,000 mothers and their babies. Analyses of this data found that when the infant feeding guidelines were followed, children were more likely to maintain a healthy growth trajectory in early childhood, but that many New Zealand children were not breastfed for long enough and were not eating enough vegetables. Food security for families with young children was shown to be an important factor in enabling adherence to the guidelines. The revised guidelines were due to be released in late 2020, and the research has been used to call for further assistance for parents with young children and to alleviate child poverty.

“Staff constantly told me and other students that they understand the situation we are in and gave us encouragement to continue studying. They also kept telling us that we could contact them if we needed any personal help.”

– Engineering postgraduate student, Learning and Teaching Survey 2020

The impact of the Covid-19 lockdowns on healthy eating



The Covid-19 pandemic resulted in a large disruption to the food system and increased the need for food assistance.

During the first Covid-19 outbreak in New Zealand, three early-career researchers from the University's Faculty of Medical and Health Sciences (in the Schools of Public Health, Dietetics and Nursing) joined academics in 38 countries to collect information about how the lockdown restrictions were changing grocery shopping, cooking, baking, family mealtimes, diet and food security. Over 3,000 New Zealanders took part in the Covid-19 Kai Survey, contributing to the international study of 40,000 participants. The survey found an overall shift toward unhealthy eating patterns, with the stress of lockdown

most adversely affecting the diet of younger adults and those caring for children. The results of this research can inform future pandemic responses by public health agencies, employers and the government.

Food and Drink Policy

The University is part of [Healthy Policy Evaluation \(Hype\)](#) – a three-year study that will investigate and evaluate food and drink options on offer at New Zealand's District Health Boards (DHBs) and some central government agencies with respect to the country's National Healthy Food and Drink Policy. This research will look at how well the policy has been adopted and implemented, its impact on food availability and purchases, resource requirements to implement and increase adoption of the policy, and the equity implications for Māori, Pacific and low-income New Zealanders.

1,160

publications based on
SDSN keywords

26

publications based on
Elsevier queries

26%

SDSN UoA National
Share of Publications

288

publications based on
UoA keywords

**figures are for 2019*

Broccoli as a first food.

Picture: Sarah Gerritsen





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

Seven projects from the University were awarded funding from the Ministry of Business and Innovation (MBIE) Covid-19 Innovation Acceleration Fund. The target is enabling immediate response to the health crisis and building capability.

Modelling work for Covid-19 for the National Crisis Management Centre



The University's Professor Shaun Hendy applied his research in complex systems and applied mathematics to develop models of the spread of Covid-19 across New Zealand, that influenced the Government's response to the outbreak. As the Director of Te Pūnaha Matatini, a New Zealand Centre of Research Excellence focused on the study of complex systems and networks, Shaun led a team of scientists who modelled the spread of infection under various mitigation scenarios and advised the Government and the National Crisis Management Centre daily. Some of the team members were students who had finished their degrees but couldn't start new roles because of the lockdown. His team's advice to the Government contributed to strong suppression measures across the country and assisted in the setting of targeted lockdown periods. Each team member received a letter of thanks from the New Zealand Prime Minister, Jacinda Ardern. New Zealand's response to Covid-19, which resulted in elimination, was recognised and applauded globally.

Rethinking Responsibility for Youth Mental Health in the Digital Age

New Zealand is experiencing a crisis in youth mental health. In a resource-constrained environment, digital technologies are increasingly promoted as a solution to the escalating need for youth mental health services. However, little is known about how youth use, ignore, create, or redeploy digital resources to support mental well-being. The research project "Ka Hao te Rangatahi: **Fishing with a New Net?** Rethinking Responsibility for Youth Mental Health in the Digital Age" is filling this gap by examining Māori, Pacific, Asian and Pākehā youths' digital care strategies, from their use of anti-anxiety apps and mental health chatbots to their engagements with YouTube mental health vlogs and online forums combatting suicide or depression. It examines how youth partake in self-diagnosis and self-treatment as well as their ethical engagements in caring for friends and peers. It assesses their expectations of the state, corporations, and technologies themselves for ensuring mental well-being. The project focuses on elucidating how we can best employ digital technologies to help, rather than harm, young people's mental well-being. The research team is led by **Associate Professor Susanna Trnka** at the University of Auckland and utilises a transdisciplinary approach, drawing on the strengths of medical anthropology (Trnka), clinical psychology (Associate Professor Kerry Gibson UoA), kaupapa Māori clinical psychology (Dr Pikihiua Pomare, Massey University), Pacific public health (Dr Jemaima Tiatia-Seath, UoA), and medical ethics (Dr Monique Jonas, UoA).

'Crazy' idea

Bronwen Connor, a pharmacologist at the University of Auckland, has spent more than 20 years working on brain disorders. Much of what she and other researchers knew about the impact of neurodegenerative diseases relies on the investigation of donated post-mortem tissue. This means the donated tissues are at later stages of the disease and researchers are looking at the cells that remain. Bronwen wanted what she calls 'cells in their teenage stage' which still hadn't made all their connections and were responsive to cues and signals. She and her team resorted to a simple gene therapy technique where the researchers open an adult skin cell and physically 'pump' in the desired genes to transform them into precursor neuron cells. This allowed researchers to see the progression of the disease as the brain cells develop. This ground-breaking method allowed the trial of new drugs in a Petri dish

1,572

publications based on SDSN keywords

32%

SDSN UoA National Share of Publications

**figures are for 2019*

1,557

publications based on Elsevier queries

1,608

publications based on UoA keywords



Nick Gant's Nightingale.

and avoided the ethical issues that come with human embryonic stem cell research. The human skin cells were transformed into precursor brain cells, and the laboratory can now produce a broad range of specific neuron types. The initial gene transfer technique has been perfected so almost 100 percent of the cells reprogrammed will survive. The regenerated cells were successfully transplanted into the brains of rats with Parkinson's and Huntington's disease, where the cells survived and formed new mature replacement cells. The process is patented by the University's commercial arm – UniServices.

Adult drinking

Professor Janie Sheridan and Associate Professor David Newcombe from the University's Centre for Addiction Research, in collaboration with Associate Professor Andy Towers (Massey University), have led two Health Promotion Agency-funded projects looking at the levels of risky drinking among older adults both nationally and internationally. Alcohol consumption is relatively more harmful in older adults yet is an often-overlooked issue. Alcohol is metabolised less quickly as people age and they may have coexisting health conditions worsened by drinking. Medicines also may interact with alcohol and result in further harm. The research has helped shine a light on the issue and is also leading towards the development of a primary care initiative in Whanganui in New Zealand, which aims to support GPs to identify and manage the risks associated with older adults drinking in a harmful way.

Detecting previous exposure to Covid-19

Funded by the New Zealand government's Covid-19 Innovation Acceleration Fund (CIAF), a project led by [Dr Nikki Moreland](#) from the Faculty of Medical and Health Sciences, has focused on establishing a way to provide evidence that an individual has been previously exposed to Covid-19 by detecting the presence of virus antibodies in the blood. Accurate antibody-based tests (also known as serological tests) will underpin multiple strands of the pandemic response

including clinical diagnostics and efforts to understand transmission and the immune response to SARS-CoV-2 (Covid-19). The antibody tests will support activities such as clinical diagnosis, understanding disease transmission and the immune response.

Remote temperature device



A matchbox-sized body sensor worn under the arm to monitor whether someone has a fever and then sends that data over long distances has won funding from the New Zealand government's Covid-19 Innovation Acceleration Fund (CIAF) to conduct clinical trials. The temperature-reading biosensor called '[Nightingale](#)' is designed to protect those most at risk from Covid-19 and avoid cluster outbreaks in places like rest homes. Early detection of fever is key to preventing spread of the virus. It also drastically reduces the need for physical contact between frontline medical staff and a cluster such as those found amongst rest home residents. Invented by a group of Auckland tech entrepreneurs under lockdown the project, led by Associate Professor Nick Gant, had the perfect mix of technological expertise. Nightingale uses very little power via Low Power Wide Area Network technology, and the signal can carry over many kilometres to receiver stations. It has a device battery life of several months. While the armpit is not the ideal site to measure body temperature, Nightingale is a smart device that uses data from a motion sensor to screen out erroneous readings, only sending small amounts of accurate data to a web-based interface for remote monitoring by nursing or healthcare staff.

Healthy body and mind in lockdown



The Bene-Fit programme, which has been running in the University's Recreation Centre since 2011, quickly transitioned into a virtual format during the Covid-19 lockdown. The programme, run by Matt and Kristy Newey, provides private fitness classes tailored to individual needs and includes fitness and wellness assessments, measuring vital stats to keep tabs on progress, as well as advice on food plans, shopping lists and food tips. With almost 60 staff members participating in each session, the classes ran every day, predominantly in circuit style. Apart from the obvious benefits of regular exercise for the mind and body, the programme offers 30 wellness objectives, with participants able to commit to as many as they felt able to. Recorded sessions were available for people who couldn't make it to the live event. The programme ensured that staff could maintain their fitness regime despite the lockdown and also benefit emotionally and mentally from the coaching.

SpinPoi

Dr Kate Riegler van West is on a mission to spread the health benefits of playing with poi. The researcher and artist completed the [world's first scientific study](#) of poi and well-being as a PhD student, winning awards for her ground-breaking research. With the support of the University of Auckland Business School's Centre for Innovation and Entrepreneurship, Kate is now taking her venture SpinPoi to the world. Her poi techniques are being implemented by healthcare professionals as a rehabilitative tool. Her clinical study proved benefits in grip strength, balance, and attention for healthy older adults after just one month of poi practice. A subsequent pilot study conducted at Auckland Hospital's Rangitoto Ward measured the success of poi with patients primarily recovering from stroke, falls, and/or other neurological conditions. The feedback from the study was very positive, with the majority of patients reporting they thought poi could be helpful for their recovery.

Disinfection for reuse of PPEs



Researchers from the University of Auckland and the University of Otago received funding of \$1.3 million to put in place a mobile solution to disinfect and potentially reuse personal protective equipment (PPE). Lead researcher [Dr Yvonne Anderson](#) of the University of Auckland's Faculty of Medical and Health Sciences, says the project has the potential to protect frontline workers against virus transmission in hospitals and the wider community. It may also address what continues to be a 'river' of PPE going to disposal. While New Zealand has avoided major strain on its health system to date, internationally the pandemic continues to affect millions of people, placing serious pressure on many health systems that continue to require large volumes of PPE to keep health staff protected. The team are trialling the process on gowns, surgical masks, N95 masks, face shields and eyewear to show the treatment means used PPE can safely be disinfected for potential reuse.





Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

683

publications based on SDSN keywords

31%

SDSN UoA National Share of Publications

12

publications based on Elsevier queries

440

publications based on UoA keywords

**figures are for 2019*



Kahu Virtual Campus

***Te Rito Toi* had more than 38,000 users and 250,000 page views within the first month of release. The website was accessed by people in 109 countries around the world in the first 30 days.**

Quality Education Hub

The University of Auckland is one of only 17 universities worldwide to be made a hub for the Sustainability Development Goals (SDGs) in the United Nations Academic Impact (UNAI) group, being assigned [SDG 4: Quality Education](#). Auckland will lead a group of 1,300 UNAI member institutions in more than 130 countries to develop new ideas for achieving the SDGs.

Collection Development and Access

During Level 4 of the lockdown, Collection Development and Access and our Copyright Officer worked tirelessly to ensure students had online access to course textbooks and core readings. Negotiations with Copyright Licensing NZ extended the current licence to digitise up to 50 percent of readings previously available only as print. Academic staff were assisted to identify alternative readings available electronically. During Levels 2 and 3, an on-demand digitisation service was set up for students and staff to request chapters and articles through a click-and-collect service. There were more than 3,000 requests to collect books and other library material. With limited access during Level 3 lockdown, there were contactless collections of requested books, audio-visual material and laptops.

Schools in disaster response and recovery

Professor Carol Mutch received a 2020 University Research Excellence Medal for carrying out a study in five Canterbury schools following the Christchurch earthquakes, between 2012 and 2018. Her research shows that rather than being peripheral players, schools functioned as community hubs, with principals as crisis managers, teachers as first responders and children as active citizens. Her research has since been widened to include disaster-affected schools across the Asia-Pacific region, including post-tsunami Japan, post-earthquake Nepal and post-

cyclone Vanuatu. In 2020, it focused on offering useful tools to teachers in Australia in the aftermath of catastrophic bushfires there. The Canterbury project has attracted international interest and resulted in peer-reviewed publications in top journals, speaking invitations and fellowships. It sits in a cross-disciplinary position between Disaster Studies and Education and is informed by fields as diverse as leadership and trauma studies and community development. Carol's research has informed policy and practice in the area of education and disaster recovery, with her ideas taken up by teacher organisations, principal training providers and departments of education, both in New Zealand and overseas.

Kahu Virtual Campus

Tasked with addressing the impact of Covid-19 on the face-to-face model of student recruitment, Vanessa McQuinlan in the University's digital team used her innovative thinking to come up with an idea to virtually engage with potential university students. Co-designed with Pro Vice-Chancellor Māori teams led by Michael Steedman, Pro Vice-Chancellor Pacific Damon Salesa and the International Office, [Kahu Virtual Campus](#) showcases the rich social and cultural dimensions of the University spaces and places. The online world is tailored to reflect students' interests and can even detect if students are international, floating up information that's relevant. It also includes videos featuring a wide range of students who tell their stories. Students are welcomed by a digital pōwhiri (traditional welcome) and presented with a 3D personalised and tailored desktop. The virtual campus received a lot of interest from schools across New Zealand, with the average visitor spending approximately 19 minutes on the platform. The second phase of the experience, including 3D modelling of the campus and of Auckland, is under way. Kahu will even be able to lead students from one classroom to another and tell them the best route. The third phase will involve amalgamating around 25 systems with some useful and practical organisational tools. The students of the University can look forward to having a digital personal assistant that will tell them if their library books are due back, or if they have an assignment coming up.

Industry-academic Research Forum on Supply Chain Management

Launched in 2019 and led by Professor David Robb as a new initiative, the forum is driven by New Zealand supply chain managers sharing challenges with academics (and postgraduate students) interested in

industry/applied research, and together tackling these challenges in a way that provides value to the organisation(s) and publications. It began with a workshop where challenges were suggested by industry experts. These challenges were then further shaped by the group of both industry experts and academics. The forum has also provided a platform to bring together departments and faculties (Business and Engineering) and gives early-career researchers and postgraduate students direct experience in problem solving for key business issues.

INFOSYS 310 Business Project

Taught continuously for more than 20 years, the course was started by Associate Professor Lech Janczewski and originally focused on information systems projects. In 2012 the course branched out to include operations and supply chain projects, and then in 2018 business analytics projects were introduced. The course offers students real projects, defined by real business organisations (sponsors) and addressing their real business needs. Students are placed within the company as employees and there are strict rules for monitoring the progress of work through project presentation, workshops and individual interviews. The course allows students to solve real business problems for local businesses and produce industry-quality documents.

The Sustainability Module

The module, which teaches the values and science of sustainability, is a collaboration between the University's faculties of Science and Arts. It was developed by Professor Niki Harré from Psychology, senior tutor Joe Fagan from Environment and Dr Manuel Vallée from Sociology. Launched in 2019, the module is available to students enrolled in a bachelors programme in Arts, Science or Advanced Science (honours). The first-year course is also a General Education elective open to all students. The courses look at various ways to incorporate sustainability into organisations and communities, looking at topics like the role individuals play in creating sustainable solutions, the 'circuit breakers' that disrupt business as usual, green technology and global agreements. The module not only teaches sustainability but practises it as well. Almost all course materials are electronic and catering at all course events is primarily vegan and low waste.

Summer Start Programme

With Covid-19 disruptions and on-and-off lockdowns, many secondary school students are experiencing long-lasting impacts on their tertiary education plans. How to respond to these student



concerns has been a significant focus for the University. To increase student preparedness for their tertiary study, the University has introduced Summer Start – a six-week programme giving eligible school leavers the opportunity to gain credits towards their degree and start their University journey early. Summer Start is open to everyone, so even if a student is not planning to study with the University of Auckland in Semester One 2021, they can get a head start on their studies by joining Summer Start. The programme commences in January 2021 and students will complete one course that will go towards their University of Auckland degree programme before Semester One classes start in March 2021. They will also receive transition readiness, academic and pastoral support to guide their success and enhance their learning in preparation for the rest of their university journey.

Learning essentials

During Auckland's Level 3 lockdown, Te Tumu Herenga, Libraries and Learning Services, at the University launched a new suite of learning products called [Learning Essentials](#) to support students' learning online. This proved to be a great success and has been widely used since it was launched in early August. All students, regardless of where they are studying, have access to these resources 24/7.

SDG Study Programmes

The University of Auckland offers specific undergraduate and postgraduate courses that relate to the United Nations' Sustainable Development Goals (SDGs) under subjects such as Geography, Environmental Science, Economics, Politics, Sociology, Education, Environment and Commercial Law. There is also a [Sustainability module](#) available under the Bachelor of Arts, Bachelor of Science and Bachelor of Advanced Science. These courses allow the students to develop an understanding of the values that underpin sustainability, complex social and ecological systems, and global sustainability issues and potential solutions. They also develop the ability to design and apply sustainability solutions in organisations and communities.

The Centre for Arts and Social Transformation (CAST)

Established in 2019 with support of the Chartwell Trust, [the Centre researches](#) how the arts have the potential to make a more socially just and equitable world through improving quality of life. It is outward-



Year 1 to 3 students create a communal piece of artwork, the dream cloth, as part of the Te Rito Toi Teaspoon of Light lesson.

focused and builds relationships with educators, artists, activists, policymakers and communities to research the power of arts for social transformation. The Centre hosts four projects to support educators:

- The [Creative Well-being Alliance, Te Ora Auaha](#) is a national network and resource for anyone interested in the contribution of the arts to health and well-being.
- The [Creative Schools Initiative](#) helps schools with robust, reliable data to measure their creative environment and improve classroom pedagogy.
- [Te Rito Toi](#) helps teachers work with children when they first return to school following major traumatic or life-changing events.
- The [Creative Thinking Project](#) explores the role of creative thinking in our lives, and it's benefits to education, society and individuals.

“The quality of teaching staff is excellent and the content riveting. I’m being taught by leading experts in their fields. Tutorials encourage us to dive deeper into our thinking, further than what we thought we were capable of.”

- Arts undergraduate student, Learning and Teaching Survey 2020



Achieve gender equality and empower all women and girls



Supreme winner for Covid-19 work

 Associate Professor Siouxsie Wiles, a microbiologist at the University, was the supreme winner at the 2020 Women of Influence Awards. She was chosen for providing evidence-led commentary and advice on keeping safe during the Covid-19 pandemic. Her clear, accessible explanations of aspects of Covid-19 and measures to stem its spread helped ease the nation's anxiety and became the basis for World Health Organisation communication tools.

New Zealand has the world's highest percentage of female graduates who found start-ups at 13.4 percent, and almost half of these women are from the University of Auckland.*

*Source: The Pioneering Women Study by Tide



The Vice-Chancellor connects with staff

University of Auckland's first woman Vice-Chancellor

In March 2020, Professor Dawn Freshwater became the University's first woman Vice-Chancellor, setting a milestone for the University. Dawn, who grew up in Nottingham in England, is a strong advocate of gender equality and has ambitious ideas about what universities can achieve through education. She says: "I see what education can do, not just personally but globally in terms of supporting the Sustainable Development Goals (SDGs). We have a global civic responsibility and it's really important to strike a balance between serving our communities, serving the region and the nation, but also serving the globe in terms of the SDGs."

Ethnic women in New Zealand politics

Associate Professor Rachel Simon-Kumar (University of Auckland) and Professor Priya Kurian (University of Waikato) are undertaking research exploring the experiences of ethnic women politicians. At a time when ethnic minority women are emerging as the new face of radical politics in several Anglo-European democracies, challenging status quo political institutions, this study will help throw light on issues of gender, leadership and minority politics in New Zealand. It seeks to understand the experiences of ethnic women as politicians within New Zealand's political systems and their lived realities that are a window to examining the complex intersections between gender, ethnicity, culture and politics in New Zealand's bicultural and multi-ethnic democracy. It focuses especially on the perspectives of the marginalised among minorities. The research is ground-breaking, looking at ethnic minority and gender politics from 'the inside' and extending an international scholarship on intersectional feminist theory. The first of its kind in New Zealand, this project is both 'about and by' ethnic women.

Period poverty

Research led by Associate Professor Terryann Clark (School of Nursing) from the University of Auckland and Dr Terry Fleming from Victoria University of Wellington, surveyed nearly 4,000 students about their experiences of period poverty. It was among the first in the world to investigate period poverty in a scientifically rigorous, randomly selected sample. Free period products are now available in partnership with the Auckland University Students' Association (AUSA) and in first-year halls of residence, AUSA reception, and the University Health and Counselling Service. Products are available in areas where students can collect them but not have to interact with staff. The issue of period poverty is an ongoing one, worsened by the economic effects of the pandemic. This initiative, partly funded by staff giving, aims to reduce inequalities for students facing cost barriers to obtaining sanitary products.

Women's brains and childbirth

A study has found that grey matter in women's brains increases after they give birth. An international research team, including lead author Associate Professor Eileen Lueders and Dr Florian Kurth from the University, analysed MRI brain scans of 14 pregnant women at two time points – first between one and two days after childbirth and again four to six weeks after childbirth. When scans were compared, researchers found a marked increase in grey matter in both cortical and sub-cortical regions, across both hemispheres and in all four brain lobes. Grey matter comprises the nerve cells responsible for processing information and contributes to thinking, feeling and behaviour. Eileen says the grey matter changes add further evidence that the human brain is highly plastic, even in adulthood. While the findings are significant, further research is needed to understand whether the tissue increase is an effect of brain restoration, reorganisation, or both. "Being a mother requires a whole new repertoire of skills and behaviour," says Eileen. "Research has shown that exercising new skills and engaging in new activities leads to tissue increases. So, mothers might not just get back what they lost during pregnancy, but even gain a bit more." Only five current studies having assessed structural changes in the mother's brain after giving birth.

Gender issues in software engineering

Code review, where software code contributions are examined by others, is a common practice on software teams. While it brings significant advantages such as improved code quality and knowledge sharing, software developers report that it can also create toxic,

unsupportive environments. Yet, many software developers argue it is more important to maintain software quality than to worry about the feelings of developers who receive harsh feedback. This attitude could be a contributing factor to the [low gender diversity on software teams](#). A project headed by Kelly Blincoe from the Department of Electrical, Computer and Software Engineering is investigating software developers' attitudes towards negative feedback in code review, with a lens on gender differences. The project is funded by a Google Faculty Research Award.

Gender analysis and good governance

Professor Jennifer Curtin is undertaking research to design gender analysis training modules and a gender responsive budgeting initiative for New Zealand. It is funded by a grant from the Ministry of Business, Innovation and Employment Smart Ideas Fund. The project draws together quantitative data disaggregated by gender, ethnicity and age, as well as insights from diverse groups of women in communities, and from policy advisers in central and local government. With additional input from her network of international experts from the UK, Australia, Canada and the wider OECD, Jennifer's objective is to identify new practices to ensure gender and other factors are taken into account at all stages of the policymaking process, from design to implementation, and to build the capability of policy advisers and advocacy groups whose expertise is essential for embedding gender analysis. The focus on the budget process will help to ensure that the future development and delivery of government programmes and services are better able to address the inequalities faced by diverse groups of women in New Zealand.

Dealing with a second silent epidemic

A report prepared by the United Nations on the impact of Covid-19 suggests a global increase in domestic violence against women. New Zealand witnessed a 22 percent spike in cases of [domestic violence during the first lockdown](#). The University of Auckland has a comprehensive family violence project that supports our commitment to being a safe, inclusive and equitable work and study environment. This includes policy, guidelines, training, resources and a detailed website linking to internal and external support. The Equity Office have co-partnered with SHINE – New Zealand's leading specialist domestic violence service, to deliver regular family violence response training sessions for staff and student leaders. During lockdown, the Equity Office provided additional information for staff, plus guidance for managers in remotely supporting staff who may be in vulnerable situations.



The 2020 group of mentees and mentors celebrate a decade of the Business School Women's Mentoring Programme.

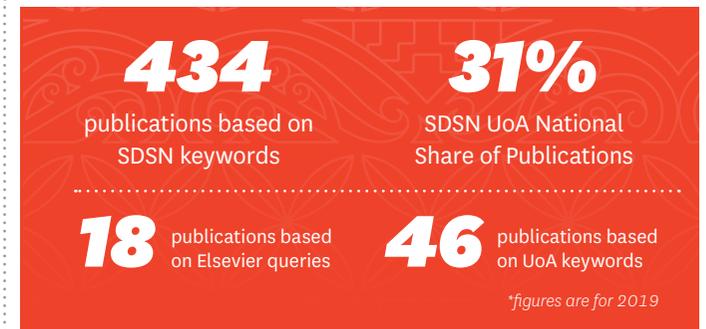
Creating a bubble



Student surveys have shown that during the Covid-19 lockdowns, many students struggled to find suitable spaces to study. Te Tumu Herenga, Libraries and Learning Services (LLS), provided those study spaces once the country moved out of Level 4. Under Level 3, spaces were available in specific centres of all three of the Auckland campuses. Those spaces were strictly limited to students who didn't have access to adequate study space at home and who were approved by Campus Life. Access was tightly controlled and students were kept physically distant by being allocated into specific bubbles – there was also extensive cleaning by LLS staff to keep the spaces hygienic and safe.

Women entrepreneurs

Women are underrepresented in business, which affects the well-being of individuals and their families. Supporting more women entrepreneurs and innovators to thrive is about future-proofing and growing the social and economic well-being of families and their communities. The University's Centre for Innovation and Entrepreneurship has actively sought to increase the participation of women through role modelling, communication campaigns, actively recruiting more women to volunteer as mentors and speakers, and initiating social innovation programmes



proven to appeal to women. The University has led New Zealand into the [top-ranked position for female founder graduates](#). An international study found New Zealand has the world's highest percentage of female graduates who found start-ups, at 13.4 percent. Of these, almost half are from the University of Auckland. These results were provided by the business banking app Tide. Its [Pioneering Women](#) study analysed data from Crunchbase for companies that had raised at least US\$1 million. The sums involved indicate that founders identified in the study are generating substantial enterprises. Of the 79,140 enterprises, only 6,940 had female founders.



Ensure availability and sustainable management of water and sanitation for all



Assessing underwater ecosystems

There is a worldwide pollution threat as nitrate from fertiliser run-off kills fish, triggers toxic algal blooms and renders drinking water undrinkable. In New Zealand, a dairying boom has contributed to nitrate seeping into the rivers, streams and aquifers. A [University microbiologist, Kim Handley](#), is delving into the underground world to discover previously unknown microbe communities in the groundwater that flows into rivers and lakes, irrigates land, and provides drinking water. Kim and her team have found nitrate that leaches into water to be the most pervasive threat. They are working on finding out what lives in the underground water, learning what the role of these microbes in the nitrogen cycle is and gaining clues on how they could help mitigate pollution woes. Kim is also assessing how these underwater ecosystems could be used to monitor pollution. In a three-year project, Kim, doctoral students Olivia Mosley and Emilie Gios, and external collaborators including Dr Louise Weaver (ISER) and Dr Karen Houghton (GNS), are concentrating on two alluvial aquifers in Canterbury, as well as sampling wells across Auckland, Wellington and the Waikato.

Making tap water the first choice

Wai Auckland is a Healthy Auckland Together initiative led by Auckland Regional Public Health Service. Wai Auckland aims to make tap water, not sugary drinks, the first and convenient choice by improving water fountain infrastructure, advocating to reduce the prevalence of sugary drinks, and collaborating with community groups. The University of Auckland is a partner supporting the development, evaluation and research needs of this project that also involves the Auckland Council, Auckland Transport, Watercare and RefillNZ as partners. So far, ten students from the Faculty of Medical and Health Sciences (Schools of Population Health, Nursing, and Medical Sciences) have been involved with Wai Auckland, by developing business case proposals, an evaluation plan and an infrastructure survey.

Plastic plague in waterways

[Nadia Dikareva](#) (a doctoral candidate in the Faculty of Science) is analysing the quantity and types of microplastics lurking in Auckland's streams and waterways and their path from land to sea. Nadia's research project involved spending a fortnight in waders, collecting water and sediment samples in 18 streams from Papakura in the south to Shakespeare Regional Park in the north. She spent months sifting particles from organic matter for microscopic analysis, and

then used a spectrometer to assess their composition. The result, *Microplastic Pollution in Streams Spanning an Urbanisation Gradient*, was published in the journal *Environmental Pollution*. Nadia's analysis revealed most fragments to be plastic, followed by fibres and films. She isolated thousands of particles that were acrylate polymers used in paints and coating materials, polyethylene and polyvinyl chloride (PVC), found in common plastics and used in everything from construction



550
publications based on
SDSN keywords

24%
SDSN UoA National
Share of Publications

13
publications based on
Elsevier queries

73
publications based on
UoA keywords

*figures are for 2019

materials to cars. Worryingly, the concentration of microplastics in Auckland streams matched that found in the much more densely populated northern hemisphere cities. Nadia found that Auckland's waterways have up to 303 particles of micro-plastic per cubic metre of water, and up to 90 items in each kilogram of sediment. Microplastic pollution was even found in streams considered pristine.

Interrupting biofouling

University of Auckland bioengineers have developed an innovative way to get rid of the underwater biofouling that creates such a headache for marinas, boat owners and aqua farmers. Electroclear, a new spin-out company based at the Auckland Bioengineering Institute (ABI), is using electric fields to disrupt small organisms' ability to live on selected underwater surfaces. [Christopher Walker](#) and fellow doctoral student and company partner Patrin Illenberger, brought their bioengineering training to bear on the problem. It is a permanent, non-toxic solution that can be applied to a wide range of geometries. They discovered that if they set up two separate electrodes underwater and created a fully encapsulated electric field, they could target and disrupt certain organisms. "As an island nation with such strong ties to our ocean, we have a real chance here to lead the world in anti-fouling and biosecurity," says Christopher. Electroclear won funding and mentor support through the University's Entrepreneurship programme, Velocity, and is talking with research institutions and commercial partners to develop applications for both marine infrastructure and aqua farms.

PuriFibre vs microplastics

We are eating our own clothes. Whenever we do our laundry, thousands of microfibrils from clothing are washed into our waterways, where they are consumed by marine life and travel up the food chain to us. A study commissioned by the WWF (World Wide Fund for Nature) found that on average, we ingest about five grams of plastic every week – the equivalent to a credit card. [PuriFibre](#) is an emerging enterprise that is being developed by students out of the University's Centre for Innovation and Entrepreneurship. Their solution towards the problem of microplastics pollution and consumption is a ball that can be thrown into washing machines, trapping microfibrils inside. After washing, the user can simply remove any caught microfibrils. The convenience of using PuriFibre means it will be an easy way for environmentally conscious citizens to take a stand against microplastic pollution.



Nadia Dikareva



Water fountains on our campuses provides clean drinking water, minimising the use of expensive, resource-intensive bottled water.

7 AFFORDABLE AND CLEAN ENERGY



Ensure access to affordable, reliable, sustainable and modern energy for all

Harvesting from ocean waves

With the growing concern regarding the relationship between carbon-based fossil fuels and global warming, developing new and effective means of sustainable energy generation becomes increasingly important, and is being driven by New Zealand government. Wave energy features has benefits over solar and wind energy. For example, it has a much larger power density and is a more continual source of energy. A group of researchers in the Faculty of Engineering, in collaboration with the Aotearoa Wave and Tidal Energy Association, are developing a novel Wave Energy Converter tuned to produce viable power output from relatively small waves. The aim is to minimise the total cost of the produced wave energy and make it competitive with the other technologies of sustainable energy generation.

Applied energy

[Dr Kiti Suomalainen](#) and [Professor Basil Sharp](#) from the University's Energy Centre studied the geographical and temporal distribution of the wind and hydro resources in New Zealand, together with electricity demand and prices. Their objective was to gain insights into the trade-offs that might be required in developing wind power in different parts of the country. It is particularly important to understand the impacts of a high penetration of wind power on an electricity market that is already highly influenced by seasonal hydro power availability. Supported by researchers at the [Electric Power Optimization Centre](#) at the University, this research aims to understand where the optimal locations to build wind capacity are in order to maximise renewable electricity and minimise negative impacts on electricity prices. The researchers found that, for some locations, it is daily random deviations from the average that have a more significant correlation with electricity prices than the seasonal patterns. This gives valuable information on wind resource availability in critical periods of the year, such as dry seasons, and thereby allows us to identify sites that can most optimally balance price volatility with renewable energy production during these periods. Although applied to the New Zealand power system, this methodology is applicable to any electricity system that utilises wind and hydro resources.

Renewable power

Solar power has been rapidly growing in New Zealand over the past decade, with most of the growth taking place in the residential sector.



Auckland Council has a goal of powering a substantial number of homes using solar photovoltaics by 2040. In a study conducted by [Dr Kiti Suomalainen](#), [Vincent Wang](#), and [Professor Basil Sharp](#) at the University's Energy Centre, light imaging was used to develop a digital surface model of the city, including topography, buildings and trees. With this model, a solar radiation tool has been used to calculate solar radiation on each square metre of roof area, taking into account the time of year, time of day, average climatic conditions, roof orientation and slope, as well as shading from nearby buildings and trees. The results show that some neighbourhoods are better suited for solar power deployment than others, due to a range of factors. This is the first step to gaining a detailed understanding of the solar resource available in the city and working towards both a technically optimal as well as a more equitable distribution of solar energy collectors across Auckland.

Future energy landscapes

[Dr Alessandro Premier's](#) research activities are focused on the architectural integration of advanced technologies and materials in order to identify and apply design practices for sustainable outcomes. The research outcomes target urban regeneration and building retrofit strategies for improving the environmental quality of buildings and places. His studies on the integration of solar technologies on both a building and urban scale led him to co-lead a working group on future energy landscapes, which seeks to understand how SDG No.7 can be linked to other Sustainable Development Goals for the improvement of energy landscapes.



Dr Alessandro Premier's solar technology
at the building scale.

Electricity sector transformation

'Electricity sector transformation in New Zealand: a sustainability assessment approach' is research by the University's Dr Kiti Suomalainen and Professor Basil Sharp. It provides a broad approach to sustainability assessment, going beyond default approaches of carbon or greenhouse gas accounting. New Zealand has a long history of producing much of its electricity from low-carbon resources. Domestic fossil-fuel resources offer opportunity for economic growth, while renewable energy resources are significant and present opportunities for green growth in both domestic and global markets. What is particular about New Zealand's case is the "middle out" approach of the national renewable energy strategy, rather than the common top-down approach of many other countries. Consenting is done on a case-by-case basis at regional level, allowing for community and stakeholder participation. The research looks at transitions in New Zealand's electricity sector and renewable energy policy and presents an assessment using sustainability indicators to study the impact. Although the electricity mix has seen a transition from hydropower towards gas, geothermal and wind energy, there has been no significant change in the overall sustainability index of New Zealand's electricity supply. This is because the system remains based on renewable sources as well as gas, which scores relatively highly in the model applied in this research.



840

publications based on
SDSN keywords

78

publications based on
Elsevier queries

33%

SDSN UoA National
Share of Publications

78

publications based on
UoA keywords

**figures are for 2019*

8 DECENT WORK AND ECONOMIC GROWTH



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



Taking care of businesses in Covid-19



Staff at the Business School shared their expertise with Auckland businesses to help them sustain themselves during the pandemic, or directed them to organisations that could help. With future projections thrown out the window, businesses in New Zealand needed to recalibrate. Not long after lockdown, [Dr Antje Fiedler](#), a senior lecturer at the Graduate School of Management, set up a pro-bono business advisory group, comprising Business School experts keen to lend a hand. As well as business consultancy advice, the group also ran webinars for a broader outreach, working with industry bodies to facilitate sessions for their members.

Labour and Employment Relations

Work on responsible labour and employment relations investigates the extent to which human resource management (HRM) and employee voice practices are transferred from European Multinational Corporations (MNCs) to their entities in the Asia-Pacific region, with a particular focus on China and India. It aims to better understand differences and similarities in training and HRM practices within MNCs, including their social and economic impacts for key stakeholders. The project is supported by the Hans-Böckler-Stiftung, and involves researchers Professor Catherine Casey (Loughborough University) and Drs Helen Delaney and Antje Fiedler (University of Auckland).

Sustainable development and the business-society nexus

This theme investigates how organisations can conduct business in an environmentally and socially sustainable way without risking financial viability. Specifically, it examines how firms work or collaborate with others towards the Sustainable Development Goals, and how SMEs (Small and Medium-sized Enterprises) and MNEs (Multi-National Enterprises) can use innovation to future-proof their business models and establish resilience in the face of increasing resource constraints and other challenges such as climate change, inequalities and migration. Dr Noemi Sinkovics of the University of Auckland is working on this project in collaboration with Professor Rudolf Sinkovics, Dr Jason Archie-Acheampong of the Rush Group in the UK, JP Jagdev of Parameter Softwares in India, Dr Samia Hoque at the Manchester Metropolitan University, Dr Isuru Koswatte at the Edith Cowan University and Dr Jihye Kim at the University of Dundee.

The Centre for Informed Futures

The fundamental goal of [the Centre for Informed Futures](#) is countering the global rise of misinformation and declining public trust, with robust research and evidence-based advice. It's an independent and apolitical think tank and research centre founded at the University by Distinguished Professor Sir Peter Gluckman. The centre offers thought leaders and researchers a way to engage with the community and inform policy discussions, while also offering a way for policymakers to find the right advice. It combines scientific disciplines to provide collaborative advice that can help policymakers and civil society better understand the issues at hand. The Centre forms part of the University's effort to better engage with society, and to have a greater impact on key issues.

Management Education

The University has a responsibility to educate responsible and ethical leaders. The University of Auckland Business School is triple-accredited and a signatory of the Principles of Responsible Management Education (PRME), a UN-backed global initiative developed to promote corporate social responsibility and sustainability in management education. The Principles of Responsible Management Education are embedded in the strategies, teaching and research of the Faculty of Business and Economics, and disseminated throughout the University.

An entrepreneurial university

The University of Auckland was named [Entrepreneurial University of the Year](#) at the Asia-Pacific Triple E Entrepreneurship and Engagement Excellence Awards in Higher Education. Entrants underwent a rigorous application and selection process, through an external panel of reviewers. Entrepreneurial University of the Year was one of a range of categories at the awards that celebrated outstanding achievements of universities and individuals in the areas of entrepreneurship, engagement, social outreach and sustainability. The University of Auckland's award came in recognition of the quality and scale of entrepreneurial initiatives generated through UniServices and the Centre for Innovation and Entrepreneurship. These include the establishment of a world-class innovation hub and Makerspace, an inventor's fund and investment committees, a global presence with new offshore spaces, and extra-curricular programmes and integration of entrepreneurship within curricula.

Legacy of creating thriving entrepreneurs

The critical role alumni play in bolstering the New Zealand economy has been revealed in a survey of University of Auckland alumni, conducted by an independent research company. Responses from more than 4,000 graduates dating back to 1940 have been used to estimate that alumni have created **approximately 383,000 jobs since the 1960s**. One of the most striking statistics from this study is the survival rate of businesses founded by University of Auckland alumni after five years – which is more than double the national average.

Budding business minds on campus

A survey of University of Auckland students found that about 15 percent of them are currently planning a business, with 36 percent hoping to have founded their own business within five years of graduating. **The survey** also found that seven percent are already running a business while they are studying. A survey of alumni found a similar result: among those who had graduated since 2010, 10 percent are employed in a business that they started before graduating.



Students at one of the events organised by the University's Centre for Innovation and Entrepreneurship.

Graduate Employability:
University of Auckland graduates are sought-after employees, as reflected in the University's #1 ranking in New Zealand and in the top five of Oceania universities in the QS Graduate Employability Rankings 2020.

27%

SDSN UoA National Share of Publications

1,509

publications based on SDSN keywords

16

publications based on Elsevier queries

**figures are for 2019*

Dr Anne Bardsley and Sir Peter Gluckman
from the Centre for Informed Futures.





Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation

29%

SDSN UoA National Share of Publications

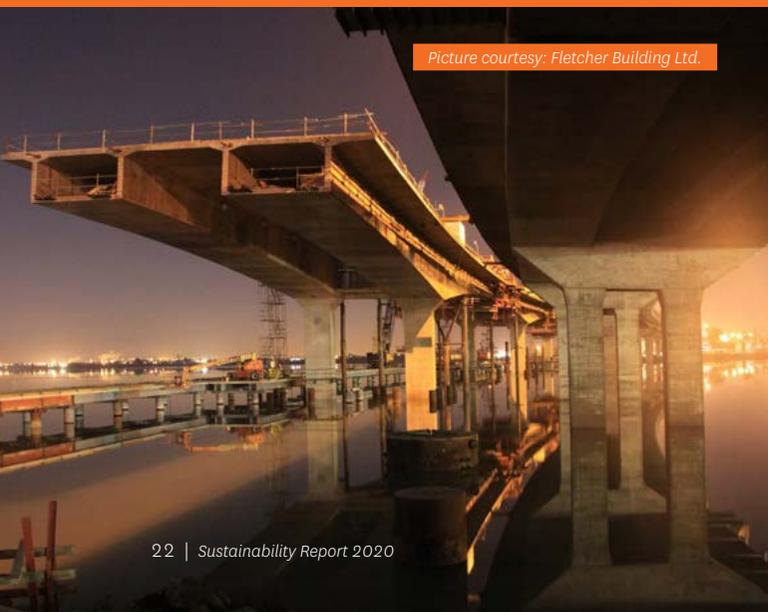
2,289

publications based on SDSN keywords

10

publications based on Elsevier queries

*figures are for 2019



Picture courtesy: Fletcher Building Ltd.

26 percent of UoA Alumni have founded an estimated 43,500 companies globally creating approximately 383,000 jobs since the 1960s.*

*Source: The Alumni Innovation and Entrepreneurship Survey.

Speedy shields creation



Just over two weeks after the announcement of Level 4 lockdown, the University's Auckland Bioengineering Institute (ABI) and MedTech CoRE researchers [designed a re-usable face shield](#) for medical staff treating patients infected with Covid-19. Around 20,000 shields were manufactured by mid-April. The design was simple but effective, comprised of a plastic frame and transparent plastic sheet. Importantly, both components could be disinfected and reused. It was developed by Dr Paul Roberts at ABI with support from MedTech CoRE collaborators and industry partners, after a meeting with local clinicians, where concerns were expressed about the lack of Personal Protective Equipment (PPE) in healthcare. Paul used the plastic glasses found in the emergency department of some hospitals as a starting point. An effective response to the fast-evolving situation, the masks were worn over surgical face masks as an extra layer of protection.

The Energy Centre

A multi-disciplinary research and education centre founded in 2004, the Energy Centre's mission is to provide research, policy analysis, and educational programmes to help business and government confront energy issues of national significance. Research is focused on three broad areas: energy markets, resource and environment markets, and transport economics. [The Energy Centre](#) is funded by the Energy Education Trust of New Zealand. The main output areas are education (courses, scholarships, postgraduate students), research focused on New Zealand's energy sector, and outreach to disseminate research findings and stimulate interest in the area of Energy Economics. The Centre organises a wide range of events open to industry, government, students, and the general public. The Energy Centre contributes to an



Dr Yusuke Hioka's acoustic environment project.

international educational programme funded by MFAT (Ministry of Foreign Affairs and Trade) delivering a course on Renewable Energy. The Centre is contributing to a new initiative called Young Energy Professionals aimed at supporting recent graduates working in the energy sector.

Investigating the effect of noise and acoustics on speech intelligibility

Intelligibility of speech is challenged by adverse conditions including the clarity of the speakers' pronunciation, environmental noise and whether or not the listener is a non-native listener. Combinations of these conditions make these problems worse and can severely affect the quality of verbal communication. This is a significant issue in today's world where more than half the population is multi-lingual. Despite this, the comprehension ability of non-native listeners immersed in a noisy environment is not well understood. To improve communication, this project will reveal and quantify how the ambient acoustic environment of a listener affects the understanding of non-native listeners at different levels of proficiency compared to that of native listeners by conducting subjective listening tests. The ultimate goal of the project is to establish solid guidelines for room acoustics as well as audio signal processing for helping non-native listeners have better communication experiences. [Dr Yusuke Hioka and Dr Justine Hui](#) along with Associate Professor Catherine Watson of the University are working on this project in collaboration with Associate Professor Hinako Masuda at the Seikei University (Japan).

Fostering innovation

The University's technology transfer company [UniServices](#) connects government and industry with leading researchers to develop effective solutions that address real-world challenges. In the past five years, UniServices has licensed 306 patents, generated 653 invention disclosures and raised \$148 million through spin-out companies. The University of Auckland Inventors Fund (recently launched by UniServices) offers University staff and students access to an evergreen, open-ended \$20 million investment fund for the development of technologies for commercialisation, and seed-capital for ventures started out of the University, averaging ten new companies per year. The University has numerous purpose-built research and lab facilities that industry can access through co-location arrangements.

Your heart on a chip

Cardiologists generally measure what the heart is doing with an electrocardiogram (ECG), which measures the electrical signals from the outside the body. However, for finding electrical problems and tuning internal devices, the cardiologist really needs to know what the signals are doing inside the heart (known as an electrogram or EGM). The only way to do that has been using sensors inserted by catheters through the arteries to the heart – an invasive and painful procedure. Under the Science for Technological Innovation (SfTI) programme, [researcher Dr Avinash Malik](#), and his team Tommy Peng and Dr Mark Trew, have been working on a solution to this problem using a data chip to finetune internal devices. The modelling does two things. First, it translates the ECG readings into the probable EGM readings at the heart level, so the cardiologist can finetune the device without invasive surgery. Secondly, it also allows a cardiologist to predict what effect various medications will have on the patient's heart rhythm, which previously required trial and error. The computer modelling, which uses machine learning, is based on data from collaboration with Associate Researcher Laura Bear from the IHU-LIRYC research lab in Bordeaux, France.

Lab in a pocket

Researchers at the University's Auckland Bioengineering Institute (ABI) have created a low-cost 'lab in the pocket' for schoolchildren. The technology aims to spark scientifically inquiring minds by giving them tools to take scientific measurements of the world around and within them, such as the quality of water they drink and the air they breathe.

It's called [the Kiwriious kit](#) and was designed by Associate Professor Suranga Nanayakkara and his team at the Augmented Human Lab (AHL) at ABI. They collaborated with Associate Professor Dawn Garbett from the Faculty of Education and Social Work. The initial development of Kiwriious was supported by a Ministry of Business, Innovation and Employment (MBIE) Curious Minds grant. Kiwriious comprises eight sensors that can take real-world scientific measurements of such things as air quality, temperature and humidity. The students plug the sensors into a Chromebook or other laptop and launch the Kiwriious Learning Platform on Chrome. The kit gives students access to scientific tools that would, for many, be out of economic reach. It also allows them to use the kit spontaneously outside the classroom in their own time when something about the world piques their interest. After successful trials in five schools in Auckland, Suranga hopes to start a national pilot in 30 schools in six cities.

Taking bowel disease technology to the world

[Surgical Design Studios \(SDS\)](#), founded two years ago at the University of Auckland's Department of Surgery in the Faculty of Medical and Health Sciences, has developed a range of medical devices that reduce the time it takes until patients can use their bowels again following bowel surgery, from five months to two weeks. The technology developed attracted \$4.3 million through early-stage capital raising. SDS raised the money through its first angel fundraising round, led by the Icehouse Ventures fund Tuhua II. The company is using the funds raised to bring its devices to New Zealand later this year, and then overseas once it gains regulatory clearances. Trials at Auckland City Hospital showed extremely promising results. Co-founder and chief scientific officer, Greg O'Grady, is an alumnus of the Centre for Innovation and Entrepreneurship's Velocity programme and continues to work as an Associate Professor at the University's Faculty of Medical and Health Sciences.

Auckland Programme for Space Systems

Launched in 2016, the APSS is for undergraduate students at the University of Auckland to collaborate in the field of space research. Second and third-year students form teams and work together to identify a societal need, then design a solution using a [CubeSat](#). In

November 2020, [New Zealand's first satellite designed and built by university students](#) was launched into space via Rocket Lab's Electron launch vehicle. Over three and a half years, the students had conceived, designed and built Te Waka Āmiorangi o Aotearoa (the New Zealand satellite vessel) APSS-1. The APSS-1 project was multi-disciplinary, encouraging undergraduates across Engineering, Science, Business and Arts to work together. The aim of APSS-1 was to measure electrical activity in the upper reaches of Earth's atmosphere, a region known as the ionosphere. The aim is to analyse how what goes on in the ionosphere can affect television, internet and telephone communications.



Kiwriious Team



Francis Moynihan Lavey, Dr John Cater (Engineering), student Jonathan Mace and Dr Nicholas Rattenbury (Science).



Reduce inequality within and among countries



Renee Motion dispatches laptops from her home garage.

Public morals

Associate Professor Caroline Foster's journal article *The Problem with Public Morals* covers the public morals exception in international economic law. It examines the growing flexibility in World Trade Law, allowing states to accept each other's policy positions on non-economic matters, including under the United Nations Sustainable Development Goals. The empirical study reveals that the public morals and societal values identified in international disputes are seldom captured directly. Instead, we see governmentally mediated representations of these morals and values. Accepting such representations masks the diversity in moral views and societal values and may endorse the characterisation of social policies as an embodiment of public morality, even where they are in tension with accepted human rights. The journal outlines the unsuitability of public moral defences to international adjudication in its present form. By contrast, the idea of legitimate public policy objectives featuring in recently negotiated regional free-trade agreements poses fewer concerns of this nature.

Workbridge and the University

The University's Equity Office and Workbridge work together to increase opportunities for meaningful employment for students and

An invitation for students to the Te Rā Māori event that celebrates the Māori culture and allows students to learn about the Indigenous culture of New Zealand.



Their own devices



Students with no access to a laptop for online studies in Semester One during the first Covid-19 Lockdown received [major IT relief effort](#) from the University to ensure they had access to laptops, so they could attend virtual lectures and complete assignments online. It involved the loan of around 600 laptops to students in need. The University received more than \$800,000 from the \$20 million government package to assist eligible tertiary learners to get digital devices, modems and internet connections. Pro Vice-Chancellor Pacific, Damon Salesa, initiated the move, recognising that Level 4 Lockdown meant that a significant number of students would be disproportionately disadvantaged. Once the lockdown levels eased, the University also opened study spaces at the new South Auckland campus Tai Tonga. Renee Motion, the University's Desktop Asset Manager, tagged and dispatched hundreds of devices from a makeshift distribution centre in a garage at her home. In the first two weeks of Level 4, 250 laptops were sent and 400 more ordered to meet the ongoing demand. There were between 10 to 45 requests for devices every day.

Social connectedness during Covid-19



Professor Merryn Gott is leading a team from the Te Ārai Research Group who won funding to look at [the impact of Covid-19 and Lockdown on those aged 70-plus](#). The year-long study, funded by the Auckland Medical Research Foundation, will consider whether the voices of those 70-plus were heard or even represented in decisions about their well-being. The study will build on the team's National Science Challenge-funded study that has explored social connection among culturally diverse older people. Previous work has

found there's a lot of heterogeneity and people from this age group are generally lumped together as 'elderly' or 'vulnerable' when, in reality, there's a lot of variation. As part of the study, older people from across New Zealand were invited to write letters recounting their experiences of lockdown. Interviews were also done by phone and video. Merryn hopes to find out what is useful for the older generation and to understand their needs during a pandemic. She will feed their experiences and perspectives to government and other relevant organisations.

Equity and eye health

Many populations do not have access to good-quality, affordable eye care despite its implications for many aspects of life, health and sustainable development. Worldwide, more than 250 million people are living with vision impairment, of whom 36 million are blind. [Dr Jacqueline Ramke's](#) research programme focuses on developing and testing strategies to improve access to eye care. One in ten children in New Zealand need glasses but don't have them. They are screened before starting school, but there's a long gap to the next screening during Year 7. Jacqueline is the second author on the *Lancet Global Health Commission Report on Global Eye Health* that will be published in the first quarter of 2021. The Commission has examined the evidence demonstrating the link between eye health interventions and improvements in other Sustainable Development Goals (SDGs). The Commission also speaks to the need for eye health within Universal Health Coverage (SDG3). Jacqueline developed an indicator during her PhD that is being considered by the World Health Organisation as a tracer indicator for Universal Health Coverage.

alumni with disabilities. Workbridge is a specialist employment service supporting people with all types of disability, injury or illness. The partnership complements the work of the Student Disability Services' Careers and Employment Adviser, and the Career Development and Employability Services at the University. They have had success with a growing number of employers engaging with initiatives to support students with disabilities into paid work that builds on their studies.

Socius XR

[Socius XR harnesses VR/AR technology](#) to provide individuals with autism a more comfortable space to practise verbal/non-verbal communication via realistic immersive simulations. Socius was started by a multidisciplinary group of students comprising Anzel Singh, Sarah Mwashomah and Weilian Du, who started the venture while participating in the University's Summer Lab entrepreneurship programme. They secured a \$5,000 grant from Edified (an Australasian education consultancy), awarded to only four promising projects in Australasia, with the potential to improve education in specific communities. Since then, Socius has been developing the concept and bringing new talent on to the team. They also became finalists in a sustainable innovation competition and were flown to Barcelona to pitch their idea at influential tech start-up event, 4YFN.

Babies with congenital heart disease

Professor Frank Bloomfield at the University's Liggins Institute is leading research, in collaboration with Starship Child Health, into the introduction of **[newborn pulse oximetry screening](#)**. Pulse oximetry is used to detect critical congenital heart disease (CHD), where the heart doesn't form properly. CHD affects between four and 10 per 1,000 live-born babies but when it's picked up early – before or immediately following birth – and

treated by surgery, survival rates are good. If not, CHD leads to death. Research has shown that Māori babies are less likely to be screened for this condition than Pākehā babies, and that Health Board-led screening is likely to increase this inequity. Researchers also found that there are ethnic inequities in the care pathway followed for babies with hypoplastic left-heart syndrome, a particularly severe form of critical CHD, with Māori and Pacific babies more likely to follow a palliative care route, rather than a surgical route, and less likely to survive to one year of age. Ongoing multidisciplinary research aims at unpicking the factors that underlie these inequities so that they can be addressed nationally.

Revitalising te reo Māori

The University of Auckland recognises **[te reo Māori](#)** is the foundation of Māori culture and identity, and despite it being one of three official languages in Aotearoa New Zealand, it remains endangered. The University has a role to play in preserving and protecting the language and culture and is committed to doing so in partnership with iwi Māori and the community. The University has a history of providing expertise in support of the revitalisation of te reo Māori through the Department of Māori Studies and Te Puna Wānanga over many years and now seeks to build on that contribution into the future. Led by the Office of the Pro

Vice-Chancellor Māori, the University aims to have 50 percent of staff demonstrating a basic level of competency in the Māori language by 2040, and all students to have the option of te reo Māori courses in their programme of study by 2050. It has **[also released an app](#)** to help in this language acquisition.

Improving health in the Cook Islands

Non-communicable diseases are the number one cause of death globally and disproportionately affect developing countries, such as those in the Pacific Islands. Although Pacific nations face increasing risk factors in young people, there is a lack of research focused on prevention and optimising early-life health. A collaboration between the Liggins Institute and the Cook Islands Ministries of Education and Health is addressing this complex issue in the Cook Islands. Research led by doctoral student Siobhan Tu'akoi, and including Dr Neti Tamarua-Herman, Dr Jacquie Bay, Professor Mark Vickers, Dr Yin Yin May Aung, Karen Tairea and Celeste Barrett-Watson, identified associations between early-life factors and later adolescent health. Using this evidence, the team facilitated the co-construction of a local early-life nutrition booklet, alongside community members and health professionals, to be used within hospitals, schools and the community.

29%

SDSN UoA National Share of Publications

2,423

publications based on
SDSN keywords

20

publications based on
Elsevier queries

**figures are for 2019*



Pulse oximetry screening can save babies' lives.



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

1,450

publications based on SDSN keywords

26%

SDSN UoA National Share of Publications

58

publications based on Elsevier queries

**figures are for 2019*



Some of the Business School gardening group.



Sustainable concrete

Dr Ferdinand Oswald of the School of Architecture and Planning at the University is evaluating the suitability of gradient concrete for use in New Zealand. Gradient, or graded, concrete creates fewer emissions because its structure is lighter and composed of less material. Ferdinand's research, *Resource and emission-reduced concrete building construction system for NZ*, looks to adapt the system to local requirements (earthquakes and climate) and to develop construction connection details (such as floor plate and wall) for its implementation in buildings. There are multiple layers in current concrete construction systems including insulation, and these reduce the ability to recycle. By comparison, graded concrete requires fewer resources to produce and is 30-45 percent lighter, with improved insulation properties. The project is a collaboration with Professors Lucio Blandini and Werner Sobek and Dr Walter Haase at the University of Stuttgart, inventors of graded concrete.

Plastic Free July

For the past two years, staff around the University have used Plastic Free July as a catalyst to rethink their habits, reduce waste and engage others. The University community is encouraged to take part in the solution to plastic pollution. Each year, more and more University staff sign up for the Plastic Free July challenge and join millions of people across the world who choose to refuse use of plastic. The challenge focuses on habits that may be one small change, and a great way to get started. A community platform shares stories of staff who have created a habit and sustained it. Achievers also share tips and tricks for waste-conscious living.

Waste not, want not

The University of Auckland Business School (UABS) gardening group of students and staff is finding ways to reduce waste and build a community of like-minded people. The group is already harvesting produce from their shared garden at the Business School, with herbs, vegetables and flowers distributed among the group members. To feed the garden, the group has filled planter boxes with compost made from food waste collected from staff kitchens in the Business School. The exercise led to increased awareness among the members and reduction of food waste in their daily lives.

The Future Cities Research Hub

Led by Professor Errol Haarhoff and Dr Paola Boarin in the School of Architecture and Planning, [the Hub](#) promotes cross-disciplinary research collaborations that lead to evidence-based understandings and design innovations for sustainable future cities. The research domains are broad and include improving health and well-being through built environments, especially in more dense urban environments. Much of the Hub's research is funded by the National Science Challenge: Building Better Homes, Towns and Cities.

Resilience of infrastructure networks

The resilience of infrastructure lifeline networks (electric power, transportation, telecommunications, potable water, stormwater/wastewater and liquefied/gas fuels) and other distributed infrastructure (flood control networks) play a critical role in the ability of society

to rapidly recover after a major disaster. Associate professors Liam Wotherspoon and Seosamh Costello and Dr Nirmal Nair are working on a project with teams in the University of Canterbury, the National Institute of Water and Atmospheric Research (NIWA), GNS Science, the University of Waikato and Massey University, to develop an improved understanding of the resilience of infrastructure networks to extreme natural hazards. They are using new methodologies with application to New Zealand-specific critical infrastructure. In the face of New Zealand's unique natural hazard environment, and based on engineering and science evidence, this research will enable New Zealanders to anticipate critical infrastructure vulnerabilities and protect and transform the built environment to support thriving communities.

Collaboration in a crisis

The University's [Professors Peter O'Connor and Carol Mutch](#) were approached by Australian academic colleagues to lead a project to help teachers in Australia when students returned to school during the bushfire crisis. Both had previously worked with children in Christchurch following the earthquakes, and Peter in Mexico City following earthquakes there. A gathering of 30 academic experts from arts, health, education and disaster recovery, from universities all over Australia and the University of Auckland resulted in the production of a set of online resources for teachers. The initiative was named after the banksia flower that can regenerate after a crisis, a metaphor for arts strengthening communities in the midst of disaster – a reminder that natural regeneration is possible. The Banksia Initiative met in Sydney with

a practical arts-based workshop on the second day for around 50 teachers.

Deconstructing an old bridge

The deconstruction of a 90-year-old bridge gave engineer [Dr Lucas Hogan](#) at the University of Auckland an unprecedented opportunity to do “real life” testing of how a long bridge behaves in an earthquake. Funded by the Earthquake Commission (EQC) and QuakeCoRE, the research was carried out in cooperation with the NZ Transport Agency. The demolition contractors fine-tuned the deconstruction programme to fit with the scientific needs of the research. EQC invests over \$17m each year in research to create stronger homes and infrastructure to reduce the impact of natural hazards. The research included removing sections of the old bridge to test at the University of Auckland, as well as testing the piles on site to simulate the stresses of an earthquake by pushing and pulling in a controlled manner. The results will show how these bridges behave after 90 years in service and suggest potential fixes for making the columns and piles more robust.

Tectonus: stabilising the building industry

The team behind [Velocity spin-out company Tectonus](#) was inspired to make a difference to the building industry by the devastating Christchurch earthquakes, inventing a superior damping connection. Their device self-centres following a seismic event, allowing a structure to withstand an earthquake and any following aftershocks. The technology can be applied to new or existing structures, requires no post-event maintenance and is cost-effective and compact. The team that makes up Tectonus consists of several academic staff and former students of the University of Auckland. In 2015 when they entered the Velocity \$100k Challenge run by the Business School's Centre for Innovation and Entrepreneurship, the judges immediately recognised the immense potential for their device, and they were awarded the grand prize that year. Since then, Tectonus has undertaken several award-winning projects and is now expanding overseas.



Novel roadway system to boost the use of electric vehicles

An array of incentives is aimed to encourage the adoption of electric vehicles (EV) in New Zealand and around the world, especially through effective policies to support the development of extensive infrastructure needed for charging the vehicles. The Dynamic Inductive Power Transfer (DIPT) roadway system enables EVs to be charged wirelessly by embedding a roadway charging network while the vehicle are in motion. With minimal maintenance cost of EVs and no charging downtime involved using this infrastructure, researchers believe the uptake of EVs will be accelerated. [Researcher Selena Sheng](#) suggests a collaborative mechanism of Public-Private Partnership (PPP) for governments, given the large-scale investment and unclear rights and responsibilities required for this novel transport infrastructure project. The empirical results showed that substantial emission savings can be achieved by using EVs with the DIPT roadway systems under PPP, when compared to traditional vehicles running on Internal Combustion Engine (ICE) and plug-in hybrid systems. It could also serve as an economically viable pathway for reaching the New Zealand government's target of net zero emissions by 2050.



Damage to rail tracks from the 2019 Rangitata flood.

Photo: Kaley Crawford-Flett

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Ensure sustainable consumption and production patterns



Disposable face shields



Prototype ventilator

Homing of surplus furniture

Nearly 80 tonnes of furniture was diverted from landfill when 220 staff and students from the School of Medicine were relocated from Auckland Hospital to the new Faculty of Medical and Health Sciences building. The move was months in the planning with [Mark Neal from the University](#) and the Auckland DHB (District Health Board) working together to reduce the environmental impact and rehome as much furniture as possible. The bulk of the items, including desks, meeting tables and bookcases, were able to be saved from landfills. Contractors and University staff worked around the clock to manage the challenges of working in a functioning hospital to complete the move and successfully rehomed nearly every piece. Much of the furniture went to community groups and resource recovery networks, while some pieces were gifted to the Auckland DHB.

3D models for speedy solutions

 Professor Olaf Diegel in the University's [Creative Design and Additive Manufacturing Lab](#) is focused on using 3D printing to accelerate rapid product development, and developed a range of open-source products to try and help the world cope with the pandemic. These included [cheap disposable face shields](#) to alleviate the distribution challenges that governments encountered with distributing Personal Protective Equipment (PPE) gear. The lab also developed some very simple widgets to help open doors without the use of hands, in an attempt to minimise the risk of transmission by contaminated hands touching the face. For more acute respiratory emergencies, the lab developed a prototype emergency ventilator that allows doctors

and nurses to free up their hands to do more critical work. Thanks to 3D printing, the development time for this ventilator was less than two weeks to get to a working prototype. The files for all of these are available open-source from cdamlab.com to allow people in need to make or adapt their own.

New pharmaceutical waste management technologies

With his team, Dr Saeid Baroutian in the Faculty of Engineering, developed a novel system that can process recalcitrant pharmaceutical wastes (including gases, liquids, and solids). For example, anaesthetic gases are captured from hospital operating rooms before they are released into the atmosphere. Hot, pressurised water is then used to break down the anaesthetic compounds into safe, inert compounds, mainly water. Current practices rely on venting and diluting anaesthetic gases to the atmosphere, sterilisation of other pharmaceutical waste, and encapsulation of seized drugs before disposal at landfills. [This technology](#) will significantly change the environmental, social and fiscal value equation to provide a solution that meets the requirements of various stakeholders, including government, healthcare, waste management and disposal organisations. It will lead to the elimination of more than 30 tonnes p.a. of pharmaceutical waste going to landfill, as well as and the disposal of illegal drug waste. This research will also lead to the prevention of greenhouse gas emissions from surgical anaesthesia through a gas capture and deconstruction system.



Rochelle Ade and Dr Michael Rehm

Green certified ratings

[Rochelle Ade and Dr Michael Rehm](#) questioned the accuracy of some 'green certified' rating tools used by the building industry to measure the warmth and efficiency of New Zealand houses. Their independent research failed to verify some of the beneficial claims of Homestar, the national building ratings tool by the New Zealand Green Building Council (NZGBC) that measures New Zealand houses on a scale from 6 to 10. A 6-Homestar rating or higher is an assurance that a house will be warmer, drier and healthier. Rochelle and Michael concurrently measured the quality of the indoor environment of older and newly constructed housing, rated as 6-Homestar and code-compliant, and found that all the dwellings spent the majority of winter colder than the World Health Organisation's healthy temperature of 18°C, with relative humidity also outside the healthy range of 40-60 percent over 80 percent of the time. The study is the first empirical research showing that newly constructed code-compliant and green-certified homes can still be cold and damp, and that there is a need for ongoing performance monitoring of dwellings.

Renewable energy development

Geothermal energy is a wonderful contributor to New Zealand's renewable energy landscape and offers an energy source that can generate electricity as well as contributing to other areas, including tourism and agriculture. [The Geothermal Institute](#) is a hub for renewable energy research at the University of Auckland and connects researchers who explore science, engineering, business, social and legal questions surrounding geothermal energy development. It has one of the longest-running University programmes in geothermal energy education in the world. The Institute is particularly proud of its international engagement where, with the support of partners such as the Ministry for Foreign Affairs and Trade, it is trying to share New Zealand's renewable expertise with the world. It also coordinates the Master of Energy degree that draws students from across the world to take a multi-disciplinary view on energy questions. Locally, it partners with geothermal companies and iwi groups to help ensure geothermal resources are managed sustainably.

Sustainable water supply for washing

During the prolonged dry weather conditions in Auckland that have resulted in low dam levels and water scarcity, the University took the initiative to wash its building exteriors with non-potable (untreated) water. Viewing water conservation as a significant issue, the University took the lead by implementing measures to minimise water use. Operating under the city's Watercare water restrictions, the University used non-potable water to wash its buildings and for the cladding warranty conditions – a common requirement where there is a high salt content in the air which can create problems for buildings. The University's aquifer is a source of non-potable water extracted through a bore and used for process cooling purposes and watering gardens.

StrutFit spares the landfill

More people than ever are buying clothes and shoes online, and for good reason: it's quicker, cheaper, and there's more to choose from. [Each year in the UK, billions of kilos worth of waste is generated through returns](#), much of which is clothing that simply doesn't fit, contributing 15 million tonnes of carbon dioxide to the atmosphere. The University of Auckland's Centre for Innovation and Entrepreneurship (CIE) runs programmes aligned with the SDGs, helping students to bring socially minded ventures into the world. Born out of the CIE's Velocity programme, [StrutFit](#) allows shoppers to virtually 'try-on' shoes by analysing a photo of their foot, which they can take using a smartphone camera. The technology then uses deep learning to measure the length of the foot and tell the purchaser what size they should buy. The venture has already been implemented by brand Bobux and is set to be adapted by many more companies, which could have a massive impact on reducing landfill waste.



The University's Dr Saeid Baroutia with anaesthetists Dr Matt Taylor and Dr Rob Burrell.

1,465

publications based on
SDSN keywords

28%

SDSN UoA National
Share of Publications

22

publications based on
Elsevier queries

**figures are for 2019*



Take urgent action to combat climate change and its impacts



527

publications based on SDSN keywords

22%

SDSN UoA National Share of Publications

86

publications based on Elsevier queries

**figures are for 2019*

Tracking southern right whales

Dr Emma Carroll is co-leading a global initiative under the Southern Ocean Research Partnership that is using southern right whales (tohorā) as a sentinel for climate change. Recognised as a key indicator species for climate change throughout their range, the reproduction and recovery of southern right whales is linked to conditions that impact prey on high-latitude feeding grounds. Understanding better where and on what southern right whales feed, and how their prey and feeding grounds might change under climate change, is a key area of this research. Emma's work is focused on New Zealand southern right whales and is estimating their population's recovery from whaling as well as using innovative technology to understand where whales go to feed. Emma led an expedition to the Auckland Islands in August 2020 that placed satellite tags on six tohorā to track their migrations ([tohoravoyages.ac.nz](https://www.auckland.ac.nz)). The [public can also follow the whales' travels](#). The work will help understand and protect the whales' migratory routes and summer feeding grounds, supporting the population to recover further.

Climate models and matauranga Māori

The [University's Dr Gilles Bellon](#), who specialises in clouds, plans to investigate lessons passed down by Māori seafarers crossing the Pacific and look for important clues into how we might respond to climate change using the ancient Māori knowledge of cloud behaviour. One of the biggest challenges for forecasters predicting global warming is accounting for the behaviour and effects of clouds, which both shield the planet from sunlight and trap radiation. Models could be improved by accounting for so-called "memory effects," where a cloud can bear the imprint of atmospheric conditions encountered hours or days earlier and as many as hundreds of kilometres away, according to Gilles. The scientist is especially interested in low clouds, which have a net cooling effect on the climate that is especially pronounced in the subtropics. Gilles is collaborating with Dr Tra Dinh, a physics lecturer at the University involved in climate change modelling and is reaching out to Māori groups with experience of lengthy sea voyages in traditional vessels. Gilles received an \$829,000 Marsden Fund grant for the project.



“For the University to live up to its role as critic and conscience of society, we believe the Strategic Plan should include climate change and climate justice as defining issues and grand, urgent challenges of our time.”

- Strategic Plan submission by the University of Auckland Branch of the Tertiary Education Union

Saving energy

In 2019, the University used just under 97,500,000 kWh of energy, which is equivalent to 154 kWh of energy per square metre of gross floor area, or just under 3,000 kWh per full-time equivalent student. 84 percent of the electricity supplied to and used by the University was generated using renewable sources, specifically hydro (60.4 percent), geothermal (17.4 percent), wind (4.7 percent), biogas and wood (1.3 percent), and solar (0.2 percent). Of the energy used in buildings, 58 percent was generated from renewable resources. The University has been monitoring, measuring and working to reduce energy use for 40 years. It saves energy by including energy-efficient operating plans, lighting and equipment in its buildings, by using motion and light sensors, by encouraging staff and students to save energy by turning off lights and equipment when not in use, and by enabling energy-saving defaults/sleep modes on computing and other equipment.

Striving for smarter, low-carbon power and energy systems

In the span of recorded history, electricity as a technology that supports the well-being of human life spans only about 130 years. Nevertheless, it has spawned supporting technologies like electronics, computers, software and now data engineering which are all inter-dependent and part of people's lives today. As such, electrical energy truly reflects engineering ingenuity. The University of Auckland's Power Systems Group (PSG) contributes through its energy teaching and research activities. Partnering with like-minded local and global industry and research partners through innovations like Smart Grid, peer-to-peer energy trading, decentralised and resilient solar-battery energy systems, Microgrid, Nanogrid, and the electrification of transport. PSG's activities are aimed at delivering "Electricity 2.0", the new architecture of energy, for the next 100+ years of energy systems. Inspired by a number of Sustainable Development Goals, the University aims to help realise carbon-free power systems for existing and emerging needs, such as transport and ubiquitous data services, and to help establish a life-spiral for 21st century utilities and the providers offering them.

International action on climate change

Associate Professor Caroline Foster's work on climate change and the Paris Agreement contributed towards the New Zealand chapter of a multijurisdictional study *Comparative Climate Change Litigation: Beyond the Usual Suspects* examining the case of Thomson versus Minister for Climate Change Issues. The High Court held in this case that the New Zealand Government had been obliged to consider whether its previous greenhouse gas emissions reduction target needed resetting in light of scientific developments. Caroline is also writing about the negotiations initiated by Costa Rica, Fiji, Iceland, Norway and Switzerland on a new Agreement on Climate Change, Trade and Sustainability, for the *Edward Elgar Encyclopedia of Trade and the Environment*. In addition, Caroline is writing the chapter on 'Dynamics in the Relationship between International and Domestic Climate Change Law and Policy in Aotearoa New Zealand' in *International Law in Aotearoa New Zealand*, edited by Drs An Hertogen and Anna Hood, to be published in 2021. New Zealand has been closely engaged in bringing international action on climate change and providing leadership in developing international climate change law and policy.

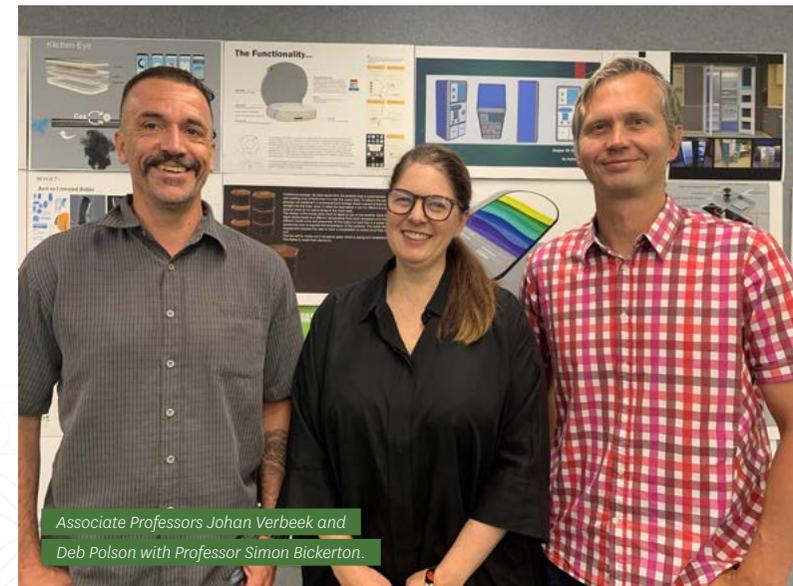
Injecting sustainability into the future

New technology to make recycling plastics easier and cheaper is the first step in a plan that University of Auckland researchers have to reduce New Zealand's rate of generating plastic waste which, per capita, is one of the highest in the world. The idea is to stimulate a circular economy that is enabled by this technology, to grow recycling opportunities and then amplify it by creating a market for high-value recycled materials. Ultimately, this would reduce the amount of plastic we are importing and putting into landfills. Associate Professor Johan Verbeek, director of the Plastics Centre of Excellence at the University has worked with plastics since 1995, and has always had an interest in innovating with sustainability in mind. The new technology Johan wants to develop is just one component of an ambitious idea he is seeking to make happen, together with Professor Simon Bickerton, Associate Professor Deb Polson, Dr Julia Fehrer, and in partnership with industry organisations across the value chain, including product manufacturers, designers, recyclers and local government.



Southern right whales, tohorā, at the Auckland Islands.

Photo: University of Auckland tohorā research team under Department of Conservation permit.



Associate Professors Johan Verbeek and Deb Polson with Professor Simon Bickerton.



Conserve and sustainably use the oceans, sea and marine resources for sustainable development

276

publications based on SDSN keywords

22%

SDSN UoA National Share of Publications

83

publications based on Elsevier queries

93

publications based on UoA keywords

**figures are for 2019*

Coastal erosion

One of the most recognised hazards for the coastal communities in New Zealand is coastal erosion, which leads to shoreline cliffs receding and threatening homes. ***Award-winning research by Dr Catriona Thompson*** reveals that it is a particular type of wave that has the biggest impact on coastal cliffs, and not necessarily the highest. Measuring the waves and their impact, Catriona concluded that the impact of a wave that breaks against the cliff was significantly greater than either broken or unbroken waves. The study is the first to look at coastal erosion by measuring ground motion at the seismic level while also recording the impact of individual waves. It shows that sea-level rise is likely to have two different effects: in areas where there is a significant rise in sea level, sea height could increase the number of breaking waves while in other areas it might mean a higher number of unbroken waves, which could decrease erosion rates. The study has been recognised by the British Society for Geomorphology which has awarded it the Michael Kirkby Award (previously known as the Wiley Award) for best paper published at ***Earth Surface Processes and Landforms*** in 2019.

Reef whisperer

The United Nations has called for urgent research into oceans made ever noisier by shipping, fishing, recreational boating, dredging, geophysical surveying, oil drilling and sonar. The underwater eavesdropping by ***Associate Professor Craig Radford*** and his colleagues at the University of Auckland's Leigh Marine Laboratory in the Hauraki Gulf is helping to reveal the blue world in a fashion similar to satellites giving insights into Earth's terrestrial features. Craig's work is significant for three reasons: a) fleshing out our knowledge of the lives of individual marine species, which can ultimately aid in managing and protecting marine ecosystems and fish stocks; b) discovering more about the threat posed to marine life by human-generated noise, especially from increasing ship and boat traffic; and c) learning how to use sound as a tool for monitoring or even reviving marine environments.

Biodiversity map

The researchers at [the University's Marine Biodiversity Research Group](#) have brought out a new biodiversity map that is highly detailed and includes 27 different data sets with information on almost everything, from genetics to whole-ecosystem data. The report looks at 65,000 species and shows where the marine protection would make the biggest difference. The International Union for the Conservation of Nature calls for full protection of 30 percent of each marine habitat and 30 percent of the ocean. More than half of the areas mapped were coastal, so countries can choose to unilaterally protect them. New Zealand is among the list of countries that could contribute the most in terms of newly protected areas, along with Canada, Australia, the US, Greenland, Indonesia and Russia.

Genomic analysis

Marine mammals are subject to natural and anthropogenic impacts, which need to be managed to sustain the long-term viability of populations. [Dr Emma Carroll's lab](#) is leading the genomic analysis of these populations in a global project that will quantify the extent to which repetitive human impacts may have long-term, population-level effects such as reductions in genetic variability and/or changes in population and social structure of affected populations. This collaborative project has brought together dozens of researchers from more than 20 countries to study poorly understood beaked whales. Using genomic tools, the work is identifying units to conserve for two globally distributed whales, Blainville's and Cuvier's beaked whales. The genomic data will also form the basis in identifying the population origin of whales killed by human activities, a critical first step in understanding how such mortalities affect the persistence and viability of natural populations.

Leigh Marine Reserve

[PhD candidate Harry Allard](#) from the University of Auckland's [Institute of Marine Science](#) conducted a three-year survey of 22 fish species within the Reserve, ten of them targeted by fishing. Finishing the survey in 2018 meant it was exactly 40 years since a 1978 study which established a baseline for future research. Both the previous and the new study were similar in approach, using biomass as a measuring tool which considers both outright numbers and size of individual organisms. Harry counted fish at similar locations to the previous study. He also surveyed 12 fished (unprotected) sites outside the Reserve which wasn't done 40 years ago. During the research dives, Harry found the number of some of the target species to be stable or increased. Overall, the data showed the marine environment within the Reserve is now dominated by fewer,

larger fish with most of these being of prime breeding age. The offspring of these fish are now seeding areas outside the Reserve.

Ocean warming impacts

[Professor Mark Costello](#) of the University's School of Environment was part of a group of scientists who completed the largest global assessment of how ocean warming impacts the mix of marine species in our oceans, and also explains how some species manage to keep their cool. The researchers from the UK, Japan, Australia, the US, Germany, Canada, South Africa and New Zealand analysed three million records of thousands of species from 200 ecological communities across the globe. The findings show how entire communities change as warm-water species increase and cold-water marine species become less successful because of climate warming. The study also found evidence that some cold-water species will continue to thrive by seeking refuge in cooler, deeper water when the surface waters are too hot. However, not all animals may have this opportunity, either because they cannot move or there is no cool deep water near where they live.



Dr Catriona Thompson and her team.



UoA Marine Society



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



Neil Birrell (R) at the maggot facility in India with BH Srikanth.



Dr Andreas Kempa-Liehr, Dr David Dempsey and Professor Shane Cronin.

Ancient dung

Alexander Boast, a PhD candidate in Environmental Science, is investigating DNA metabarcoding of coprolites (ancient dung), which has greatly improved our ability to investigate the behaviour and ecology of extinct species. He uses coprolites from extinct New Zealand birds to reveal aspects of dietary behaviour, such as the consumption of fungi, and both the distribution and coextinction of parasites. He shows how this approach can identify lost ecological interactions, which have key implications for understanding, conserving and restoring currently threatened ecosystems.

Whakaari/White Island eruptions

The December 2019 tragedy of sudden volcanic eruptions and loss of lives at Whakaari/White Island drove [Dr David Dempsey](#) and [Dr Andreas Kempa-Liehr](#) to collaborate and develop a new alert system using constant, high-rate data streaming from modern monitoring equipment on New Zealand volcanoes. The new alert system uses sophisticated machine learning algorithms to teach itself from the data fed into it and can give up to 16 hours' warning of an eruption. It 'learns' from patterns in a volcano's data so that it can signal almost instantly when a particular pattern matches that of the build-up to a previous eruption. It is now deployed on White Island with plans for installation on other volcanic islands in New Zealand that do not have an advanced real-time warning systems. GNS Science, in line with international best practice, operates a Volcano Alert Level (VAL) that provides only a measure of the current status of a volcano. It is updated every few weeks and relies on human judgement. The development team is now working with GNS to implement the new system alongside their existing VAL process.

Education Network for Science

The University's [Liggins Institute](#) offers a series of mini-modules on bio-protection, including sustainable agriculture and environmental protection. This is part of the Institute's LENSscience (Education Network for Science), a dedicated science education programme that facilitates the understanding of the nature of science. The network works through major science-school-community outreach partnerships in New Zealand and the Pacific.

Fundamental principle of law

Professor Klaus Bosselmann (Faculty of Law) has developed and promoted sustainability as a fundamental legal principle defined as the duty to protect and restore the integrity of Earth's ecological systems. As a member of the United Nations knowledge experts network Harmony with Nature, the legal expert group of the Global Pact for the Environment and the IUCN World Commission on Environmental Law, he has ongoing collaborations with the UN General Assembly, UN Environment and UNESCO.

United Nations Academic Impact (UNAI)

Dr Sally Birdsall, a lecturer in environmental education, was the first from the University to present at a United Nations Academic Impact (UNAI) Hub webinar, hosted by a college in Bangalore and attended by 350 school principals from all over India, as well as countries as diverse as Sri Lanka and Morocco. Founded by UN Secretary-General Ban Ki-moon in 2010, the aim of the hubs is to align 17 tertiary institutions with one each of the Sustainable Development Goals (SDGs). The University of Auckland has recently become the hub for the goal four, Quality Education, which means it will lead discussion and action on this issue globally. Sally talked about the connection between education and equitable societies and gave practical examples of how to embed a number of the goals into the school curriculum. She showcased two projects from New Zealand that encourage students to learn and take action to restore native biodiversity, and work in partnership with local councils. The project also offers teachers workshops to increase their knowledge and build their confidence in including outdoor contexts in their lessons.

Predator Free 2050 goal

[A New Zealand – Australian collaboration](#) has produced the first full genome sequence of *Rattus rattus* – the ship rat. This work is considered to be a big milestone for New Zealand's Predator Free 2050 goal. The new reference genome will empower scientists working on critical questions of conservation, evolution and disease prevention. The ship rat has caused species extinctions and dramatic biodiversity loss on every island group around the world, including New Zealand, as well as spreading disease and affecting agricultural production. The initial assembly based on short read technology was produced in late 2015 by University of Auckland researcher, Dr Florian Pichlmüller, who is now a research fellow with Genomics Aotearoa, a collaborative genomics and bioinformatics platform involving a group of New Zealand universities and Crown Research Institutes. The New Zealand scientists teamed up with genomic and bioinformatics experts from CSIRO, Australia's national science agency, to further improve the quality of the genome with state-of-the-art analytical approaches and technologies only recently established in New Zealand.

Deceptive orchids and duped wasps

[PhD candidate Amy Martin and Dr Anne Gaskett](#) of the University, and Dr James O'Hanlon of the University of New England, set up field trials over six sites to study the Australasian tongue orchid (*Cryptostylis subulata*) and its sole pollinator, the parasitoid wasp *Lissopimpla excels*, otherwise known as the orchid dupe wasp. The tongue orchid achieves pollination by mimicking the appearance and pheromones of the female wasp, thereby fooling the male wasp into mating with their flowers and so achieving pollination. Previous research has shown that once a male is attracted by an orchid, it will ejaculate on the flower about 70 percent of the time. Despite previously held beliefs that deceptive flowers do not harm or elicit great costs from their pollinators, the study found orchids not only affected individual pollinator behaviour but may have an influence on population dynamics more generally. Sperm economics is an important part of the sexual behaviour of a wide range of species because it can change how they reproduce and survive.

Fertiliser with Hexacycle

A student's venture which uses maggots to process waste into fertiliser and chicken feed has set up its first treatment plant in India. Hexacycle is the brainchild of University of Auckland PhD [student Neil Birrell](#), an entomologist who is studying insects for human consumption in the Faculty of Science. His idea to use the larvae from the Black Soldier

Fly to reduce organic waste in landfill was first developed when he participated in the Centre for Innovation and Entrepreneurship's Summer Lab programme. Hexacycle has received mentoring and support from the University's Velocity entrepreneurship programme to scale up the concept, taking it from a prototype fly hatchery in Neil's back garden to India's first black soldier fly treatment plant in less than three years.

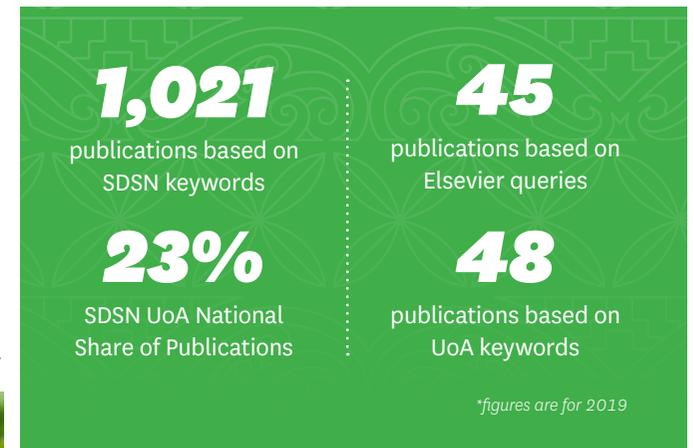
Luxor astronautics

Recent events have rekindled public attention regarding the question of militarisation and weaponisation of outer space. Satellites are becoming an increasingly important tool in international surveillance and verification. Growth of the small satellite industry is limited by the power available from solar arrays. In the small satellite market, power systems, which are primarily solar arrays, typically consume about 30 percent of a space craft's mass. Satellite designers and integrators make compromises by restricting the number of available instruments or decreasing their performance in favour of lower power consumption. Satellites could achieve their true potential if the power budget were not a factor. Luxor Astronautics is a venture born out of the University of Auckland's Centre for Innovation and Entrepreneurship. They are developing a product that utilises the optical concentration of sunlight to generate unmatched quantities of power, all while remaining lightweight, compact and easy to use.



Kauri dieback, myrtle rust and the arts

Funded by Mobilising Ecologies for the National Science Challenge, a three-year project titled *Toi me Ngahere, Art and Forest: Kauri Dieback, Myrtle Rust and the Contemporary Arts*, launched in July 2020, will investigate how contemporary arts can engage with and generate public awareness on ecological threats such as kauri dieback and myrtle rust. The research, in partnership with nine iwi/hapu, is transdisciplinary, covering ecology, Indigenous knowledge, community education and involvement, and the arts. Artworks will be presented in a range of locations, including regional and national art galleries as well as on local iwi/hapu platforms and formats, and in other public locations.



16 PEACE, JUSTICE AND STRONG INSTITUTIONS



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

“We seek an education that supports alternative futures, and systems that are environmentally sustainable and emancipatory economically, socially and politically.”

- Strategic Plan submission from staff at University’s Māori Studies, Wānanga o Waipapa

Honouring the victims

The University prides itself in diversity and equity for all community members and believes in the concept of He Karakia Whakawātea. This is both the acknowledgment of pain and loss, and the recognition that as that pain lifts over time we look towards new hope-filled beginnings for ourselves and others. A symbol of peace, unity and remembrance for the 51 lives lost and the 40 injured in the Christchurch mosque attacks on 15 March 2019 was installed on the University campus in March 2020. Three conch-shell calls and karanga (a Māori ritual chant of welcome) announced the beginning of the ceremony and unveiling of the sculpture, Ngā Roimata o Ranginui, created by Anton Forde and Ngahina Hohaia. The event was attended by the Vice-Chancellor, the artists, staff, students and members of the Muslim community to whom the memorial was gifted.

Digital imbalance

Associate Professors Fernando Beltran and Gehan Gunasekara at the University are working on a project that could potentially reverse the digital power imbalance generated by data monetisation. The raw material of people’s digital lives is transformed into behavioural data that earn digital giants billions of dollars. In this project, students will be paid to take part in experiments to discover what monetary values they put on their personal information. They will be asked to rank different types of information – financial, health, religious and political – by value. Then they’ll be asked to name their price for surrendering specific data. If they agree, for instance, for a health condition, a deal is struck, and the candidates can be paid real money. The explorations by Gehan and Fernando tie in with a swelling interest in the topic. Part of this project is also focused on a technique to ensure individuals’ identities are

kept secret when sets of anonymised data are moved around. Called differential privacy, this method was co-devised by Harvard computer scientist Cynthia Dwork and is being used by organisations such as Apple, Google and the US Census Bureau.

Shared sovereignty

Associate Professor Caroline Foster in the Faculty of Law is working on a research project that will investigate the hypothesis of building a partnership with sovereignty oriented around implementing emerging ‘global regulatory standards.’ Exploring the relationship between the World Health Organisation (WHO) and States in the context of the International Health Regulations 2005, Caroline’s regulatory standards would include requirements for due diligence regarding harm to States’ shared and common interests, and due regard for the interests of those outside individual States’ political constituencies. The partnership would emphasise goodwill to provide well-focused technical and financial assistance and updated, reliable scientific knowledge. The research becomes more relevant in light of the global criticism that WHO has received for the delayed declaration of Covid-19 as a Public Health Emergency of International Concern (PHEIC) and for apparent politicisation in accepting many of China’s accounts of action taken to contain the outbreak of the pandemic.

The Equal Justice Project

The Equal Justice Project is a student-led pro bono charity based in the University of Auckland’s Faculty of Law. Its goal is to promote equal justice and access to justice for the most vulnerable groups in society. It is comprised of four teams – Pro Bono, Community, Communications, and Access – that between them undertake legal research for lawyers,



Together for Peace and Justice

by Xavier de Fraissinettes in the Parc de la Tête-d’Or in Lyon.

work at Community Law Centres and similar facilities, write articles and parliamentary submissions, and hold public presentations and discussions about contentious topics in the law.

Nation state and earth trusteeship

Professor Klaus Bosselmann (Faculty of Law) and Ms Prue Taylor (School of Architecture and Planning) jointly lead a Faculty Research Development Fund project to examine the concept of the nation state with respect to global responsibilities. They were co-founders of the Earth Trusteeship Initiative, a coalition of 80 civil society and environmental law organisations promoting trusteeship institutions at national levels and at the United Nations. Klaus was also main author of the Hague Principles for a Universal Declaration of Responsibilities for Human Rights and Earth Trusteeship recently adopted at the Peace Palace in The Hague. In November 2020, the New Zealand Centre for Environmental Law, at the Faculty of Law, hosted an international symposium on earth trusteeship.

Fishing app for healthcare workers

Kiara Miller, a PhD candidate at the Auckland Bioengineering Institute (ABI) and her fellow interns from UNSW (Sydney) and Makerere University (Uganda) got together to develop a training app for healthcare workers in Uganda. They came up with the idea during an Engineering World Health (EWH) internship and were struck by the problem of health workers unable to use donated medical equipment. While these workers often found themselves in places where power and internet service were unreliable, Kiara and her colleagues realised most people had a mobile phone, and used them in myriad and innovative ways. The training app is called '[Fishing: An E-Learning Platform and ERP system](#) for Limited Resource Environments', in reference to the aphorism, 'give a man a fish and you feed him for a day, teach him to fish and you feed him for a lifetime'. The prototype they developed has been awarded first place in the EWH (Engineering World Health) Design Competition for students and is being used by healthcare workers in Entebbe Hospital, where it has been well received.



Kiara Miller (centre) fixing theatre lights in a Ugandan hospital.



The unveiling of Ngā Roimata o Ranginui in memory of the Christchurch mosque attack victims.

830

publications based on
SDSN keywords

28%

SDSN UoA National
Share of Publications

71

publications based on
Elsevier queries

**figures are for 2019*



Strengthen the means of implementation and revitalise the Global Partnership for Sustainable Development

Forging a Pacific partnership

A [partnership with the University of Hawai'i at Mānoa](#) is being led by the Faculties of Arts, Creative Arts and Industries, and Medicine and Health Sciences. The early focus of this partnership is on language study, Indigenous studies, urban and regional planning, and Indigenous health. The University of Hawai'i at Mānoa is a research university of international standing with a heritage and location that create close links to the Asia-Pacific region. The partnership is centred on the University's close ties through the Association of Pacific Rim Universities (APRU) network and Asia-Pacific Association for International Education (APAIE), as well as the two universities' long-standing student exchange and academic cooperation.

Testing teamwork



University staff have been at the forefront of Covid-19 testing being done in urgency. Scientists from [the University of Auckland and the Auckland District Health Board](#) (ADHB) banded together to help process a huge increase in Covid-19 tests after the second outbreak of the virus in New Zealand. The Grafton Clinical Genomics Laboratory analysed as many as 2,000 swabs a day. Laboratory scientists from the University and Auckland Hospital dropped everything to work through the weekend mid-August, ramping up after their earlier round of testing that ended in July. The University's Liggins lab had remained at physical containment Level 2 (PC2) after the reconfiguring required for earlier Covid-19 testing and was already compliant with safety standards. Samples were brought via an underground tunnel from the hospital across the road and processed to break down cell membranes to get at the material inside. They were heated in biohazard safety cabinets to kill the virus, with

genetic material extracted by a robot. The testing has highlighted the close working partnership between the University and the ADHB through the Auckland Academic Health Alliance, enabling the research facility to quickly switch to clinical testing during a public health emergency.

Research partnerships

The University's Centre for Biodiversity and Biosecurity and the School of Biological Sciences have a strong partnership with [Manaaki Whenua](#) (Landcare Research), a Crown Research Institute that focuses on sustainable management of land resources. [The George Mason Centre](#) for the Natural Environment is another Faculty of Science research partnership and covers a diverse range of research areas, such as marine science, green chemistry, environmental change, biodiversity, biosecurity, sustainability, biophysics, computational biology and social ecology.

Marine expertise

[The Institute](#) produces research that enhances the understanding of the marine environment drawing on expertise from departments and faculties across the University and partners with organisations such as the National Institute of Water and Atmosphere (NIWA), the Cawthron Institute and the Ministry for Primary Industries. The researchers work to undertake long-term monitoring of the marine environment and marine populations, ecosystems and habitats, to document and understand change, and inform and improve management practices.

Decoding GBA

Working with the Garvan Institute of Medical Research (Australia) and the University of Otago, [Associate Professor Justin O'Sullivan](#) discovered that components of the gene GBA have a significant role in



“If we want a genuine partnership model more thought needs to be given to ‘how can we bring communities to the centre of our work.’”

- Strategic Plan submission from the Senior Leadership Team, School of Learning, Development & Professional Practice

regulating and delaying the onset of Parkinson's Disease, the world's second most common neurodegenerative disorder. Justin and his colleagues looked closely at the gene GBA, which is associated with a higher risk of developing Parkinson's and has been used as a biomarker for the disease. PhD candidates Sophie Farrow (UoA), Oscar Graham (Otago) and Dr William Schierding from Liggins (UoA) looked for answers in the non-coding parts of the GBA gene that were once thought of as 'junk DNA'. The team screened 128 sites in the non-coding part of the GBA gene and found that if it takes a particular form, the result is a delay of the onset of Parkinson's by five years. The idea is to discover the molecular basis for the delay in disease onset, which could provide a target for therapies to delay its progression. The research is funded by the Michael J Fox Foundation for Parkinson's Research and the Silverstein Foundation for Parkinson's with GBA.

Law and governance in the Anthropocene

The New Zealand Centre for Environmental Law (NZCEL), hosted by the University of Auckland Law School, provides leading-edge research and training for sustainability law and governance. A focus in recent years has been interdisciplinary research on the importance of Earth System science for law and governance in the Anthropocene. This involves ecological approaches to the design of law and governance at national and international levels. Professor Klaus Bosselmann is chair of the Ecological Law and Governance Association and of the Earth Trusteeship Initiative, and co-chair of the Scientific Committee of Common Home of Humanity. Klaus is coordinating input of academic legal networks into the UN Stockholm+50 Conference for June 2022.

Collaborating on educational delivery

The University of Auckland China Learning Centres gave our students who remained in China during the pandemic a positive new option to continue their studies. The initiative was initially launched at two of our longstanding prestigious Double First-Class partners in China at Southwest University, and Chongqing and Northeast Forestry University. A third location was established at Nanjing University of Science and Technology (Jiangyin Campus) for the launch of our China September Session, timed to align with the release of Gaokao results in China. The centres enabled [330 University of Auckland students](#) to have an on-campus, cohort-based experience, connect with other students, participate in social activities

and access in-person support from local learning facilitators. Students also received financial support to assist their move to [the China Learning Centres](#). New Zealand Prime Minister Jacinda Ardern and the Chinese Ministry of Education have cited this initiative as a model of an innovative response to the Covid-19 crisis and for country-to-country collaboration on educational delivery. While most universities used the option of remote learning during the pandemic, the University of Auckland also arranged for some students to have access to classes at another campus in their home country. The University's China Learning Centres will continue in 2021.

The Future Voices Forum

University of Auckland students and staff were given the opportunity to influence the thinking of New Zealand government and business leaders on creating a sustainable and inclusive New Zealand. [The Future Voices Forum](#) was a workshop organised by the Business School's Centre for Innovation and Entrepreneurship in partnership with the Aotearoa Circle. A group of 68 participants were canvassed on their thoughts and concerns regarding transport, food and energy. The results were reported back to the CEOs of organisations such as ASB, Mercury, Sanford and Treasury at the related Fenwick Forum event. The Forum was created in response to the ongoing global pandemic. The decline of New Zealand's natural capital and the need to create a way forward to ensure sustainable prosperity was already of concern to many. Covid-19 has highlighted the need for new ways of thinking and doing as New Zealand's economic foundations are challenged.



Sharing a Culture of Intellectual Social Responsibility

About this Report

This report summarises the range of activities that the University of Auckland undertakes to meet the United Nations' Sustainable Development Goals (UNSDGs).

Most of these activities can be identified under research, teaching, operations, public engagement and partnerships. We have substantiated the report with metrics (quantitative) and case studies (qualitative).

This year has created new challenges and also the opportunity to overcome these challenges collectively. The Covid-19 outbreak disrupted many of our ongoing practices and the implementation of many SDGs. We tackled the global pandemic's unprecedented events by focusing on reducing inequalities, poverty and hunger among our staff, students and the wider community, and working towards the good health and well-being of the people around us. This year's report is a list of our ongoing activities and initiatives, many of which were improvised to face the global pandemic's challenges. We remain committed to the United Nations' Sustainable Development Goals and believe that the underlying principles of UNSDGs will help recover better post-pandemic.

Research metrics

Publications and related research metrics are reported for each SDG based on a hybrid approach. In addition to the publicly available keyword sets developed by Elsevier and the Sustainable Development Solutions Network (SDSN), the University of Auckland has been working to *establish its own sets of keywords*, using a text-mining approach. The general validity of this methodology can be seen in the relatively high degree of overlap between the newly generated keyword sets and the public Elsevier/SDSN versions. What our method adds is the ability to capture relevant but very locally specific terms. These may include, for example, specific geographical locations, or locally used terms for general academic concepts.

Case studies

Striving to pick a diverse range of initiatives from across the University, we shortlisted a range of case studies from comprehensive consultation with key stakeholders undertaking these activities. These case studies cover examples of research, learning and public engagement and were chosen because they highlight clear contributions to the respective SDGs involved.

This SDG report lists only a few of the many initiatives undertaken by the University of Auckland. Microsite demonstrating keyword analysis of our publications has been created to communicate the extent of our initiatives towards the SDGs.

University Impact Rankings for the SDGs

The 17 United Nations Sustainable Development Goals were established in 2015. They set a 15-year agenda and call to action for all countries to end poverty, fight inequalities, and build peaceful, just, and sustainable societies by 2030.

The University of Auckland was ranked No. 1 globally in both the 2019 and 2020 University Impact Rankings by Times Higher Education (THE), which measures how universities worldwide perform against the SDGs. These outstanding results recognise the University of Auckland's commitment to sustainability and making a positive social impact through its research, teaching and knowledge transfer.

Sustainable Development Goal	Our Ranking 2020
Overall ranking for impact (entered 15 of 17)	1st
SDG 1: No poverty	11th
SDG 2: Zero hunger	8th
SDG 3: Good health and well-being	4th
SDG 4: Quality education	39th
SDG 5: Gender equality	9th
SDG 6: Clean water and sanitation	8th
SDG 7: Affordable and clean energy	5th=
SDG 8: Decent work and economic growth	7th
SDG 10: Reduced inequalities	21st
SDG 11: Sustainable cities and communities	11th
SDG 12: Responsible consumption and production	30th
SDG 14: Life below water	2nd
SDG 15: Life on land	3rd=
SDG 16: Peace, justice and strong institutions	7th
SDG 17: Partnerships for the goals	3rd





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**SUSTAINABLE
DEVELOPMENT
GOALS**