



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

WHAIORANGA TAIAO WHAIORANGA TANGATA

Our work towards the Sustainable
Development Goals in 2021



Whaioranga Taiao, Whaioranga Tangata reflects our aspiration for both a healthy and connected environment and fair and inclusive communities, acknowledging that neither can exist without each other. The title illustrates two of the biggest challenges facing the world today, with the Covid-19 pandemic challenging the health and connectedness of our people like never before against a backdrop of climate change urgency.



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FOREWORD FROM THE VICE-CHANCELLOR



2021 will be remembered as another unique year that continued to test our resilience in the face of massive disruption and uncertainty.

Against this backdrop, it gives me great pride to see the many ways we advanced the United Nations' Sustainable Development Goals through research, campus operations, teaching, and external engagement.

Throughout the Covid-19 pandemic, the University of Waikato has remained committed to providing a high-quality teaching and learning experience, removing barriers and fostering a strong sense of community in an online environment. This has challenged us to be resourceful, collaborative and agile like never before, attributes that stand us in good stead for the path ahead.

As we grapple with our new, post-pandemic reality, the Sustainable Development Goals provide a vital framework for action, prompting us to pause and adjust our focus.

The uncomfortable reality we face is a world that has seen the first increase in global poverty in 20 years, women leave the workforce in droves, rates of anxiety and depression soar and trust and confidence in institutions diminish, causing significant unrest.

It is imperative our choices from this point on reflect this new reality because universities have a critical role to play in the pursuit of a better, fairer future.

We look forward to taking further bold steps to embed the Sustainable Development Goals into the fabric of our institution in 2022 and beyond.

Professor Neil Quigley
Vice-Chancellor

KO TE TANGATA | FOR THE PEOPLE

The University of Waikato's approach to the Sustainable Development Goals is underscored by a commitment to Te Tiriti o Waitangi and our motto Ko Te Tangata, which means 'For The People'. The unique knowledge and expertise of tangata whenua is vital for creating healthy environments and thriving communities. Our work also reflects our location in - and the mātauranga from - Waikato, Te Moana-a-Toi Bay of Plenty, Aotearoa New Zealand and Moananuiākea Pacific Ocean.

This report demonstrates our commitment to the 17 Sustainable Development Goals through four key areas:

TEACHING

We inspire the next generation to create a better tomorrow, focusing on the biggest issues facing humanity today.

RESEARCH

We make an impact through our innovative and collaborative research, because we are stronger when we work together.

OPERATIONS

We prioritise the wellbeing of our staff, prize inclusiveness and are constantly innovating to reduce waste and be smarter about our energy usage.

EXTERNAL ENGAGEMENT

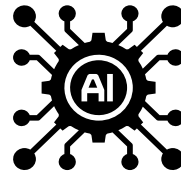
We value authentic, two-way community connections in our own communities and across the world.



SOME OF OUR PROUDEST MOMENTS FROM 2021



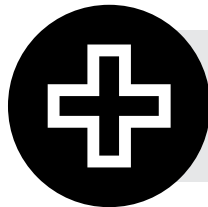
Hosted the New Zealand Economics Forum bringing together leading experts and decision-makers with a focus on pandemic recovery



LAUNCHED A NEW INSTITUTE FOR ARTIFICIAL INTELLIGENCE



Launched the world's first **BACHELOR OF CLIMATE CHANGE**



Welcomed our first cohort of Bachelor of Nursing degree students who worked with some of our most vulnerable communities in their clinical placements



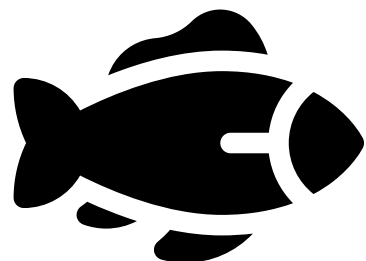
Nurtured connections with 200 global partners including a new strategic partnership with Cardiff University in Wales



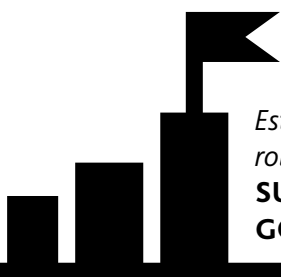
Worked closely with the Waikato Wellbeing Project to tackle some of the most pressing issues in our own region



Led one of the largest research projects in the country focused on ending racial oppression



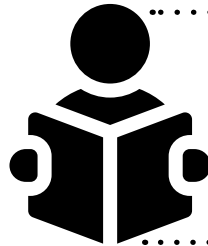
HOSTED THE **LARGEST MARINE SCIENCE** conference in New Zealand at our Tauranga campus



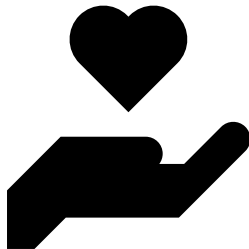
Established a new leadership role to champion the
SUSTAINABLE DEVELOPMENT GOALS ACROSS OUR UNIVERSITY



Helped shape the global commentary around athlete wellbeing and equality at the Tokyo Olympics



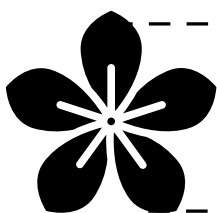
Continued to take great strides towards decolonising the education curriculum and improving outcomes for Māori students across the country



Remained committed to the wellbeing of our people and removing barriers to online learning caused by lockdowns



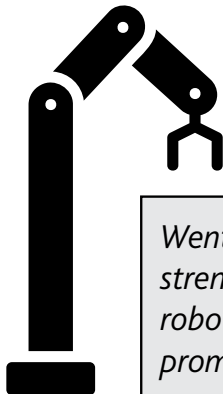
Embraced more flexible ways of working and provided additional leave to staff to support their wellbeing



Developed a Pacific Plan to help realise the aspirations of Pacific learners and staff



Progressed the concept of a **20-Minute City** for Aotearoa New Zealand



Went from strength to strength in horticultural robotics including a prominent display at Fieldays

GOAL 1: NO POVERTY

END POVERTY IN ALL ITS FORMS EVERYWHERE



\$16m invested in scholarships - many specifically for hardship



Generous IT provisions to remove barriers to online learning



Free bus services for students from outlying areas in both the Waikato and Bay of Plenty regions



HARNESSING THE LIFE-CHANGING POTENTIAL OF TERTIARY EDUCATION

Our comprehensive outreach and recruitment programme has a special focus on schools in low socio-economic communities. We know the value of connecting with these communities in ways that work for them, to inspire and support young people to enrol in tertiary study and break the cycle of poverty.

OUR WORK-READY GRADUATES

Internships are a vital part of our undergraduate degree programmes. They are usually paid and often result in permanent job offers for our students. Our dedicated Work-Integrated Learning team provides wrap-around support ensuring our students get the most out of these opportunities so they can hit the ground running when they graduate.

EXPLORING POVERTY THROUGH AN INDIGENOUS PSYCHOLOGY LENS

Dr Mohi Rua, from the School of Psychology, is a passionate teacher and researcher of the many complex issues affecting poverty. He has looked closely at poverty in relation to Māori men's health, winning the Royal Society Te Apārangi Te Kōpūnui Māori Research Award for his efforts.

GOAL 2: ZERO HUNGER

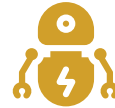
END HUNGER, ACHIEVE FOOD SECURITY, IMPROVE NUTRITION AND PROMOTE SUSTAINABLE AGRICULTURE



Nutritious, seasonal menus in all student accommodation.



Hosted local food trucks on campus in weekends providing an opportunity to sample affordable cuisine from across the world



Partnering with the community to ensure students never go hungry courtesy of free grocery packs, a revolving pantry and distributing surplus food from restaurants

REGENERATING SHELLFISH BY BLENDING MĀORI KNOWLEDGE WITH WESTERN SCIENCE

Associate Professor Kura Paul-Burke is a passionate marine scientist based at our Tauranga campus who has recently turned her focus to helping restore mussel populations in Ōhiwa Harbour using a blend of Māori knowledge and western science. New mussel lines made of woven, natural materials were developed and are now laden with mussels. The lines are far kinder to the harbour than the plastic lines preferred by commercial mussel farmers. In 2021 she was nominated for the second year in a row for the Kudos Science Trust Awards in both the Environmental Science and Vision Mātauranga categories.

UNLOCKING THE POTENTIAL OF ALGAE AS A NOURISHING FOOD SOURCE

Following the opening of a new facility dedicated to macroalgal research in Tauranga in 2020, we have a larger team of researchers now hard at work, creating innovative ways to use seaweed which is accumulating in our harbours. From gourmet sea salt to nutraceuticals and a food to support the growth of other plants, there are rich opportunities being explored with support from the Waikato Management School.



ROBOTS PROVIDE LIFELINE TO GROWERS

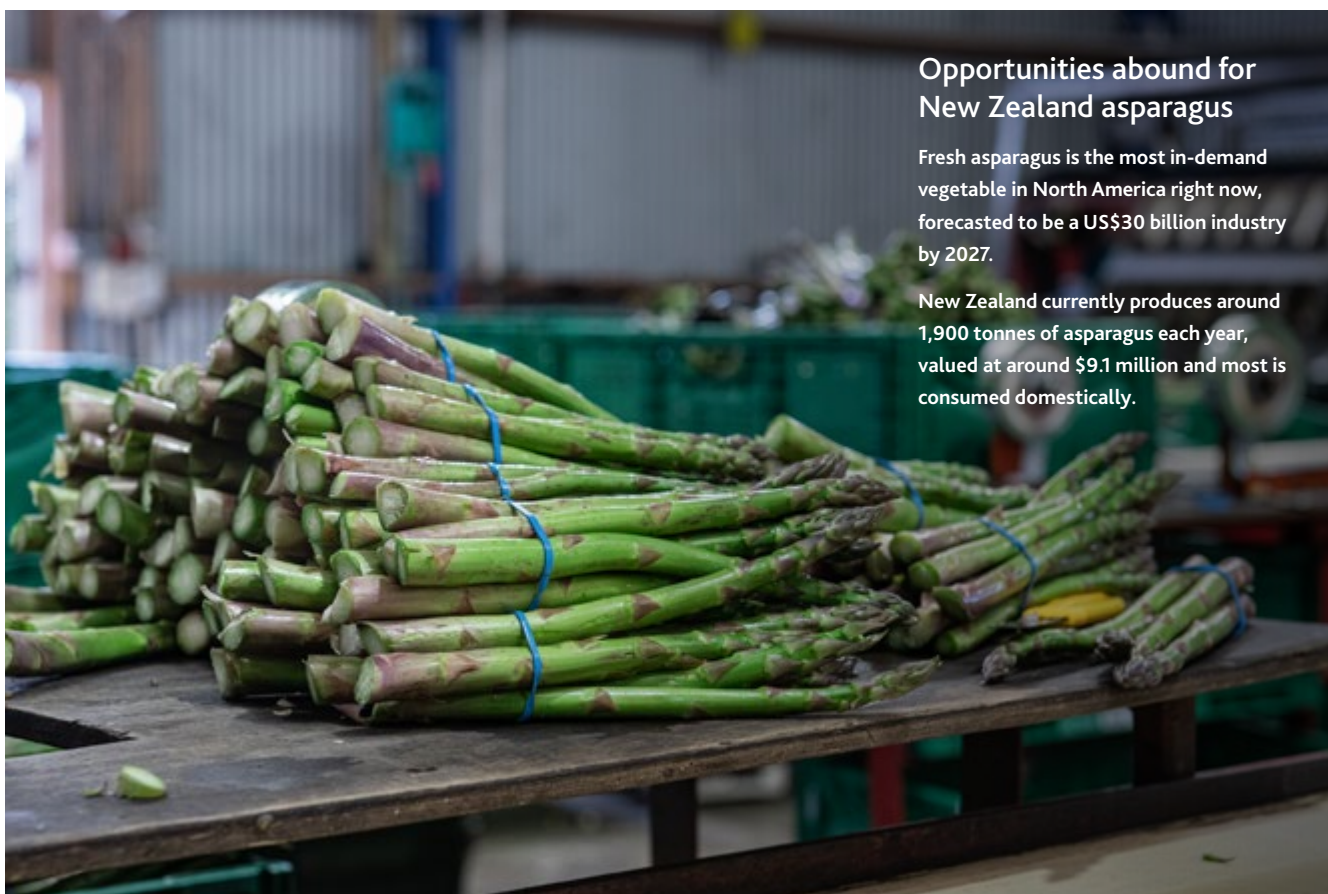


New Zealand growers have faced some significant challenges over the past two years, with border restrictions making it nearly impossible to secure skilled, seasonal labour. Throw some severe weather events into the mix, new industry regulations, pandemic working conditions and families under pressure and it is little wonder the industry is feeling the strain.

Researchers at the School of Engineering and School of Computing and Mathematical Sciences have been ramping up their work on a series of high-tech solutions which could help the industry overcome some of the most critical challenges.

These range from an autonomous asparagus harvester, a human-assist grapevine pruner, an apple fruitlet thinning robot, a kiwifruit orchard survey robot, and other robots designed to harvest blueberries, apples, rock melon and kiwifruit.

Each is a collaborative effort involving growers, industry partners, and other institutions with some now ready for commercialisation.



Opportunities abound for New Zealand asparagus

Fresh asparagus is the most in-demand vegetable in North America right now, forecasted to be a US\$30 billion industry by 2027.

New Zealand currently produces around 1,900 tonnes of asparagus each year, valued at around \$9.1 million and most is consumed domestically.



A CUT ABOVE THE REST

Dr Shen Hin Lim and his team are behind the creation of a world-first autonomous asparagus harvester, developed in collaboration with growers, the New Zealand Asparagus Council and Robotics Plus Ltd, with the support of the Ministry of Business, Innovation and Employment (MBIE), the Ministry for Primary Industries (MPI) and Callaghan Innovation.

The robot's vision system detects asparagus spears, computes their base location, and if tall enough to harvest, uses a robotic arm to cut the spear as the robot passes over. The technology also gathers yield data, and has potential add-ons for packing and weeding.

The project recently secured \$5.8 million in funding for commercialisation following successful field trials in the US and New Zealand, and is set to be a game changer for the asparagus industry.

NURTURING RESEARCH EXCELLENCE

The University of Waikato has long been known for its strength in agricultural robotics with the mechatronics programme surging in popularity in recent years. Experts in artificial intelligence, machine learning, computer vision, time-of-flight sensing, non-destructive testing and control and bespoke hardware development also collaborate through the research group WaiRAS (Waikato Robotics, Automation and Sensing).

“The programme is building capacity and providing a talent pipeline of researchers with skills in robotics, data analytics and computing who are in demand in the agricultural industry,” says Professor Mike Duke, the Dr John Gallagher Chair of Engineering.

SOLUTIONS IN THE PIPELINE FOR GRAPES AND KIWIFRUIT

Professor Mike Duke is one of the principal investigators on a five-year MBIE-funded transdisciplinary co-design project to support grape growers with the development of the MaaraTech grapevine pruner. The robot uses cameras and sensors to identify and build a 3D model of the grapevine, taking vital measurements before software instructs a mechatronic arm and cutting blade – dubbed “the barracuda” – to manoeuvre and prune the vine at the correct point.

The kiwifruit industry is also set to benefit from Waikato robotics expertise. Dr Nick Pickering is playing a key role in the co-design and development of an autonomous orchard survey robot, an orchard digital twin and a new programme focused on human-assisted kiwifruit harvesting, working closely with international kiwifruit marketer Zespri.

“Robotics, sensing and digital twins show great potential to add value across a complex horticulture system balancing people, plant productivity and the environment. Working closely with industry and end users in a human-centred design approach is enabling us to iterate quickly towards feasible, viable and desirable products,” says Dr Pickering.



GOAL 3: GOOD HEALTH AND WELL-BEING



ENSURE HEALTHY LIVES AND PROMOTE WELLBEING FOR ALL, AT ALL AGES



Free counselling services for students



New Bachelor of Nursing degree



100% smoke-free campuses and comprehensive medical and counselling services on campus

SPECIALIST FACILITIES IN DEMAND FOR TOKYO-BOUND ATHLETES

The University of Waikato Adams Centre for High Performance was a popular destination for Kiwi athletes bound for the Tokyo Olympics in 2021, thanks to its specialist environmental chamber.

The chamber was set to mimic the hot, humid conditions in Tokyo and helped many teams and individual athletes to acclimatise prior to leaving New Zealand, as an alternative to training overseas in the lead-up to the Olympics. Researchers were also able to trial cooling strategies including ice vests and ice slushies.

Stephen Fenemor who recently completed his PhD at the University of Waikato, played a key role looking at heat management strategies. He has now secured his dream job as a performance physiologist at High Performance Sport New Zealand.

During the Tokyo Olympics, Stephen worked alongside a nutritionist and a strength and conditioning coach to help the Olympic team prepare and recover from their events.

OUR CUTTING-EDGE SPORT SCIENCE FACILITIES

The University of Waikato Adams Centre for High Performance is a cutting-edge facility based at Mt Maunganui's Blake Park, equipped with the latest in sports science and research capability. It is a valuable resource for many of our biomechanists and other academics working with elite sportspeople from around the country. The centre was opened in 2016 as a laboratory for sport science research, education and commercialisation.





FIRST NURSING STUDENTS WELCOMED

The University of Waikato is blazing a trail in health education and in 2021 welcomed the first cohort of students working towards a Bachelor of Nursing degree. The programme was developed to meet a national shortage of nurses and in response to the Government Inquiry into Mental Health and Addiction in 2018. It offers more clinical hours than any other provider in New Zealand and integrates a focus on mental health and addictions throughout the degree. The University is also developing biomedical scientists and population health specialists through its Bachelor of Health programme launched in 2019.

SHOWCASING CAREERS FOR WOMEN IN BIOMECHANICS

Dr Kim Hébert-Losier, a physiotherapist and senior lecturer in Te Huataki Waiora School of Health, led a series of events across the country to support New Zealand National Biomechanics Day in 2021.

The events were focused on young women in secondary schools and celebrated the mechanics of human movement, while showcasing the opportunities for women to study and work in the field.

“It sent a strong message that biomechanics, sport and research has no gender barriers, and there is a place for women in all of these fields,” says Dr Kim Hébert-Losier.



TACKLING RISING COSTS AND INEQUITIES IN BREAST CANCER CARE

Professor Ross Lawrenson led research in 2021 which shone a spotlight on the treatment of breast cancer in New Zealand, namely the rising costs and inequities. The research projects were funded by the Health Research Council and the NZ Breast Cancer Foundation.

One study revealed that the cost of breast cancer treatment in New Zealand has increased to an average of nearly \$45,000 per patient, largely due to the cost of treatment including immunotherapy and Herceptin.

The other study showed that Pacific women with metastatic breast cancer were less likely to receive chemotherapy and Herceptin than non-Pacific women.

APP HELPS EXPECTANT MOTHERS

An app designed to help prevent postnatal depression and anxiety among expectant mothers was relaunched by the University of Waikato in 2021 to help women find the support and strategies they need for positive mental health.

Dr Carrie Barber, from the University's School of Psychology, first developed the Positively Pregnant app in 2017 and piloted it with a group of mothers. With seed funding from the University's commercial arm, WaikatoLink, a redesigned and updated version was launched in 2021.

“A lot of what is in the app are things we know work from positive psychology and each of them provide women feedback or direct them to where they can find help,” says Dr Barber.







TOKYO OLYMPICS

NEW ACTION SPORTS; REFRAMING PARTICIPATION AND EQUALITY

The addition of four new action sports in the 2021 Tokyo Olympics signalled an exciting new era for the future of sport across the world. Many hope the move will break down barriers around elitism, attract a younger audience and create new opportunities for women and girls. But how will the nature of these sports change now that ‘gold medal lust’ is prompting countries to shore up their talent pipelines and invest heavily in new infrastructure? What will it mean for young people who once gravitated to these sports because they flew under the radar?

Professors Belinda Wheaton and Holly Thorpe, from Te Huataki Waiora School of Health, explored these complex and fascinating issues in their new book; *Action Sports and the Olympics: Past, Present and Future* which was released just prior to the Tokyo Olympics.

The book takes an in-depth look at the International Olympic Committee (IOC) and changes that have been occurring over time, including the introduction of skateboarding, surfing, sport climbing and BMX freestyle in 2021.

Professor Wheaton says the inclusion of skateboarding in particular will help “legitimise” the sport, enabling it to evolve in a way that schools and clubs will embrace, and parents will encourage their children to pursue.

The duo are also positive about recent steps by the IOC towards gender equality, including putting quotas on sports, which are creating new opportunities for women and girls both as athletes and leaders.

They do note, however, that a lack of facilities, funding and sponsorship in New Zealand will likely drive people to countries like Australia, China and the United States who are putting significant resources and infrastructure around these sports.

“By becoming Olympic sports, we are seeing the structures of these sports changing, and it could have quite interesting implications for who participates in these sports, and why and how they participate,” says Professor Belinda Wheaton.

GOAL 4: QUALITY EDUCATION

ENSURE INCLUSIVE AND EQUITABLE QUALITY EDUCATION AND PROMOTE LIFELONG LEARNING OPPORTUNITIES FOR ALL



World-leading teacher education programme



A dedicated team called Te Puna Ako focused on supporting staff with their teaching and students with study skills



A data-driven learner success programme called Ōritetanga which uses machine learning to pinpoint achievement issues

BUILDING KNOWLEDGE IN OUR COMMUNITY

Despite the disruptions due to Covid-19, we continued to host events both online and in-person throughout 2021 that were free for the general public to attend. These included a series of public lectures led by our professorial staff and Kaupapa Kōrero, a series of panel discussions tackling topical issues.

TARGETED SUPPORT FOR TEACHING AND LEARNING IN UNCERTAIN TIMES

With ongoing disruptions through 2021 as a result of Covid 19, Te Puna Ako Centre for Tertiary Teaching and Learning provided a critical service to staff and students with a focus on improving the online teaching and learning experience.

This took the form of drop-in sessions, workshops, one-on-one consultations, short instructional videos and Ask Me Anything Zoom sessions, traversing topics ranging from supporting student wellbeing, designing effective slides, tips and tricks for using online tools like Zoom and Panopto, through to pronouncing Chinese names and places.

The team was also pleased to host the annual Te Puna Aurei LearnFest event in 2021, bringing together experts from across the world online to discuss issues and opportunities in teaching and learning.

LECTURER'S DEDICATION TO ONLINE LEARNING RECOGNISED

Dr Nick Munn was recognised as one of the country's leading tertiary teachers in 2021 when he was selected as one of nine recipients of an Ako Aotearoa National Tertiary Teaching Excellence Award. This followed hot on the heels of an award in 2020 for excellence in e-Learning as well as the University's Vice-Chancellor's Medal for Staff Excellence.

Dr Munn is a senior lecturer within the School of Social Sciences and has a passion for environmental ethics and political philosophy.

His students say his classes are refreshingly different, noting he strives to make them

inclusive, interactive and communal, fostering a sense of community which became especially important as the University moved to online learning.

He has a special knack for capturing the fascination of his learners through a variety of multimedia tools and supporting them to meet their own personal learning objectives.

Dr Munn is held in high regard by his colleagues for his teaching skills, particularly his focus on learners with diverse needs and his commitment to continuously raising the bar and trying new things.



OUR WORLD-LEADING TEACHER EDUCATION PROGRAMME

Te Kura Toi Tangata School of Education is committed to enhancing education through the three interconnected disciplines of teaching, research and professional learning. It offers a range of undergraduate and postgraduate qualifications with flexible delivery options. Students can also opt to study education through a social science lens, examining the role education plays in our lives and how social and cultural settings shape our development. Te Wahi Toi Tangata Institute of Professional Learning provides high-quality professional learning opportunities across the education sector in New Zealand, offering a host of workshops for teachers in areas ranging from enhancing student agency to improving engagement with families.

CONVERSATION KEY TO HELPING CHILDREN COPE DURING A PANDEMIC

Dr Amanda Bateman has been conducting conversation analysis research for over a decade and is currently co-editing a book for educators about how to have better conversations with children so they can navigate difficult experiences, like a global pandemic, drawing on research conducted after the Christchurch earthquakes.

“Children right now are experiencing a world that looks very different from how it did a year ago. Combine that with the fear and anxiety that many parents are facing, whether because of illness, job losses or financial insecurity, and children are facing a difficult social context,” says Dr Amanda Bateman.





Global-Kiwi
LIVING PHOTOGRAPHY

Portrait Sittings
The University of Waikato
Portrait Sittings are available for all students.
Bookings are available from 1st October 2023.
Bookings close 14 days before the ceremony.
Bookings are available on a first-come, first-served basis.
Bookings are available for all students.
Bookings are available for all students.

Degree Diploma Service
Wait

TRANSFORMING EDUCATION FOR MĀORI STUDENTS



For over two decades, Professor Mere Berryman and the Poutama Pounamu facilitators have been helping to indigenise the culture of schools and other education centres around New Zealand and at the same time, decolonise the structures of these same settings.

Their work builds on years of iterative research and reflects the bicultural nature of New Zealand society.

Throughout the last six years, Poutama Pounamu have delivered a unique blended learning programme to cohorts of educators, aimed at taking personal and professional responsibility for understanding how historical power, privilege and positioning within schools and centres has played out. Participants are challenged to understand and address instances of privilege and bias - beginning with their own.

“Our goal is to help those working in education to gain a deeper understanding of historical events that have led to disparity for Māori and how this continues through our colonial education system.”

“Ultimately it’s about changing the status quo and creating a better future, where the next generation have more equitable opportunities to develop their potential and take their rightful place in society,” says Professor Mere Berryman.

The Poutama Pounamu facilitation team is made up of 23 members who work with over 300 schools and early childhood centres across Aotearoa New Zealand helping to create fairer outcomes for Māori children.



GOAL 5: GENDER EQUALITY

ACHIEVE GENDER EQUALITY AND EMPOWER ALL WOMEN AND GIRLS



Generous parental leave policy providing six weeks paid leave in addition to that provided by the Government



New leadership programme launched for women



Scholarships for women, in STEM and to support the return to study



SPOTLIGHT ON THE HEALTH OF FEMALE ATHLETES

Waikato researchers have been investigating chronic energy deficiency amongst elite female athletes for many years, joining forces to lend their expertise to High Performance Sport New Zealand through an initiative called WHISPA. WHISPA brings together a multi-disciplinary team of experts to support women in sport to protect their health and wellbeing while striving for high performance. They tackle issues ranging from energy deficiency to menstrual irregularity, ACL injuries and pregnancy.

NEW PROGRAMME LAUNCHED TO SUPPORT EMERGING WOMEN LEADERS

The University was proud to launch the Waikato Women in Leadership programme in 2021. The programme aims to help emerging women leaders across the University to develop leadership capabilities and enhance their networks. The year-long programme combines one-on-one mentoring, peer group mentoring and workshops on topics ranging from cultural leadership to communications and career planning.

Programme Steering Group



Deputy Vice-Chancellor Research,
Bryony James



Deputy Vice-Chancellor Academic,
Robyn Longhurst



Director Organisational Development and Wellness, **Nikki Thomas**



Deputy Vice-Chancellor Māori,
Sarah-Jane Tiakiwai



Director Human Resources and Employment Relations, **Hanlie du Plessis**



Assistant Vice-Chancellor Pacific,
Keaka Hemi

THE GENDERED PANDEMIC

A DEEP DIVE INTO THE LASTING EFFECTS OF LOCKDOWN ON KIWI WOMEN

How New Zealand women have been impacted by the Covid-19 pandemic and the strategies they have devised to cope will be researched in a new multi-disciplinary project led by Professor Holly Thorpe at the University of Waikato with the help of a two-year James Cook Research Fellowship.



Globally, women lost more than 64 million jobs in 2020 alone due to the pandemic, resulting in an estimated \$800 billion loss of income. Their physical and mental health has also been heavily impacted for both frontline workers and those working in the home. Rates of domestic violence have also surged, resulting in what some refer to as the 'shadow pandemic'.

In New Zealand 90 percent of the jobs lost during the pandemic in 2020 were from women and while the Government's Wellbeing Budget recognised the disproportionate impact of the pandemic on women and young people, Professor Thorpe says we are yet to see specific strategies to address this.

“Even once the vaccine rollout is complete, we know the social, economic and emotional effects of the pandemic will continue to be disproportionately felt by New Zealand women, including the trauma associated with that,” says Professor Holly Thorpe.



“This research will help us understand not only the impact the pandemic has had on New Zealand women, but also how through the incredible social disturbance they have found ways to look after themselves and others.”

Professor Thorpe will lead a multidisciplinary cross-cultural team made up of Māori, Pacific and Muslim early career researchers including Dr Grace O’Leary (Te Arawa), Mihi Nemani (Māori-Samoan, Ngatiwai) and Dr Nida Ahmad.

The research builds on two pilot projects being led by Professor Thorpe investigating how women across the sport sector have responded to the pandemic, and another project exploring how women from different cultural backgrounds are understanding, defining, and managing wellbeing.

Professor Thorpe has already co-authored a book; *Feminist New Materialism, Sport and Fitness* alongside Julie Brice and Marianne Clark, and she says the research will build on exciting new developments in feminist theory and methods.

“At the local level it will contribute to more complex ways of thinking about women’s wellbeing and what strategies and policies are needed to recognise the gendered effects of the pandemic and how we can better support women through this and out the other side of it.”

GOAL 6: CLEAN WATER AND SANITATION



ENSURE AVAILABILITY AND SUSTAINABLE MANAGEMENT OF WATER AND SANITATION FOR ALL



Reduced water use by 24% against a 2019 baseline



Leading the way with innovative research and community partnerships around wastewater bioremediation



A dedicated research group within the School of Engineering focused on providing clean water for communities, businesses and industry



TREATING WASTEWATER THE ALGAL WAY

New Zealand's wastewater treatment systems are often overloaded and Waikato-led research is showing a solution could lie in algae. In late 2020, the University opened a purpose-built macroalgal facility in Tauranga to progress this groundbreaking work, under the leadership of Dr Marie Magnusson. Indi Novak (Ngāti Porou, Ngāti Awa), pictured, is playing a key role in this work. She is a current PhD student at our Coastal Marine Field Station in Tauranga whose research focuses on the use of algae ponds in rural wastewater treatment as a potential solution to nutrients and bacteria entering the aquatic environment.

HEALTHY WATERWAYS WITH ARTIFICIAL INTELLIGENCE

We have combined our longstanding expertise in data science and environmental science to keep better tabs on the state of our natural environment, so authorities can make more informed and timely decisions. The Ministry for Business, Innovation and Employment (MBIE) funded, \$13 million project TAI AO, led by Professor Albert Bifet, collates environmental data from around the country and makes it available to scientists. TAI AO performs a range of automated tasks including detecting algal blooms on waterways with minimal human involvement.



FRESHWATER SCIENTIST TO OVERSEE HEALTH OF ROTORUA LAKES

Leading freshwater scientist Dr Deniz Özkundakci has made a valuable contribution to the management of lakes across the Waikato region over the course of his career, with a special focus on mitigating the impacts of agriculture. In 2020 he developed a strategic framework to improve modelling for environmental decision-making and in late 2021 he was appointed to the role of Toi huarewa – Waimāori Bay of Plenty Regional Council Chair in Lake and Freshwater Science.

In this role he will guide the extensive work being done to protect and restore water quality in the 12 Rotorua lakes for the enjoyment and use of present and future generations. The Rotorua Te Arawa Lakes Programme is a partnership with Rotorua Lakes Council, Te Arawa Lakes Trust and Bay of Plenty Regional Council with funding from the Ministry for the Environment.

GOAL 7: AFFORDABLE AND CLEAN ENERGY



ENSURE ACCESS TO AFFORDABLE, RELIABLE, SUSTAINABLE AND MODERN ENERGY FOR ALL



Building sector capability through our environmental and electrical engineering degree programmes



Home of first five-star rated 'green building' in the Waikato



Committed to being carbon neutral by 2030

OUR PROGRESS TOWARD CARBON NEUTRALITY

2021 was another disruptive year which saw reductions in carbon emissions across all University operations, in large part due to staff working from home, travel restrictions and many events moving online. However, a number of new initiatives were launched to keep us on track towards our longer term sustainability goals.

- Total carbon emissions down 56% against a 2019 baseline.
- Secured funding for a new Biofuel hot water boiler and CO₂ heat pumps for student accommodation which will reduce emissions by 8.6T per year.
- Installed 50 smart meters for targeted electricity analysis.
- Secured funding for a low-emissions chiller and LED lighting upgrade which will reduce emissions by 34T per year.

SUPPORTING BIG INDUSTRY TO ACHIEVE NET-ZERO CARBON



The industrial process heat sector contributes 28 percent of New Zealand's energy emissions but represents arguably the most complex and challenging of the energy sectors to decarbonise by 2050. The Ahuora Centre for Smart Energy Systems, led by Professor Michael Walmsley, is tackling this challenge head-on with the help of \$12.5 million in funding from the Ministry of Business, Innovation and Employment (MBIE) Endeavour Funding, and with the support of researchers from across the world including the University of Auckland and Massey University. The team is focused on building a novel energy technology platform based on adaptive digital twin technology and underpinned by the next generation of energy systems science.

“Our mission is to help create more sustainable New Zealand industries that sit in harmony with taiao (the environment) and tāngata (the people) through smart energy systems and integration,” says Professor Michael Walmsley.



CREATING PATHWAYS FOR FUTURE CLIMATE WARRIORS

Sara Bahr put her machine learning knowledge to good use when she worked on a summer research project in 2021 which involved building a 'digital twin' of the steam boiler at our Hamilton campus, to safely test ways of reducing emissions. The project led to her securing a role in the Ahuora research team, a dream for the former Hamilton Girls' High School student who aims to carve a career in the energy sector.

“It is a multi-disciplinary project which basically teaches me thermodynamics, as well as the software side of machine learning and control.”

GOAL 8: DECENT WORK AND ECONOMIC GROWTH



PROMOTE SUSTAINED, INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH, FULL AND PRODUCTIVE EMPLOYMENT AND DECENT WORK FOR ALL



Ranked #1 in NZ for Business and Economics (THE World University Rankings)



Wrap-around support to see student work placements succeed in unpredictable times



Unparalleled connections with industry and the business community



TOP ECONOMISTS GATHER AT HAMILTON CAMPUS

The University brought together a high-profile lineup of New Zealand's top economists, policymakers and industry leaders for a two-day event held both online and in-person at the Hamilton campus in March 2021. The event focused on the long-term economics effects of New Zealand's Covid-19 response, debating the pathways and priorities for the decade, in addition to other challenges such as climate change and affordable housing.

The keynote speakers included Deputy Prime Minister Grant Robertson, Governor of the Reserve Bank Adrian Orr, and CEO of ASB Bank, Vittoria Shortt.

The forum garnered significant media attention prompting important conversation around economic policy in New Zealand at a critical time.



WAIKATO MANAGEMENT SCHOOL RANKED #1 IN NEW ZEALAND

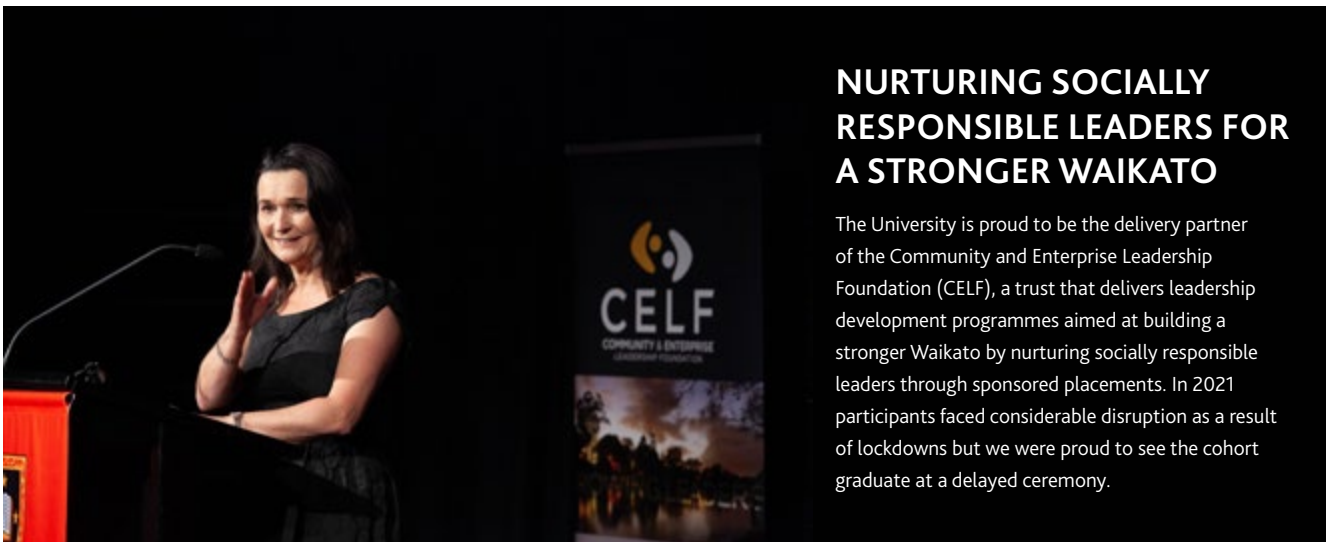
In results released in mid-October, the University of Waikato was ranked in the top 101-125 universities in the world in the subject category of Business and Economics, the only university in New Zealand to reach this ranking. The Waikato Management School also has Triple Crown accreditation, placing it firmly in the top one percent of business schools in the world.

Waikato Management School (WMS) Pro Vice-Chancellor, Matt Bolger, says the news is indicative of the excellence of the team at WMS, and in particular the exceptional quality of research being produced. WMS has the highest ratio of PhD graduates to academic staff in New Zealand, and its researchers publish more research than almost any other university in the country (second to the University of Otago).

"Our academics are not only great teachers, but experts and thought-leaders in their fields, and their research is highly cited by other researchers, which contributes to the high ranking," says Mr Bolger.

"Year-on-year, Waikato Management School has been ranked in the top quartile internationally. This has been achieved through sustained hard work and the productivity of our team and excellent connections with business, society and other leading universities around the world."

The Waikato Management School was established in 1972, and celebrates its 50th anniversary in 2022.



NURTURING SOCIALLY RESPONSIBLE LEADERS FOR A STRONGER WAIKATO

The University is proud to be the delivery partner of the Community and Enterprise Leadership Foundation (CELF), a trust that delivers leadership development programmes aimed at building a stronger Waikato by nurturing socially responsible leaders through sponsored placements. In 2021 participants faced considerable disruption as a result of lockdowns but we were proud to see the cohort graduate at a delayed ceremony.



COMMUNITY LEADERSHIP IN ACTION

In November 2021, Rachel Karalus was recognised as a the Community and Enterprise Leadership Foundation (CELF) Alumni Leader of the year. Rachel completed the CELF programme following a successful legal career which then saw her take on the role of Chief Executive for K'aute Pasifika Trust. K'aute Pasifika

provides health, education and social services to the region's growing Pacific population and has gone from strength to strength under Rachel's leadership. The trust has now secured Government funding for the development of a new Pan Pacific Community Hub - the first of its kind in New Zealand.

LOOKING AFTER BUSINESS OWNERS IN A PANDEMIC

Dr Amanda Williamson from the Waikato Management School recently turned her focus to the impacts of Covid-19 on entrepreneurial wellbeing, providing timely insights to support the business community.

It is widely known that running a business can have a significant impact on the body's inflammatory, metabolic and cardiovascular systems as a result of long hours, uncertainty, resource constraints and being "always on".

The pandemic has made it even more challenging for the entrepreneur, with remote working leading to even longer working hours and more stress than ever before.

Through her research, Dr Williamson has shown that respite, reappraisal and regimen (the three Rs) are helping business owners to recharge from work, and boost their productivity and wellbeing.



GOAL 9: INDUSTRY, INNOVATION AND INFRASTRUCTURE



BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALISATION AND FOSTER INNOVATION



Fastest growing engineering school in NZ offering the full range of accredited degree programmes



Dedicated team supporting our researchers to take their innovations to the world



Strong industry connections and wrap-around support for student work placements



TAKING OUR RESEARCH TO THE WORLD

The University of Waikato's Research and Enterprise Office is focused on creating value from research discoveries and innovation. They work with our researchers, government, industry and community organisations, to extend research capability, create collaborative opportunities and help in the implementation of research findings, and transfer of knowledge and technology.



“Creativity and innovation is in the DNA of our institution. This creates a safe space for big, bold ideas to be tested. For researchers to be truly collaborative. Where Māori perspectives are incorporated and enrich everything we do,” says Professor Bryony James, Deputy Vice-Chancellor Research.

STAYING ONE STEP AHEAD OF THE HACKERS

The safety of our online lives was brought into sharp focus in 2021 with sophisticated cybersecurity events bringing a number of large organisations to a standstill and compromising personal data on a massive scale. We are proud to have been on the cutting edge of cybersecurity research for many years and recently have seen great progress with our spin-off company First Watch, which develops and licenses cybersecurity software for industrial control systems. The company recently secured investment to the value of about \$3.2 million from investors in CTEK Ltd to take the first product from proof-of-concept to first sale.



FOSTERING INNOVATION IN BUSINESS

The Waikato Management School is underscored by a commitment to innovation and applies this expertise to areas like emerging export-oriented industries, agri-technology, and marine systems.

In 2021 they introduced a new course in design thinking, offered through both the MBA programme and as a standalone short course.

The programme is led by Clare Swallow who has carved an impressive career as a tech-savvy entrepreneur. She says the basic premise of

design thinking is to bring human beings back into the centre of our problem solving and putting aside unconscious bias and preconceived ideas.

Clare says when businesses are led by design thinking, trust increases. As trust increases, they find creativity increases and as creativity increases, innovation happens.



NEW SPECTROMETER BOOSTS RESEARCH CAPACITY

Researchers at the School of Science will benefit from a powerful new spectrometer that was installed by a specialist team of engineers in June 2021. The JEOL 600 MHz Nuclear Magnetic Resonance Spectrometer, or NMR for short, will help researchers to identify chemicals and compounds.

It is particularly suited to metabolomics – the scientific study of the unique chemical fingerprints that cellular processes leave behind. This will have valuable applications in areas like honey chemistry, testing of saliva and the search for bioactive compounds in marine species.

Local high school students and teachers were invited onto campus for various workshops throughout 2021 to see the new spectrometer in action.

NEW WATER SAMPLING DEVICE TO HELP SCIENTISTS ACROSS THE WORLD

Waikato researchers unlocking keys to climate change have developed a new device that is now being used by researchers around the world.

The device, called Syp, is now being manufactured in Hamilton and marketed by Waikato Scientific Instruments, a spin off company from the University's commercial arm WaikatoLink.

Dr Adam Hartland, a Rutherford Discovery Fellow, Associate Professor and climate change researcher, set about developing the device when he couldn't find a water sampling device suited

to measuring cave drip water at regular intervals over a long period of time.

Syp can automatically collect up to 58 predefined water samples over 12 months, all powered by AA batteries.

Syp units have already been sold to Vanderbilt University and Cornell College in the United States, The University of Rouen, France, and Northumbria University in the United Kingdom. Dr Hartland will continue to work with the universities as the devices are deployed in their own field studies.



ENGINEERING BEYOND STRAIGHT LINES

The University's School of Engineering opened a new state-of-the-art Design Studio to support hands-on, high-tech learning for its civil engineering students.

The studio will allow students to test scale models of real structures, collaborate to solve real-life problems and use augmented reality to visualise what projects might look like.

"At Waikato we want our students to engineer beyond straight lines. Engineering isn't just maths and physics. We want students to use maths and physics to think creatively and be able to collaborate, experiment and prototype. These spaces will help to provide for that," says Dean of Engineering, Professor Mark Dyer.





UNLEASHING THE POTENTIAL OF AI TO BUILD A BETTER WORLD

Launched in April 2021, Te Ipu o te Mahara, the University's Artificial Intelligence Institute takes an interdisciplinary and collaborative approach to the development of cutting-edge artificial intelligence (AI) research. The team is focused on real-time analytics for big data, machine learning and deep learning, building on 25 years of internationally recognised research and the development of some of the world's most popular open source tools.

The new Institute's goal is to build awareness and expertise across disciplines to better leverage AI for the benefit of communities.

NZ'S MOST POWERFUL COMPUTER COMES TO CAMPUS

In April 2021 New Zealand's most powerful supercomputer for artificial intelligence applications was installed at the University's Hamilton campus. The NVIDIA DGX A100 is often referred to as the Ferrari of computing because of how fast it can rapidly and efficiently process massive amounts of data.

One of the first projects the computer is being used for is to train models that can learn and classify New Zealand's plants and animals, based on a publicly available database of more than one million photos.

"This computer will allow our researchers to process that data in a matter of days. It will enable them to gain insights and progress their research at an unprecedented scale," says Professor Albert Bifet, Director of Te Ipu o te Mahara, Artificial Intelligence Institute.



GOAL 10: REDUCED INEQUALITIES

REDUCE INEQUALITY WITHIN AND AMONG COUNTRIES



Highest proportion of Māori students in any NZ university



Top 60 universities in the world for research on reducing inequalities



Supporting our LGBTIQ+ community to network and support each other through the Rainbow Alliance

OUR MISSION TO ADDRESS INSTITUTIONALISED RACISM

In 2020, the University of Waikato commissioned an independent review into public claims of racism. A Taskforce was then appointed in 2021 to develop a programme of work following this report, for the University to undertake transformational change.

The work of the Taskforce is now complete and the University has begun a long-term programme of work to implement the recommendations of the Taskforce's report across all aspects of the University.

HONOURING OUR PACIFIC CONNECTIONS

A new Pacific Strategic Plan was adopted in June 2021 following lengthy consultation. Pacific peoples have a long history and rich cultural heritage of voyaging, valuing knowledge, and learning. The new plan demonstrates the University's commitment to building and enhancing these dimensions of our institution, and realising the educational aspirations and success of Pacific learners and staff.

The University officially welcomed its first Pacific Chancellor, Sir Anand Satyanand, with a special ceremony at the Hamilton campus in March 2021. The event also served as an opportunity to launch a new Pacific journal; *In Our Language: Journal of Pacific Research*, the first journal to translate previously peer-reviewed articles from English and publish them in Pacific languages.



RESEARCHERS JOIN FORCES TO TACKLE RACISM IN OUR COMMUNITIES

A group of Waikato researchers is leading groundbreaking research into racism in New Zealand with the help of \$10 million in Ministry of Business, Innovation and Employment (MBIE) Endeavour funding. The project Working to End Racial Oppression (WERO), is examining the systems through which racism is reproduced with the goal of producing tools to help organisations overcome institutional racism and build relationships in racialised communities. The project is led by Dr Waikaremoana Waitoki, Dr Arama Rata and Professor Francis Collins.

NEW PROJECT ENSURES THE BENEFITS OF INDIGENOUS DATA ARE SHARED WITH INDIGENOUS PEOPLE

An international project between Waikato and New York-based researchers received a \$750,000 boost to develop tools aimed at protecting Indigenous communities' rights over their own knowledge and data.

The project is led in New Zealand by Associate Professor Maui Hudson (Whakatōhea), Director of the University of Waikato Te Kotahi Research Institute, and in New York by New York University Legal Scholar, Dr Jane Anderson, supported by strategic design partners IDIA (Indigenous Design and Innovation Aotearoa).

Associate Professor Hudson says; "Data relating to Indigenous peoples and their traditional knowledge has long been misused by non-Indigenous governments, scientists and innovators. The work we are doing will ensure Indigenous communities' benefit from the use of their knowledge and genetic resources."



GLOBAL REFUGEE CRISIS BROUGHT TO LIFE IN A NEW OPERA

Nida Fiazi came to Aotearoa from Afghanistan as a young girl of four and graduated from the University of Waikato in 2021 with a Bachelor of Arts in Writing Studies. She attended graduation in full traditional Afghani dress and was supported by her family. The 22-year-old is already well on her way to success as a writer, having penned an opera in 2021 with her lecturer, Dr Tracey Slaughter, and composer Dr Michael Williams about her refugee experience.



GOAL 11: SUSTAINABLE CITIES AND COMMUNITIES



MAKE CITIES AND HUMAN SETTLEMENTS INCLUSIVE, SAFE, RESILIENT AND SUSTAINABLE



Home of the Transport Research Group, a multidisciplinary team of researchers committed to finding sustainable transport solutions for New Zealand



55% of vehicle fleet nil or low emission and 9 electric vehicle charging stations on campus



TACKLING OUR TRANSPORT ISSUES AT THE CORE

Our Transport Research Group is a multidisciplinary team of researchers committed to finding sustainable transport solutions for New Zealand. Their work is helping to overcome policy barriers, supporting the transition to electric vehicles influencing decision makers and nurturing more sustainable mindsets and behaviours. They are looking closely at a range of issues including public perceptions around autonomous vehicle technologies and changes to in-vehicle technology.

PREFERENTIAL PARKING ON CAMPUS FOR RIDE-SHARING

To incentivise ride-sharing, the University provides preferential parking at optimal locations around its Hamilton campus through a scheme called RideLink. The web-based system helps match students or staff for either regular ridesharing or one-off trips, like going home for the holidays.

CHAMPIONING THE '20 MINUTE CITY' CONCEPT FOR NEW ZEALAND

Professor Iain White has been working with local and central authorities to progress a concept called the '20 Minute City', challenging decision makers to adopt a more transformative approach to post-pandemic infrastructure investment. The concept has been embraced in many other parts of the world and is essentially about putting the right kinds of infrastructure in the right places. This includes good pedestrian access and high connectivity, safe cycle lanes, and joined up planning that aims to better link people with the facilities they use, so all needs can be reached within 20 minutes of home.

In October 2021, Professor White and the project team conducted a nationwide survey asking New Zealanders how far they're prepared to travel for work and other services.

"We need to be careful in applying concepts from overseas, and so we need to collect data on what is of value to people in our towns and cities and how they prefer to get there," says Professor White.







GOAL 12: RESPONSIBLE CONSUMPTION AND PRODUCTION



ENSURE SUSTAINABLE CONSUMPTION AND PRODUCTION PATTERNS



100 recycling stations campus-wide



Diverted 38% of our total waste from landfill in 2021 (159 tonnes)



Sustainable principles embedded in all events

GREEN EVENTS THE NEW NORM ON CAMPUS

We hold hundreds of events each year across our two campuses and in 2021 many of these were delivered virtually as a result of Covid-19. This has become our new normal and we are seeing some great sustainability gains from this approach with the reduced emissions from transport and resources. We also issued a new guide for staff called the Green Events Guide, to embed sustainability principles throughout the event planning and execution process. Some of the other key changes to events include:

- Moving to online-only programmes and ticketing systems
- Minimal use of single-use plates, cups and cutlery
- Avoidance of 'goodie bags'
- Catering with caution to avoid food waste

NEW RECYCLED CLOTHING STORE OPENED ON CAMPUS

Hospice Waikato opened a new store called Rewind at the Hamilton campus in B Trimester. The store sells a range of youth-inspired recycled clothing and bric-a-brac.



A CIRCULAR ECONOMY FOR AOTEAROA NEW ZEALAND



The University of Waikato is leading a multidisciplinary project focused on developing a circular economy concept for Aotearoa, New Zealand, with the aim of reducing waste and developing a more sustainable model of production and consumption with a focus on the construction and packaging industries.

Led by Professor Kim Pickering, a global expert in materials engineering, Āmiomio Aotearoa is a \$10.9 million project funded by the Ministry of Business, Innovation and Employment (MBIE).

It brings together a diverse range of people including scientists, engineers, business experts and policy advisors to focus on waste reduction in the construction and packaging industries, incorporating Indigenous perspectives and traditional Māori knowledge (mātauranga Māori).

With the country in the throes of a building boom, construction waste already making up around 50 percent of total waste and the industry facing a serious materials shortage, it is a well-timed project that will see a departure from the 'take-make-waste' model where resources are only used once.

The research team is working with some of the biggest players in the construction industry to develop and test new materials that could replace structural timber, cladding, fencing and decking. This includes materials made from polypropylene waste remoulded into new products using natural fibres like flax and hemp as reinforcement and mussel shells (a waste product from the aquaculture industry) as a fire retardant and stabiliser.

“Many businesses thought a circular economy was recycling, but we need to be much bolder than that,” says Professor Kim Pickering.



Professor Pickering is all too aware that New Zealand is already importing “cheap and cheerful” alternatives to the products she and her team are designing. This issue is being addressed by the policy arm of Āmiomio Aotearoa.

Professor Eva Collins from the Waikato Management School is a key member of the team. She says a circular economy presents a major opportunity to improve New Zealand’s long-term competitiveness and create value in many sectors of the economy, whilst at the same time improving productivity and enabling a transition to a sustainable, low-emission, and climate-resilient future. “For success, the emphasis needs to be on collaboration throughout the value chain from engineers and architects to builders and policymakers,” she says.

“If we can transition to a low-carbon circular economy, New Zealand could avoid costly extraction, creation, and disposal of resources and instead focus on regenerating healthy natural systems. It requires a significant shift in the way people think, live and work,” says Professor Eva Collins.



Āmiomio Aotearoa is part of the Sustainable Business Network's Go Circular 2025 which aims to help shift New Zealand businesses from a linear economy to one where waste, pollution and greenhouse gases, produced by industries and materials, are kept in circulation and natural systems regenerated.

The leadership team also includes University of Waikato researchers Associate Professor Sandy Morrison, Professor Les Oxley, Professor Barry Barton, Associate Professor Tom Roa and Dr Robert Joseph.

Āmiomio Aotearoa also involves researchers from the University of Canterbury, Victoria University of Wellington, Massey University, University of Otago, University of Auckland, SCION, Manaaki Whenua Landcare Research, BRANZ Ltd, and several international partner organisations.



GOAL 13: CLIMATE ACTION

TAKE URGENT ACTION TO COMBAT CLIMATE CHANGE AND ITS IMPACTS



Committed to being carbon neutral by 2030



Home of world-leading researchers in climate change and action



Launched a world-first Bachelor of Climate Change



WAIKATO EVENT CONNECTS TO COP26 AND CLIMATE CHANGE CRISIS

The University of Waikato supported the Waikato Commonwealth Human Ecology Council (CHEC) committee to host a virtual conference on climate change, aligning with the United Nations COP26 climate change conference in Scotland.

Associate Professor Tom Roa (Ngāti Maniapoto, Waikato-Tainui) played a key role in the event which brought together local climate change leaders and advocates from academia, government, the community, iwi, grassroots organisations and business over a period of two weeks to reflect on the themes and concerns emerging from COP26 in 2021.

The Waikato initiative focused on Māori, Indigenous and grassroots community perspectives, acknowledging the challenges facing coastal communities in particular.

“The marae at Marokopa will very soon be underwater, the water is lapping at the marae gates. At Kāwhia, erosion has been a concern for more than 15 years. That marae, at Maketu, is also in danger in the next 20 years of being underwater. These are people’s pasts, presents and futures under threat,” says Associate Professor Tom Roa.

Associate Professor Roa says that Indigenous knowledge, including mātauranga Māori (Māori knowledge), plays a key role in solving the climate crisis and amazing things are already happening locally with grassroots organisations working closely together.



WORLD-FIRST BACHELOR OF CLIMATE CHANGE LAUNCHED

The University of Waikato achieved a world-first in 2021, with the launch of a new Bachelor of Climate Change degree.

The new, three-year cross-disciplinary undergraduate degree welcomed its first students in A Trimester 2022.

This degree combines scientific knowledge of the biophysical world with understanding of economic and political systems and the impacts on Māori, Pacific and Indigenous communities.

Dean of Science, Professor Margaret Barbour, says students with the new qualification will be in demand as we work towards the target of net-zero emissions by 2050.

"The Bachelor of Climate Change brings together this collective expertise across all the disciplines creating a common language in the fight against the globe's most pressing environmental issue."



GOAL 14: LIFE BELOW WATER

CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT



Home of leading marine scientists addressing key issues facing our coasts and estuaries



Unique aquaculture programme focused on innovative use of marine resources



World-class facilities in Tauranga offering full access to a unique and varied 'living lab'

OUR WORLD-CLASS FACILITIES IN TAURANGA

The University's Tauranga campus offers the only science research facility in New Zealand specifically configured to address the real issues of our engagement with the sea. The Coastal Marine Field Station and neighbouring facility for macroalgal research are home to some of New Zealand's leading marine scientists and innovators focused on protecting and restoring our marine environment, and creating wealth from our marine resources.

IMPROVING THE HEALTH OF OUR ESTUARIES

Known as the nurseries of the sea, estuaries are important and complicated environments that often slip between the gap of marine and freshwater management. In 2020 the Parliamentary Commission for the Environment released an alarming report on the state of estuaries in New Zealand, highlighting the growing problems caused by nutrient rich sediment running off the land. We are proud to have more than 15 PhD students currently carrying out important estuarine research to tackle this problem, many under the supervision of estuarine scientist, Professor Conrad Pilditch.

UNLOCKING THE POTENTIAL OF ALGAE

The University proudly opened a new facility dedicated to macroalgal research in Tauranga in late 2020 and a team of researchers have been hard at work ever since, creating innovative ways to use the seaweed accumulating in our harbours. In 2021 Dr Marie Magnusson and Dr Rebecca Lawton received \$1.2 million to lead research into seaweed farming in the Hauraki Gulf and Bay of Plenty, as part of a \$5 million commercial regenerative seaweed farming pilot. The pilot will include hatchery production, on-water farming, seaweed processing, product trials and training programmes for seaweed farmers. It will provide the proof-of-concept for farming native seaweed at a commercial scale, in partnership with iwi and local farmers. Dr Magnusson also worked with Aqua Curo to progress an exciting bioremediation pilot project at the wastewater treatment plant in Te Puke. The pilot will use macroalgae to remove nitrogen and phosphorus from treated wastewater to improve the water quality prior to it being released back into our waterways.





400 SCIENTISTS GATHER TO DEBATE NEW ZEALAND'S MOST PRESSING MARINE ISSUES

Over 400 scientists gathered at the University's Tauranga campus in July 2021 for the New Zealand Marine Sciences Society Conference.

With a theme of "Titiro whakamuri, kōkiri whakamua", looking back to move forward, the four-day event traversed topics ranging from microplastics, the impact of sea-level rise, how we can grow our aquaculture industry and identifying compounds in seaweed for use in agrichemicals. There was also a special symposium on green shipping, the use of electric ferries and the impact of acoustics on the marine environment.

Professor Chris Battershill who heads the University's team of marine scientists in the Bay of Plenty, played a key role in the organisation of the conference.

"There are many tensions at play. We want to ramp up New Zealand's blue economy for the benefit of New Zealand Inc, but we also want to ramp up our conservation and restoration efforts. The two priorities are fundamentally linked," says Professor Chris Battershill.

The conference brought all these complex considerations into one place, with a focus on the huge opportunities for unlocking high-value bioactive compounds within the marine environment while also protecting ecosystems from threats including land runoff, pollutants, sea temperature rise and ocean acidification.

Alongside a fast-growing aquaculture industry, New Zealand is also emerging as a leader in the development of agrochemicals derived from marine compounds. University of Waikato researchers are currently working on marine-based alternatives to glyphosates, the main ingredient in Roundup.

"We are entering a new era for high value bioactives from marine organisms and the agrochemical industry presents a huge opportunity for New Zealand because unlike pharmaceuticals we can capture all of that intellectual property in New Zealand," says Professor Battershill.



ROCKING THE BOAT: THE FUTURE OF AQUACULTURE IN NEW ZEALAND

Dr Simon Muncaster delivered a public lecture in Tauranga in July 2021, focusing on the challenges and opportunities that lie ahead for the aquaculture industry in New Zealand.

Recently Dr Muncaster has been working with a multidisciplinary research team and local iwi on the opportunity to farm New Zealand flounder, or pātiki. Flounder has the potential to be grown in shallow waterways, rather than needing big sea cages and tanks. It also offers an opportunity for coastal landowners and iwi to farm fish in shallow raceways, as well as to investigate the possibility of restocking the environment. Both of these concepts would be a move away from typical commercial aquaculture models.





GOAL 15: LIFE ON LAND



PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS



Home of world-leading experts in soil science, ecology and biodiversity



An abundant 'living lab' in our backyard ripe for scientific exploration



Committed to blending western science with Indigenous knowledge - mātauranga Māori

MONITORING THE HEALTH OF OUR ENVIRONMENT WITH ARTIFICIAL INTELLIGENCE

The University of Waikato has combined its longstanding expertise in data science and environmental science to keep better tabs on the state of our natural environment, so authorities can make informed decisions. The \$13 million, Ministry of Business, Innovation and Employment (MBIE) project TAI AO, led by Professor Albert Bifet, is now in its third year. It collates environmental data from around the country and makes it available to scientists. The computer programme performs a range of tasks including detecting algal blooms on waterways with minimal human involvement. It also checks Department of Conservation predator cameras and helps map at-risk trees using satellite imagery.

BIODIVERSITY ON CAMPUS

There are 2,500 trees and 70 ferns on the University's 65-hectare Hamilton campus. These include a wide variety of native and exotic flora and fauna including several groves of kahikatea and many other native trees, including rimu, tītoki, kauri, tōtara, miro, rewarewa, kōwhai, tī kōuka (cabbage tree), kāpuka (grisellinia), nīkau, and kānuka.



SOIL SCIENTISTS REVEAL REAL RISKS OF DRAINING PEATLANDS

Boggy, peat soils across large portions of the Waikato region are among the densest natural carbon stores in New Zealand. However, efforts to drain these areas to make the land farmable has led to massive carbon emissions and will continue to do so for years to come.

Soil science experts Professor Louis Schipper and Associate Professor Dave Campbell have been focused on the many aspects of this 'wicked problem' and say while re-flooding the peatlands

would stem carbon dioxide losses, it would not fix the problem in its entirety.

The duo were featured as part of Stuff's Forever Project in 2021, a national media campaign focused on climate change solutions.

They are key members of a team called WaiBER at the University of Waikato, who are progressing a raft of research projects focused on increasing soil carbon content and removing carbon dioxide from the atmosphere.



GREENING OUR CITIES WHEN WE NEED IT MOST



With Indigenous biodiversity at a crisis point around the world and more people looking to nature close to home to support their mental health during the Covid-19 pandemic, there has never been a better time for bringing Indigenous nature back into urban communities.

Professor Bruce Clarkson is an ecologist at the University of Waikato, and he is passionate about this very topic.

In 2021 he secured \$10 million for a research project called Restoring Urban Nature, courtesy of funding from the Ministry of Business, Innovation and Employment (MBIE). The project aims to restore Indigenous ecosystems and develop high-quality green spaces in urban landscapes and suburban backyards.

The multidisciplinary project builds on Professor Clarkson's previous project People, Cities and Nature, another five-year MBIE-funded programme which has transformed urban spaces in the Waikato, Hawkes Bay and Taranaki regions of New Zealand.

A SHINING EXAMPLE IN HAMILTON CITY

In July 2021 Professor Clarkson's work restoring urban environments in Hamilton, at Waiwhakareke Natural Heritage Park and local gully systems, saw him honoured with the prestigious Hamilton Kirikiriroa Medal.

It was his vision and research that helped to launch the Waiwhakareke project in 2004 with the support of local authorities, iwi and many community partners along the way. His vision was for a pest-free, self-sustaining biodiversity haven for native birds, bats, lizards and other species, inside the city boundaries.

Over 16 years, he has been the driving force in transforming the 65.5 hectare council-owned site from farm paddocks into an internationally acclaimed regenerating native forest, wetland and a lake ecosystem rich in biodiversity.

Every year on Arbor Day, and on countless other days, young and old gather at Waiwhakareke to plant trees.

The park is also used as an outdoor classroom and a place where mātauranga Māori (traditional Māori knowledge) is celebrated, alongside the science of restoring the flora and fauna.

It also has an appeal as a visitor destination, located next to Hamilton Zoo - a new shared entry is being built to showcase this important conservation precinct.

Professor Clarkson's research on Indigenous biodiversity continues to shape the city and has been incorporated into the Hamilton City Council 2021-2031 Long-Term Plan. Some \$29 million is earmarked for restoring and improving the city's extensive gully network, with the council aiming to increase urban Indigenous vegetation cover from two to 10 percent.

“It’s not just for the sake of biodiversity, it’s a place of recreation and a place where the community is working collectively, building social cohesion. It has multiple benefits, not just the biodiversity we are bringing,” says Professor Bruce Clarkson.

GOAL 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



Leading provider of law education in NZ with firm commitment to biculturalism



Working with NZ Police to provide evidential basis to help decision-making



Uniquely connected to our communities and decision-making bodies to maximise impact



PIONEERING FACULTY OF LAW CELEBRATES 30 YEARS

Te Piringa Faculty of Law was founded in 1991 with a firm commitment to biculturalism and was the first in the country to introduce Māori perspectives into its mainstream legal programmes. Its name, Te Piringa, translates as the coming together of peoples and cultures. Over the past three decades, it has become known as one of New Zealand's leading law schools, with a reputation as a pioneer in dispute resolution. With Professor Alpana Roy as Dean, the Faculty is now leading not only in Māori and Indigenous law, but in environmental law, international law, public law, and law and technology.

Emeritus Professor Margaret Wilson was the Faculty's founding dean and recalls the popularity of the programme upon its opening, with around 1000 applications in its first year and having a firm commitment to providing a pathway for students in the regions. "That was the most important thing for me. For many students going to Auckland, Victoria, Otago or Canterbury wasn't a practical option," says Emeritus Professor Margaret Wilson.



HONORING THE STUDENT VOICE

The Waikato Students' Union (WSU) is the voice of our student body and is governed by a group of 12 democratically elected students who listen, speak and act passionately on behalf of students. In 2021 Kyla Campbell-Kamariera (Te Rarawa, Te Aupōuri and Taranaki Tūturu) ably led the WSU as its President, a role which also gave her a seat on the University Council. The University Council is responsible for governance of the University, providing strategic direction and major decision-making. Kyla was a strong and passionate advocate for students during what was another year plagued by pandemic disruption, helping senior leaders make decisions around grading mechanisms and hardship support.

SUPPORTING NZ POLICE THROUGH EVIDENCE-BASED RESEARCH

The University works closely with NZ Police through the Evidence-Based Policing Centre, a joint partnership that is dedicated to multidisciplinary research about crime. The centre was the first of its type in the world when it first launched in 2017, targeting problems, testing solutions in live environments and tracking results to ensure the best outcomes for our communities.



TRANSFORMING DATA ECOSYSTEMS TO BENEFIT INDIGENOUS PEOPLES

A team of University of Waikato researchers is leading groundbreaking research focused on optimising data ecosystems for the benefit of Indigenous societies. The research will move beyond current efforts to reduce bias in algorithms, and explore what it means to 'decolonise' algorithms that adversely affect Māori communities.

Associate Professor Māui Hudson, Associate Professor Te Taka Keegan and Professor Tahu Kukutai (pictured below) are leading the four-year research programme titled Tikanga in Technology: Indigenous Approaches to

Transforming Data Ecosystems. The research is supported by \$6 million from the Ministry of Business, Innovation and Employment (MBIE) Endeavour Fund.

They will work with researchers from many other universities across New Zealand and globally to develop tools and processes that can help IT workers understand and incorporate Indigenous perspectives when working on data sets, not only in terms of storage and data processing, but also in the creation of algorithms that have the potential for bias.

Situated at the interface of mātauranga Māori and data science, this interdisciplinary programme has strong support from key data stakeholders across Te Ao Māori and Government. Associate Professor Hudson says the goal for Tikanga in Technology is to impact on data science projects in communities, at the University of Waikato, and beyond. "The research team plans to make publicly available a range of tools, frameworks and principles that will promote ethical and equitable engagement, with data grounded in Te Ao Māori world-views."





TURNING THE TIDE ON PRISON VIOLENCE



Dr Armon Tamatea is a clinical psychologist and former advisor to the Department of Corrections who is now leading a five-year research project, Nga Tūmanakotanga - Turning the Tide on Prison Violence, which is focused on reducing violence in New Zealand prisons.

The \$3.9 million project led by Dr Tamatea, is funded by the Ministry of Business, Innovation and Employment (MBIE), and began in 2019, involving a team of researchers from around the world.

There are around 9,000 violent incidents a year across the 18 prisons in New Zealand, 130 of which constitute serious assaults. However, the violence isn't always prisoner-on-prisoner violence. The number of prison staff assaulted increased from 654 to 889 in the 2019-2020 year, according to Department of Corrections figures.

Dr Tamatea was drawn to his research topic through his previous experience working for Corrections, including advising on violent incidents at Paremoremo Prison and Mt Eden Prison.

The first phase of the research, now two years in, has involved talking with the men and women inside, staff and management and family on the outside, as well as looking at policies and procedures. It has also involved taking a close look at environmental factors and prison design, including access to nature and outdoor environments, modern versus old, high security versus low security, open grill doors versus closed doors, and privacy versus accessibility.

“Manaakitanga is an important operating principle for us. It’s about ensuring that the people we are having a kōrero with are okay, and we reflect an ongoing concern for their wellbeing,” says Dr Armon Tamatea.

This next stage of research will focus on prevention and see the team embedded in five prisons in different regions, building relationships with the prisoners and staff at each site, along with local iwi.

The outcomes of the research will be used by Corrections and the Police to help predict violence in prisons, develop prevention and intervention strategies in partnership with the prison-based gang community, and a rethink on prison design and environment.

There won't be a one-size-fits-all solution to improving prison safety in New Zealand, says Dr Tamatea. “It’s about recognising what is going on

at each site and co-designing interventions and community development projects with the men and women who live and work at each one.”

One of the aims for the project team is to improve outcomes for Māori, who make up a disproportionate percentage of the prison population (some 53.1 percent are Māori, followed by 30.2 percent European, 11.5 percent Pacific and a remaining 4.9 percent who are classified as Other).

“At the very least, one thing I want to be able to achieve with this work is to support and facilitate some ways of improving safety within prisons, and prioritise localised knowledge as well.”

GOAL 17: PARTNERSHIPS FOR THE GOALS



STRENGTHEN THE MEANS OF IMPLEMENTATION AND REVITALISE THE GLOBAL PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT



Home of the Waikato Public Law and Policy Research Unit focused on the regulation of civil society, constitutional law and Indigenous governance



Active members of the Australasian Campuses Towards Sustainability (ACTS) group



Part of the Te Pūkai Tara Universities New Zealand SDGs Expert Working Group and host of the next SDG Summit event

PROUD SUPPORTERS OF THE WAIKATO WELLBEING PROJECT

The University works closely with the Waikato Wellbeing Project, a community-led initiative that has set ten wellbeing targets for the Waikato region, based on the United Nations Sustainable Development Goals (SDGs). A number of University staff were involved in helping to shape these targets and renowned urban ecologist, Professor Bruce Clarkson, now leads the workstream for SDG 13 - Life on Land. The Project's ultimate goal is to achieve a more environmentally sustainable, prosperous and inclusive region by 2030 and we are honored to be a part of it.



Waikato wellbeing project | Hinonga toiora o Waikato



SDGs THE FOCUS OF NEW LEADERSHIP ROLE

Professor Lynda Johnston was appointed to a new role of Assistant Vice-Chancellor Sustainability in 2021. Her focus is on shaping the University's strategic approach to sustainability and environmental management, and providing academic leadership and oversight of its activities as measured against the SDGs. One of her key achievements in 2021 was authoring a Sustainability Plan to guide decision-making at a strategic level across all facets of University operations.

OUR GLOBAL PARTNERSHIPS

The University of Waikato is a global university: we are connected internationally through numerous research, teaching and mobility partnerships; we deliver education offshore and we attract top international academic staff as well as international students from over 80 countries. We know that global collaboration increases the impact of our research, enhances opportunities for our staff and enriches the student experience. We are committed to fostering this collaboration through a portfolio of active and sustainable global partnerships.

NEW STRATEGIC PARTNERSHIP WITH CARDIFF UNIVERSITY

The University of Waikato launched a strategic partnership with Cardiff University in Wales in 2021 to foster opportunities for both staff and students, including a seed fund for collaborative research projects.

Collaborative research focused on the intersection between artificial intelligence (AI) and edge computing has also already proven fruitful between Waikato's Artificial Intelligence Institute and the Cardiff School of Computer Science, through research papers on AI for the Internet-of-Things and its application to rural areas.

The partnership is also expected to deliver opportunities in language and culture including language revitalisation, with the Welsh language that is considered a model for language revitalisation worldwide.

“Our partnership has already shown what can be achieved through international collaboration between committed academics in a short space of time and during a global pandemic,” says Professor Neil Quigley, Vice-Chancellor.



WHAT'S NEXT?

OUR SUSTAINABILITY PLAN 2022 - 2026

In 2021 we developed our first ever Sustainability Plan with input and support from across our University community. The plan includes six key objectives to drive and guide action towards sustainable development and fairer futures. Our plan is underpinned by a commitment to incorporating the knowledge and perspectives of Māori and Pacific peoples' as inseparable from environmental, social and economic dimensions of sustainable development.

OUR KEY OBJECTIVES

- 1** Embed Māori and Pacific principles and values of sustainability in the University's values.

- 2** Enhance the University's environmental performance with the aim to be carbon neutral by 2030.

- 3** Prioritise research that promotes the UN SDGs, climate action, and the creation of sustainable environments and fair futures.

- 4** Increase the number of students who have opportunities to develop sustainability and climate change related knowledge and understandings of effective and innovative solutions.

- 5** Foster leadership of sustainability across all areas of the University.

- 6** Join with others outside the University in dialogue and action on the SDGs with the aim of helping us meet our goals.





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