

# SUSTAINABLE DEVELOPMENT GOALS



- ❖ In 2015, 193 United Nations Member States agreed to adopt the 2030 Agenda for Sustainable Development (Agenda) and its 17 Sustainable Development Goals (SDGs).
- ❖ The Agenda and SDGs provide a shared blueprint to end poverty, promote prosperity and wellbeing for all people, and to protect the planet, now and into the future.
- ❖ The SDGs are the destination for everyone to reach in 2030.
- ❖ The SDGs require a holistic approach and participation of all sectors of society.
- ❖ Aotearoa New Zealand has committed to playing its part. Aotearoa is currently ranked 27<sup>th</sup> of all 193 UN Member States in the overall performance towards achieving the SDGs.\*
- ❖ The University of Canterbury supports the Agenda and SDGs. Learn how we are contributing to each of the SDGs.

\*<https://dashboards.sdindex.org/rankings>



# BSENS Bachelor of Social & Environmental Sustainability

## “Summer UN Internships”



This summer students from the new UC BSENS Bachelor of Social and Environmental Sustainability Degree and BCOM Business Students have an opportunity to intern with the United Nations One Planet Earth to document New Zealand’s Sustainable Consumption and production policies and case studies of reducing food waste & address poverty



The UNEP One Planet network is an organisation of 196 governments that addresses the unsustainable patterns of consumption and production as root causes of the triple planetary crises of climate change, biodiversity loss and pollution. In this virtual internship BSENS and BCOM students will assist UNEP to identify ways New Zealand produces and consumes food & goods that can also address inequality, poverty and wellbeing

UC students will review New Zealand policy on sustainable production and consumption for the UNEP website and will identify casestudies from Canterbury including food projects that promote sustainable living / consumption patterns as well as address social inequalities and poverty with a focus on circularity policies, sustainable footprinting and wellbeing.



# Poverty Reduction & Extractive Industries

Dr Pascale Hatcher - Associate Professor in Political Science & International Relations

## 1 NO POVERTY



Eradicating extreme poverty for all people everywhere by 2030 is a pivotal goal of the 2030 Agenda for Sustainable Development.



Mining is an important source of revenues for developing countries rich in mining resources. Did you know that the Asia-Pacific region alone accounts for more than half of the world's total production of metal ore? Revenues from mining exports in developing countries can significantly increase public spending! For example, Oxfam estimates that:



Angola could multiply its spending on health by a factor of between 8 and 10, while Nigeria could multiply its health spending by a factor of 2.5 or three.



Chad could more than double its investment in education, while Venezuela could triple its education spending.



But large-scale mining not only is plagued with human rights abuses, it's also one of the world's most environmentally destructive activities!



## Research Questions



Why are some of the richest countries in valuable natural resources often amongst the poorest nations in the world?



Why and how are some development actors such as the World Bank and bilateral donors promoting foreign-led, large scale mining in the Global South in the name of poverty reduction?



Who should decide whether, and if so how, mining should take place?



What is the responsibility of rich countries such as New Zealand in minimizing the socio-environmental impacts of the minerals we import from the Global South?



## The Case of Mongolia

Mongolia has mineral reserves of US\$1.3 trillion! It became the world's fastest-growing economy (2012)! Yet the mining boom has failed to deliver on its development promises:



**Environmental Impacts:** Dust and water are the two main issues as local nomadic herders are competing for resources with 2 of the largest mines on Earth – Oyu Tolgoi and Tavan Tolgoi. The Oyu Tolgoi mine alone will use 920 litres of water per second... for the next 30 years!



**Economy:** The IMF has issued a US\$5.5 billion financing package for Mongolia – in terms of GDP, the 4<sup>th</sup>-largest package in the IMF entire history! The Mongolian government is signalling that it will continue to rely on mining as the main pillar of its economy. It has now opened more than one-fifth of the country to mining exploration.



**Political Spaces:** It has been increasingly difficult for local communities to contest the current mining regime, both locally and internationally. The country's economic dependency on mining means that the government is attempting to silence any dissidence. Local leaders, civil society representatives, environmentalists (and their lawyers) are being prosecuted.





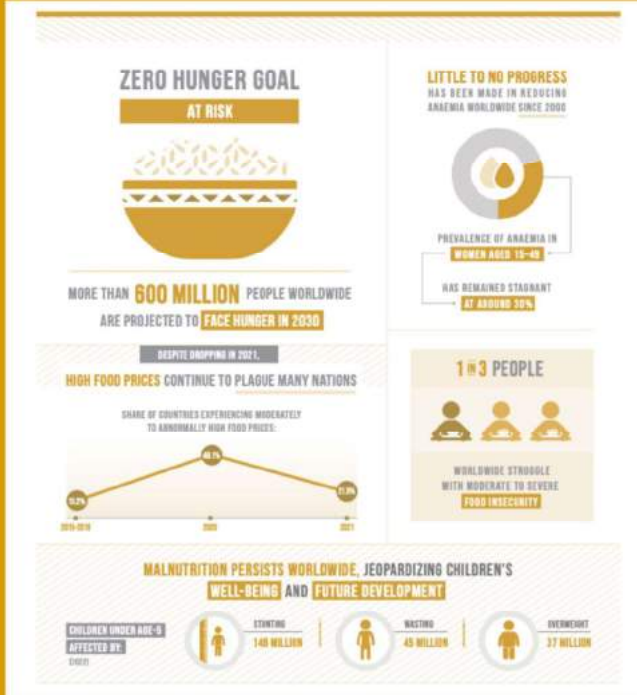
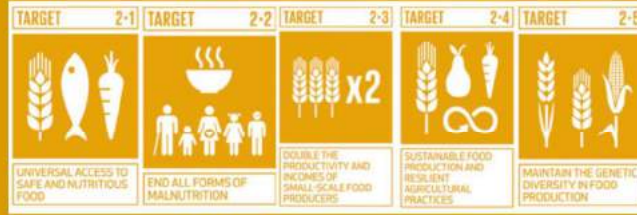
# SDG 2: Zero Hunger



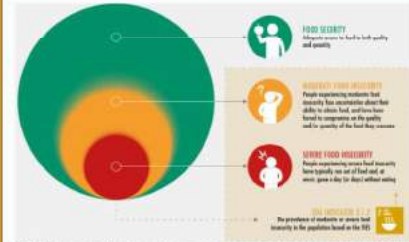
By Dane Aguinot (dag65@uclive.ac.nz) and Magdalene Leith (mle154@uclive.ac.nz) 21st of October, 2023

## What is the goal?

- The goal of Sustainable Development Goal 2 is to end world hunger by 2030. The main targets of this goal include:
- Making sure everybody has access to food, with a specific focus on vulnerable communities.
- Eliminating all forms of malnutrition which includes obesity and stunting
- Supporting small-scale farmers by doubling their income and land productivity.
- Emphasize building resilience in crop production. This includes promoting sustainable agricultural practices and ensuring that there are genetically diverse crops, which is essential in adapting to the adverse effects of climate change, such as extreme weather events.
- It's crucial to highlight the urgency of these targets, given the reality revealed in the United Nations report on global hunger (2021), which indicates that 828 million people worldwide are currently affected by hunger.



## Why are people hungry?



- Food insecurity refers to the inability to consistently have access to healthy, nutritious food.
- Poverty is a major underlying cause of food insecurity, affecting individuals worldwide by limiting their access to an adequate food supply due to financial constraints.
- Another contributing factor to food insecurity is limited food access. This limitation can be location-based; where certain places around the world face challenges in obtaining an adequate supply of healthy, nutritious foods. Examples include geographical remoteness, lack of transportation infrastructure, or limited market availability.

## What are the effects?

Hunger can have detrimental effects to human health, which can include but is not limited to: Reduced learning, productivity, and mental health, impaired physical, cognitive, and emotional development, malnutrition - which includes:

- Stunting - defined by the World Health Organisation as "...The impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation". As shown in figure 2, in 2022, 148.1 million children under age 5 are affected by stunting globally.
- Wasting (low weight for height) - 45 million children in the world under age 5 suffer from wasting.
- Being overweight - 37 million overweight worldwide in 2022.

The prevalence of undernourishment (figure 1) is concentrated in developing countries with 9.2% of the world population facing chronic hunger in 2022.

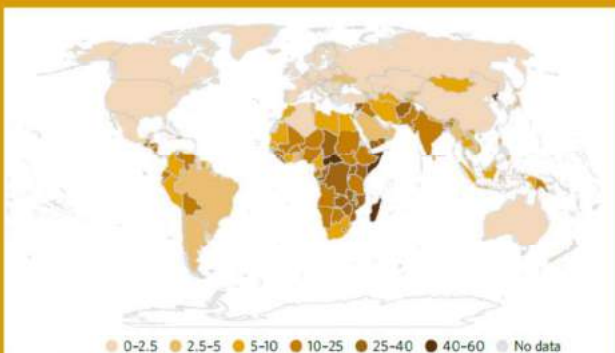


Figure 1. Prevalence of undernourishment, 2020-2022 average (percentage). (United Nations, 2023)

## What can we do to help?

There are a number of things that you can do in your daily lives in order to achieve SDG2. This can include:

- Decrease food waste: freeze leftovers and produce. Creating your own responsible habits e.g. proper storage.
- Consume less meat: producing meat is energy inefficient. Reducing meat consumption means that resources can be allocated more efficiently, making it possible to feed a larger population, reducing the pressure on farming systems.
- Support organisations that focus on SDG2
  - Global Alliance for Improved Nutrition (GAIN)
  - World Food Program (WFP)
  - The Hunger Project
- Support sustainable agricultural practices: buy food that is local and in-season, this can support local farmers and sustain native crops.
- Volunteer for local soup kitchens, food banks, and charities that are doing work to feed local people.

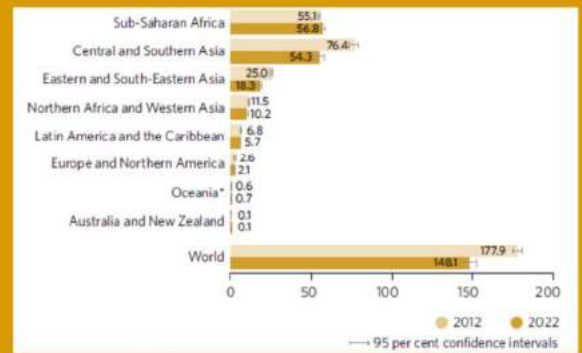


Figure 2. Number of children under age 5 who are affected by stunting, 2012 and 2022 (millions) (United Nations, 2023).

# Building Resilience for Food Security through Local Supply Chains

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<sup>3</sup> Resilient Organisations, Christchurch, New Zealand

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## Background

The Hutt Valley and its population of about 160,000 residents potentially face 90 days without road access in an Mw 7.5 Wellington Fault earthquake. Failure of critical assets such as roads, electricity, telecommunications, fuel, and water can impact supermarkets' ability to continue functioning and the delivery of food supplies.

- How do we get supplies in?
- What can we do to improve the community food resilience?

Emergency managers have identified several potential options: deliver goods to supermarkets via a sea route using barges over Wellington Harbour or build new / upgrade current road(s).

Therefore, exploring these different options that may strengthen local supply chain distribution following a disaster will be critical to understanding the food resilience of the Hutt Valley.

The aim is to provide decision-makers with the ability to understand better the risks, resources, uncertainty, and trade-offs of different intervention options.

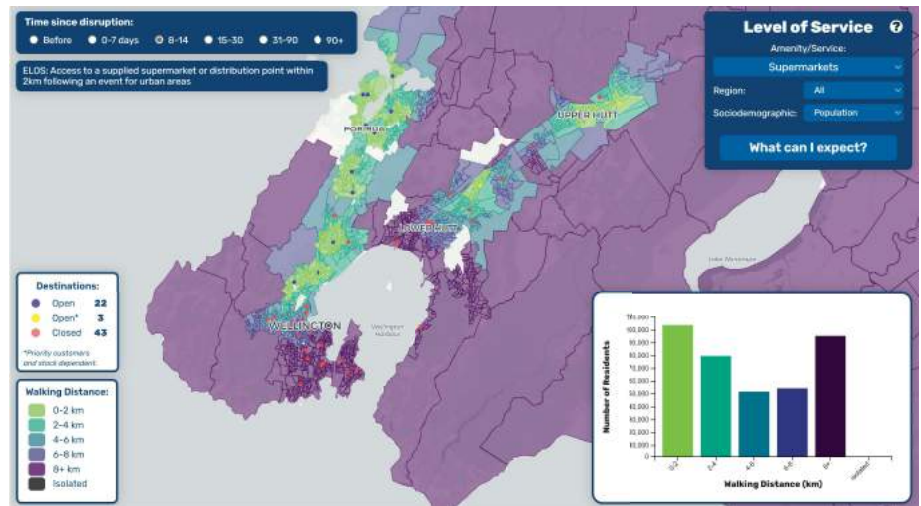


Figure above shows a user interface showing walking access for Wellington residents in the event of a disaster. It shows supermarkets in the Hutt Valley are still closed or open with certain conditions 8-14 days after the disaster. However, it does not account for the supply of stock to these supermarkets. Is there even enough food in open supermarkets?

## Do you have enough food supplies?

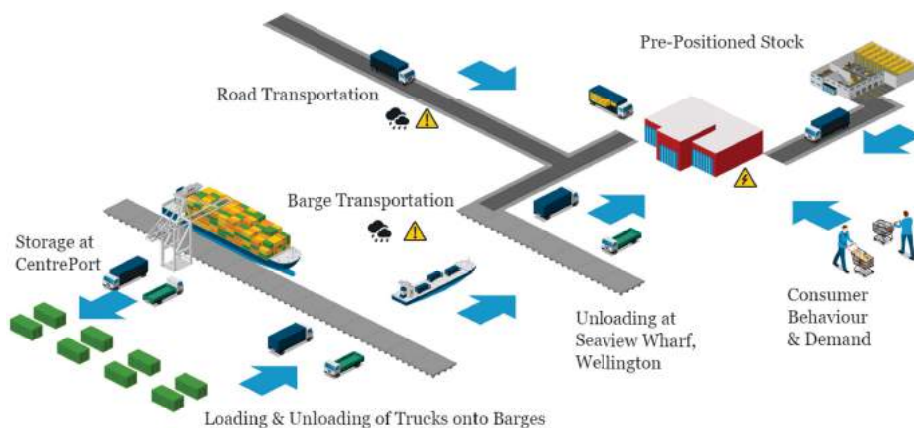


Figure above illustrates supply chain logistics to supermarkets via the barges or road interventions

## Objectives

This research aims to investigate the role of local supply chains in achieving urban food security resilience following a natural hazard and evaluate potential interventions. Specifically:

- To what degree do local supply chains impact a community's food resilience?
- Can we withstand and recover from disruptions in a way that ensures a sufficient supply of acceptable and accessible food for all?
- What aspects of the local supply chain impact local food resilience?

## Methodology

Discrete-Event Simulation (DES) models the operation of a system as a sequence of events in time. DES can be useful for problems that consist of queuing simulations or a complex network of queues in which the processes can be well defined, and their emphasis is on representing uncertainty through stochastic distributions.

## Conclusion

- Following a disaster, local supply chains are essential to food resilience.
- We need to improve our ability to compare how different intervention decisions enable supply chains to deliver sufficient food to retail stores following a disaster.
- A Discrete-Event Simulation is able to model the complex network of queues and track resources.
- The outputs can provide decision-makers with better understanding of risks, resources, uncertainty, and trade-offs of different interventions in order to improve food security.

# SD3 GOOD HEALTH & WELL-BEING

## HLTH101 INTRODUCTION TO HEALTH STUDIES

### APPLY THEIR UNDERSTANDING OF DISEASE AND HEALTH FROM DIFFERENT LENSES

Students apply their understanding of diseases to population groups in New Zealand. This develops their ability to understand disease (and health) from different viewpoints. This develops students understanding of SDG targets 3.7 & 3.8, and 3.B.

### ANALYSE WHAT INFLUENCES HEALTH

Students analyse individual, social and community, cultural, and environmental influences on health. Tailor-made learning resources coupled with online discussions, tutorial activities and assessments help develop the student's analytical skills. This contributes to their understanding of SDG targets 3.6 to 3.9, 3.A and 3.B.

### EVALUATE CHALLENGES TO ACHIEVING GOOD HEALTH AND HOW HEALTH SYSTEMS RESPOND

Students examine challenges to achieving good health, deepening their understanding of challenges of health inequities, complexities, and globalisation. They also evaluate how the Aotearoa New Zealand health system responds to achieving good health. This develops their understanding of SDG targets 3.6, 3.7, 3.8, 3.B, 3.C and 3.D. We do this through engaging discussions and debates, both class and online.

### CREATE & INNOVATE SOLUTIONS

By the end of the course, students are thinking about diseases, health, what influences health, some challenges and ways that the Aotearoa New Zealand health system is responding. They create fliers and video presentations highlighting these issues. They investigate solutions to the challenges and think about what else could be done in New Zealand to achieve good health

UNDERSTAND

APPLY

ANALYSE

EVALUATE

CREATE

### UNDERSTANDING DISEASE

In HLTH101 students learn about diseases, their patterns and what influences diseases. This understanding broadens their knowledge about SDG targets 3.1 to 3.5, and targets 3.7, 3.9 and 3.A. We do this through tailoring learning resources, class-room and online discussions, and activities.

# 3 GOOD HEALTH AND WELL-BEING



The **Sustainable Development Goals** are captured in our Bachelor of Health Sciences teaching, staff research, and student supervision in the Faculty of Health at UC.

**Good health and wellbeing is about ensuring people have access to quality, timely health care, and making the most of preventive measures, such as vaccination, improved water and sanitation. While we've seen advances in responses to HIV/AIDS and maternal mortality, the effects of COVID-19 on the health workforce globally have been devastating. Challenges to achieving SDG3 remain.**

**TARGET**
**3-C**

**INCREASE HEALTH FINANCING AND SUPPORT HEALTH WORKFORCE IN DEVELOPING COUNTRIES**

"The fracture lines in India's health system have been developing for years. After decades of under-investment in healthcare and preventative health, India has one of the most primitive health systems in the world. As a consequence, healthcare costs are a leading cause of poverty.

As my recent research into rural mental health services shows, patients are caught between the under-resourced public sector and the profit-focused private health market. Some even many, have to 'sell a buffalo to pay for a brain scan.'"

**Dr Kaaren Mathias**  
Senior Lecturer, Faculty of Health  
& Founder-Director of the community mental health project, Burans, Uttarakhand

**TARGET**
**3-7**

**UNIVERSAL ACCESS TO SEXUAL AND REPRODUCTIVE CARE, FAMILY PLANNING AND EDUCATION**

Dr Amrita Namasivayam completed her PhD at UC in 2021 asking: What if...? fewer women in Uganda could die from unsafe abortions or complications due to unplanned pregnancies?

Amrita examined contraceptive use in Uganda finding, within the largely patriarchal society, women had to navigate many obstacles. These included: fears about contraceptive side effects; partner opposition and socio-cultural norms that favoured large families.

"My husband doesn't want family planning, yet for me I want to go for family planning because of the responsibility I have, I go without his knowledge so he keeps wondering why I don't get pregnant."  
- Female participant, urban Uganda

Today, Amrita is International Project Lead for Kiribati and Vanuatu at Family Planning New Zealand.

**TARGET**
**3-5**

**PREVENT AND TREAT SUBSTANCE ABUSE**

In HLTH213: Health Systems & Policy, our students undertake an evidence-based assessment of interventions to reduce alcohol-related harm. They learn that, at the population level, policy responses have the greatest supporting evidence e.g. minimum pricing, restrictions on locations and operating hours.

In workshops, students gain applied skills writing submissions to government, undertaking critical policy analysis, and using mixed media to advocate for policy change. These practical skills set them up for a career in health policy and health promotion.

**TARGET**
**3-3**

**FIGHT COMMUNICABLE DISEASES**

One Virus, Four Continents, Eight Countries: An Interdisciplinary and International Study on the Psychosocial Impacts of the COVID-19 Pandemic among Adults

Social Protection and Social Determinants of Health in COVID-19 and Related Disasters: What Can We Do About Them?

Patterns of Suicide Ideation Across Eight Countries in Four Continents During the COVID-19 Pandemic Era: Repeated Cross-sectional Study

Public health and COVID-19: Leaky bodies and regulated borders

**TARGET**
**3-4**

**REDUCE MORTALITY FROM NON-COMMUNICABLE DISEASES AND PROMOTE MENTAL HEALTH**

Figure one: Disability adjusted life years lost (DALYs) by cause in NZ, 2016.

In HLTH214: Environmental Health, Assoc. Prof. Arin Basu draws on his work with the Global Burden of Disease Mortality team to support students to interpret the Global Burden of Disease and Disabilities to appreciate the magnitude of the non-communicable disease problem.

**TARGET**
**3-8**

**ACHIEVE UNIVERSAL HEALTH COVERAGE**

In HLTH213: Health Systems & Policy, students explore why universal coverage is an important goal for health systems. Defined as: having access to health service when they are needed without incurring financial hardship, New Zealand adopted universal health coverage in 1938. Today, 78 countries have universal health coverage.

In HLTH213, students examine different models of universal health coverage, analyse data on health system performance and find NZ's Beveridge model is efficient and cost-effective, but with lower levels of patient satisfaction than we see in many social insurance based systems.

# SDG 4 Quality Education

EDEM685: Culturally Inclusive Pedagogies: Motivating Diverse Learners

Prof Angus Macfarlane, Dr Kay-Lee Jones and Jen Smith (CC)

School of Teacher Education | Faculty of Education

## Teaching for āpōpō

EDEM685 creates immersive and pedagogically-aligned wānanga (learning experiences) designed to empower educators in navigating the integration of theoretical knowledge into practical application. Our aim is to equip professionals with the tools and insights required to effectively address the growing diversity within learning environments in Aotearoa New Zealand.



When it comes to teaching and learning... Culture counts!

“There is nothing more practical than a good working theory”

(Professor Angus Macfarlane, EDEM685 Wānanga 1, 2022)

This Masters level paper caters to a diverse postgraduate student body, encompassing educators from various educational sectors, including ECE, Primary, Secondary, and Tertiary levels, along with specialist teachers, and professionals affiliated with government ministries. The development of our curriculum is a rigorous process to ensure alignment with our students' educational objectives and aspirations. The wānanga include:

Theories of Engagement and Motivation for culturally diverse learners, Indigenous Social and Emotional curriculum, Te Tiriti o Waitangi in education environments, indigenous education frameworks such as Hikairo Schema and Te Kura Tapa Whā, Online learning for culturally diverse learners, the praxis of Māori and Pacific education, De-streaming, and cultural safety.



EDEM685 has a rich history spanning more than 25 years, initially established at the University of Waikato and, for the past decade, hosted at the University of Canterbury. Its inception was a result of the visionary work of Professor Angus Macfarlane (*Te Arawa*), a tohunga in Māori Education. Professor Macfarlane's research, which underpins the academic direction of this course, delves into the examination of Indigenous and sociocultural imperatives that exert a profound influence on the fields of education, psychology, and mātauranga Māori.

## A whakapapa of excellence



From 2022, Dr Kay-Lee Jones (*Te-Aitanga-a-Mahaki, Ngāti Porou, Ngāi Tahu*) and Senior Lecturer Jen Smith (*Ngāti Whātua, Ngāpuhi*) lead this kaupapa in Angus' stead.





# SDG 4 Quality Education

Sara Tolbert, Associate Professor  
Faculty of Education  
University of Canterbury



## “Glocal” contexts

What does it mean to live well together in times of ecological precarity? Preservice teachers draw from science and mātauranga Māori to learn how tamariki can learn ‘science that matters’ to our local and global (or “glocal”) communities. In activity depicted to the left, preservice teachers are conducting a multi-pronged study, testing for macroinvertebrates, temperature, flow and pH, to explore the driving question, Is our stream wai ora, wai kino, or wai mate?

In the activities below, preservice teachers work with soils in the Waiutuutu Community Gardens to learn how soil animals contribute to ecological health. They draw from both the Hua Parakore framework (Te Waka Kai Ora) as well as soils and biodiversity research (Manaaki Whenua - Landcare Research) to better understand critical relationships between humans, soil, non-human animals, and soil microbes. They learn how to design activities and experiences for tamariki that simultaneously support science understandings and ethical and sustainable ways of living within the natural world.



## Transdisciplinary connections

Also essential to sustainable development education in our current times is learning to make connections across disciplinary contexts. Preservice teachers in the Faculty of Education learn to design meaningful cross-disciplinary educational activities for tamariki, such as working together to make sustainable household cleaning products. They draw from science, technology, and art to explore relationships between pH and cleaning agents, while considering the impact of various chemicals (sustainable and unsustainable) on our ecosystems.



## Climate change and community

Preservice teachers learn to teach about the science of climate change in empowering ways such as engaging with community partners (e.g., Christchurch City Council). Exploring what local groups and hapū are doing to mitigate and adapt to climate change helps ākonga see how we can work together to address wicked problems. They also conduct ‘modeling’ experiments to study effects of climate change relevant to coastal communities such as ocean acidification, and use digital modeling tools and games to explore multiple perspectives on climate change adaptation.



**Quality Education: Empowering Ākonga to Effect Change Together**

# Crash-test Dummies & Why Having More Female Scientists Matters



A woman involved in a car crash is **47%** more likely to be **seriously injured**, and **17%** more likely to **die**, than a man.

Why?

**Because cars have been designed with male safety in mind.**

- Crash-test dummies were first introduced in the 1950s, and for decades they were based around the 50th-percentile male.
- In the early 1980s, researchers argued for the inclusion of a 50th-percentile female. This advice was ignored by manufacturers and regulators.
- It wasn't until 2011 that the US started requiring a "female" crash-test dummy (but really it is just a scaled down male)
- In the EU, anthropometrically correct female crash-test dummies still aren't required in any car safety test.



## SDG 5: Gender Equality

Mary Wiles, Senior Lecturer  
Faculty of Arts  
University of Canterbury

### Women/Theory/Film



*Cléo from 5 to 7*, Agnès Varda, 1962

This Honours course investigates the changing place of women in film: as glamorized spectacle and cultural commodity, as spectators and consumers, but also as creators and theorists. We explore the development of feminist filmmaking and film theory within an international context, focusing specifically on the interrelation between American films and filmmakers and New Zealand and other national cinemas. We address topics that have historically engaged women filmmakers, theorists, and scholars. These include: images of women on the screen; the notion of countercinema; issues of female spectatorship; women's place in film genres, and issues related to race, class, and sexual preference as they intersect with feminism.

### Coming of Age in Global Cinema

Stories of youth after childhood are compellingly represented in films across the globe. In this course, we examine the representation of adolescence within an international context, focusing primarily on the experience of youth beyond dominant Hollywood. We closely analyse those films from across the globe that complicate our understanding of female adolescent identity by acknowledging its intersection with other kinds of identification - in particular racial, class, national, and that of sexual orientation.



*Rain*, Christine Jeffs, New Zealand, 2001



*Girlhood*, Céline Sciamma, France, 2014



*Vai*, directed by nine female Pacific filmmakers, in nine Pacific islands: Fiji, Tonga, Solomon Islands, Kuki Airani (Cook Islands), Samoa, Niue and Aotearoa (New Zealand). 2019

**Gender Equality: Empowering wāhine to achieve change**

# The Climate Migration Impact on Aotearoa's Potable Water Supply

By W.M. Conibear and A.G.M. Lysaght | Dr R.A.M. Peer

## Why do we need to assess the impact of climate migrants on infrastructure?

- Aotearoa's population is projected to increase to 6,215,800 people by 2050 and **climate migration is expected to contribute 1.6% to this increase.**
- Although they account for climate change and population increases, nationwide water resource management forecasting techniques currently **exclude the impacts of climate migrants on water supply.**
- Water New Zealand's Insights and Sustainability Advisor noted that "our [Aotearoa] **water source capacity and climate preparedness** is a really tricky one that **is not yet well understood.**" (Direct correspondence)
- There is a **need to understand the impact of climate migration** on Aotearoa's potable water supply.

## How do we estimate the impacts?

- Available data from Stats NZ (population estimates to 2050) and New Zealand's Drinking Water Register (available water capacity) and data of insurance home losses (to assume internal migration) in 2050 were leveraged to build a model with Aotearoa's **first estimate of regional available potable water supply for a 2050 population including climate migrants** (Figure 1).
- A qualitative scale was built to describe the **Level of Impact (LoI)** a region is predicted to face in 2050, considering both the impacts of climate-induced changes in available water capacity and population changes due to climate migration.

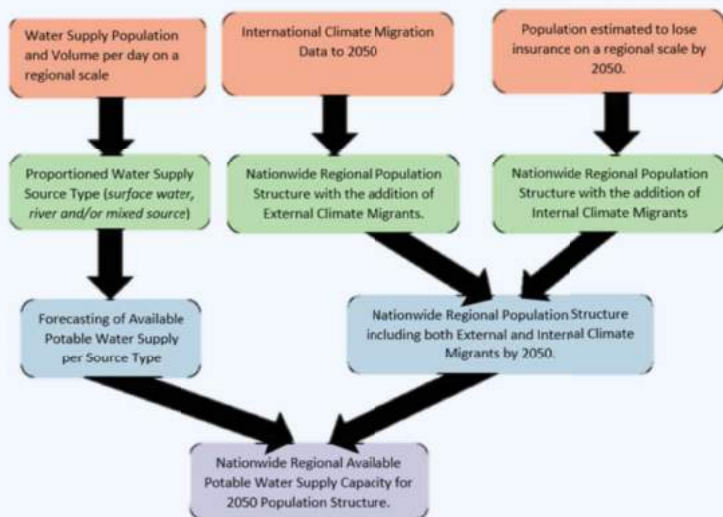


Figure 1 - Schematic outlining model construction; accounting for climate, migration and water supply data.

- Because of limited data availability on climate migrants and water source capacity, the following assumptions were required:
  - The relative proportional of water supply type (surface water, ground water, mixed source) would remain constant from 2018 to 2050.
  - Based on the Asia-Pacific migration prediction, 2.5% of Pacific Islands population would migrate to Aotearoa.
  - The most recent data for the location where Pacific Island migrants settled across Aotearoa was valid for 2050.
  - No new immigration policies would impact the forecasted migration data beyond 2020.

## What are the predicted impacts?

### Data simulation

- The regional available daily water supply per person for 2018 and 2050 was determined from the model output (Figure 2). The incorporation of climate migrants for 2050 population estimates shows that **water supply will need to be better managed to avoid demand exceeding available capacity (of 162.8 L/person/day).**
- The regional population distribution of predicted internal migrants and external migrants were different. **Water resource management planning must account for these regional differences.**
- **Regions supplied by a high proportion of surface water were found to be vulnerable** to a decrease supply capacity in 2050.

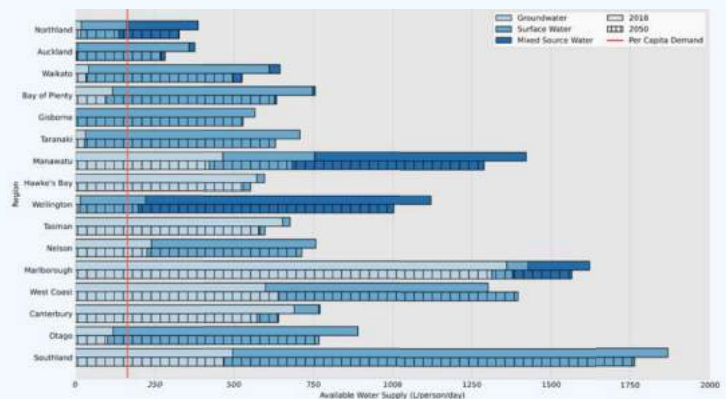


Figure 2 - The available daily water supply per capita in 2018 and projected to 2050 incorporating climate migrants on a regional basis.

### Level of Impact (LoI)

- A qualitative scale of impact of climate migrants on water supply was used to classify the regional outcomes of our assessment (Figure 3).
- **Auckland** was estimated to **receive the majority of climate migrants by 2050 (38%)** and is **supplied mostly by surface water**. This **classifies the Auckland region at a LoI of 5.**
- **Auckland's water demand will increase more than any other region** and surface water source supply will experience the greatest pressure from increased severity and frequency of drought due to climate change.
- **Manawatu, Marlborough and Hawke's Bay regions** were each estimated to **receive less than 2.5% of the total climate migrants by 2050.** Regional water supply is largely sourced from **groundwater**. Comparatively, the potable water supply in these regions will not be as greatly impacted by climate migrants.

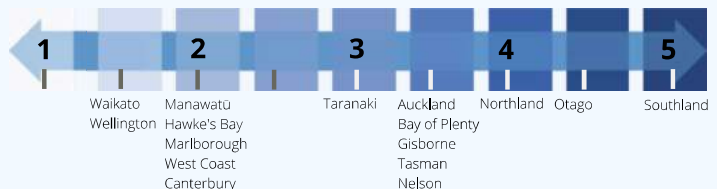


Figure 3 - Level of Impact Indicative scale across regions.

## Where do we go from here?

- This model shows that the **climate migrants are likely to impact available water supply over time** and therefore **regional water plans should account for climate migrants in the future to avoid water demand exceeding supply capacity.**
- More specific quantification of climate change impacts on water supply will improve data quality and overall assessment. In this analysis, the impact of climatic changes were considered only for surface water; the impact of increased flooding on groundwater was ignored.
- The migrants from each Pacific Island country must be quantified to improve the quality of migration data for 2050. This assessment assumed a uniform proportion (2.5%) of the 2050 Pacific Islands population will migrate to Aotearoa.



# Humanitarian Engineering & Safe Water for Communities

Matthew Hughes & Ricardo Bello-Mendoza



Civil & Natural Resources Engineering | Co-Directors Humanitarian Engineering Programme

Humanitarian Engineering applies people-centred engineering to improve the quality of life of communities. Engineers play key roles in infrastructure development and provision of essential Water, Sanitation and Hygiene (WASH) services. Understanding how to implement WASH and other basic human needs systems supports disaster response and wider community development. The University of Canterbury's Humanitarian Engineering Programme provides students with fundamental skills in Field Engineering, hapū/marae engagement, and international experiences.

## Humanitarian Field Engineering



Extraction of water from bore



Water treatment



Construction of tap stand

## Hapū/Marae Engagement



Ōnuku Marae, Akaroa



Ōnuku Marae – observing water treatment and storage



Ōnuku Marae – water source analysis

## International Experiences - Tonga



Installing water roof-capture and treatment at a high school



**EPECCentre**  
ELECTRIC POWER ENGINEERING CENTRE  
*Te Hiranga Pūhanga Hiko*

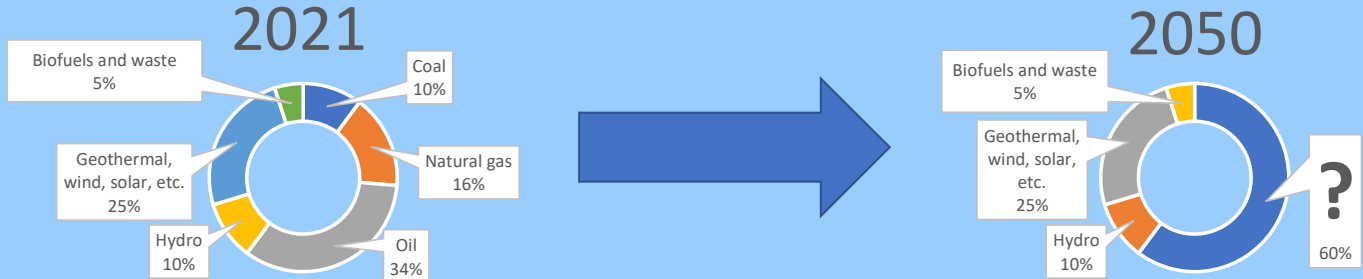
**SDG**

**7 AFFORDABLE AND CLEAN ENERGY**



**United Nations**

*We need to shift where our energy comes from*



*Current and past EPECCentre projects working towards an affordable, renewable energy future:*

**Energy efficiency and demand reduction**



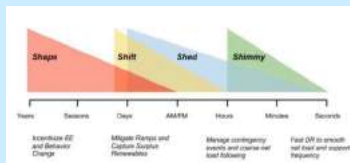
**EV and EV Charging**  
Testing the efficiency of EV chargers and EV battery management. Being efficient here saves energy, money and infrastructure costs.

**GREEN grid (2012-2019)**  
Renewable energy & the Smart Grid – Future Proofing NZ’s Electricity Supply. Led by EPECCentre to contribute to access to reliable, safe, and affordable renewable energy



**Future Architecture of the Network**  
How would our electricity supply network look if we transferred power with DC in place of AC? Can efficiency improve by reducing DC/AC and AC/DC conversions?

**Demand-side Flexibility**  
Can we reduce our peak electricity demand by shifting when we use it? FlexTalk participant.



**Transport Decarbonisation**  
How do we reduce emissions while ensuring equitable accessibility to trade, education, work, and health?

**Renewable Energy & New technologies**

**Transport electrification**  
Can we better electrify transport with cutting edge cryogenic power electronics? Applications to road, rail and air transport



**ECCA Solar calculator**  
Developed by EPECCentre, the Energywise™ Solar Tool is a free, easy to use tool to evaluate the benefits of roof-top solar for NZ households.

**High Temperature Electric Brushless Motors**  
Applications for high temperature operation for aerospace and geothermal power plants.



**Transition Engineering**  
Host professional development online courses that teach the InTIME Methodology® (Interdisciplinary Transition Innovation Management & Engineering) for applying to the wicked problems of climate change

**Agrioltaics**  
Can we use highly productive land to efficiently produce both food and energy? Solving the tension between land uses.



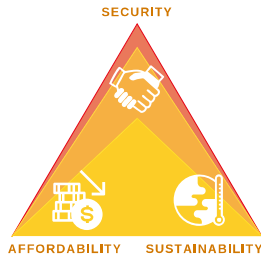
# SDG 7: Affordable and Clean Energy - “Ensure Access to Affordable, Reliable, Sustainable, and Modern Energy for All”

Dr.-Ing. Jannik Haas | Senior Lecturer | Sustainable Systems | Director of Postgraduate Programmes in Renewable Energy  
 Dr. Rebecca Peer | Senior Lecturer | Sustainable Systems | Co-director of Postgraduate Programmes in Renewable Energy

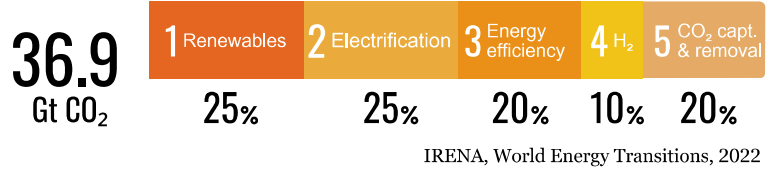
## The energy trilemma

Objectives that need to guide energy policies.

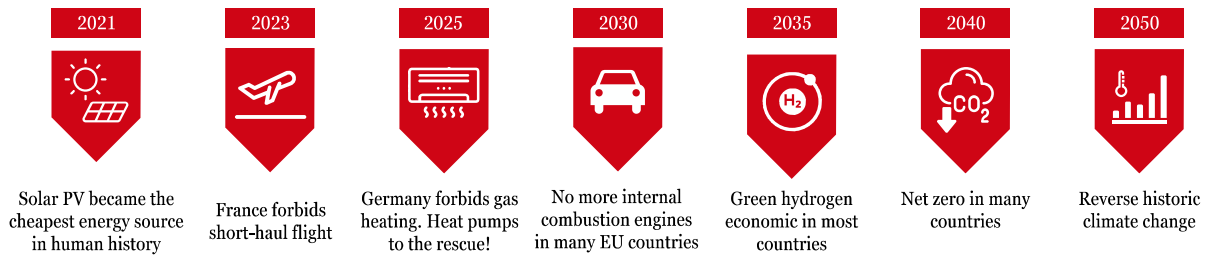
How do we balance them?



## Five pillars towards net-zero



## Taking a look into our future



## Courses



**ENCI601 Risk Management**  
 Identification, analysis, evaluation and treatment



**ENGR621 Energy, Policy and Society**  
 Inter-disciplinary subject of energy



**ENCN625 Wind Resource Modelling**  
 Analytical, numerical, spatial modelling



**ENCN623 Energy Systems Modelling and Analysis**  
 Planning renewable energy systems, applied software



**ENEL667 Renewable Electricity System Design**  
 Technical design of renewable electricity systems



**ENCN423 Sustainable Energy Technologies**  
 Solar, wind, hydro, biomass and geothermal resources

### And more!

- ENME605 Advanced Energy Systems Engineering
- ENTR614 Planning and Design of Sustainable Transport
- ENAE607 Building Energy Systems Design Practice
- EMGT605 Sustainability Systems in Engineering
- ENCH683 Advanced Energy Processing Technologies and Systems
- ENME465 Heating Ventilation and Airconditioning Engineering
- ENEL480 Electrical Power Systems

## Postgraduate programmes

- Certificate of Proficiency (single courses)
- Postgraduate Certificate in Engineering (one semester)
- Master of Engineering Studies endorsed in Renewable Energy (taught master)
- Master of Engineering (research-based master)
- Doctor of Philosophy

## Research at Civil and Natural Resources Engineering

We have the following ongoing **projects** on renewable energy:

- **HINT**: New Zealand German Platform from Green Hydrogen Integration (NZ MBIE and German BMBF)
- **Pūhiko Nukutū**: A Green Hydrogen Geostorage Battery in Taranaki (MBIE).
- **Comprehensive Zero-Carbon Strategy for South America**: Advancing Energy Equity and Green Hydrogen Export Potential (UC's SDG projects)
- **Adaptive decision-making tool** for multi-source water and energy infrastructure optimisation (UC's SDG projects)
- **Pathways to net-zero carbon buildings and communities** (NZ BRANZ) as part of the Building Innovation Partnership

### Groups

#### • Transport Research Hub

A cluster involving over 20 interdisciplinary staff members on transport.

#### • Sustainable Energy Research Group (SERG) ⚡

Over 10 postgraduate researchers and diverse staff members working on future energy systems



Interested in research? Join us!



serg.co.nz

# PACE 225

## WORKPLACE SKILLS AND CORPORATE SOCIAL RESPONSIBILITY



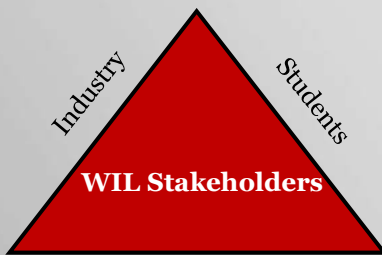
Image: Haworth Tompkins

### DIRECT IMPACT ON OUR COMMUNITY...

- Authentic project development to advance a partner organisation's corporate social responsibility towards a "call-to-action."
- Small team-based learning with groups, researching, planning, and presenting recommendations to partner organisations.
- Upskilling in professional development and career-directed learning in a combination of academic and reflective exercises.

### WORK-INTEGRATED LEARNING (WIL)...

- Broad term that covers a wide range of activities, such as
  - internships,
  - scenario- and case-based learning,
  - practicums, professional practice, and
  - placements.



University of Canterbury

- Can be implemented as a small module of a course or embedded across an entire curriculum or University degree program.
- A form of career development learning, is a teaching and learning practice where students are given the opportunity to connect their discipline, and the skills they are learning, to the world of work.

### OUR PACE 225 PARTNERS...

- Hawkins on the Court Theatre Build
- Multitude of contributing partners including:



- Partners lectured into the course, lending their expertise around
  - Career development
  - Corporate Social Responsibility
  - Christchurch business climate



**PACE**

### PROFESSIONAL AND COMMUNITY ENGAGEMENT PROGRAMME...

- Equity-based
- Unpaid
- Interdisciplinary
- Project or Internship Courses
- Local and International Experiences
- Bespoke Internship Placements

**IMPACT**

### AFTER PACE 225...

- Uplifted career confidence
- Uplifted professional development
- High resilience and adaptability
- High engagement with workplace learning

**Learn It, Live It**



# SDG 8: Decent Work and Economic Growth

Dr Nadeera Ranabahu, Senior Lecturer, Te Kura Umanga | UC Business School

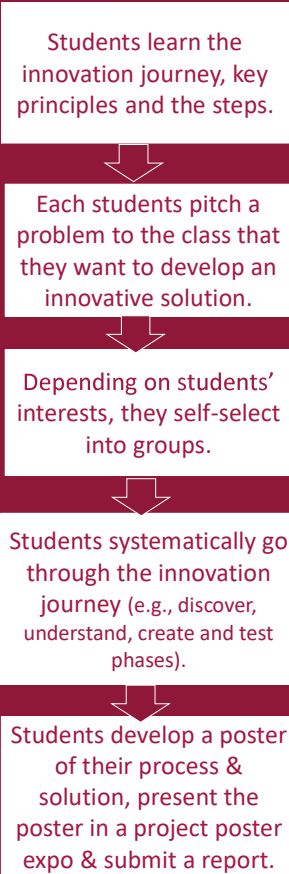
## Introduction

The teaching in innovation and entrepreneurship is focused on the student-centric principles and are guided by the core values of Whakamana (empowering learners), Kotahitanga (respect and embrace all cultures and values), and Whakawhanaungatanga (building meaningful and positive relationships). These require use of experiential education activities for the students to understand, conduct, connect and reflect on their values and beliefs with the type of economic activities they want to do.

### Example 1: Student Projects in INOV 200 (Opportunities: Here, There and Everywhere)

**Overview:** Students in groups embark on an innovation/ a design thinking journey for a 'problem' they want to find an innovative solution. These problems are related to social and environmental issues (e.g., plastic waste, lack of recycling, water use, etc)

#### Process



#### Project poster exhibition



#### Sample project reports



#### Student testimonials

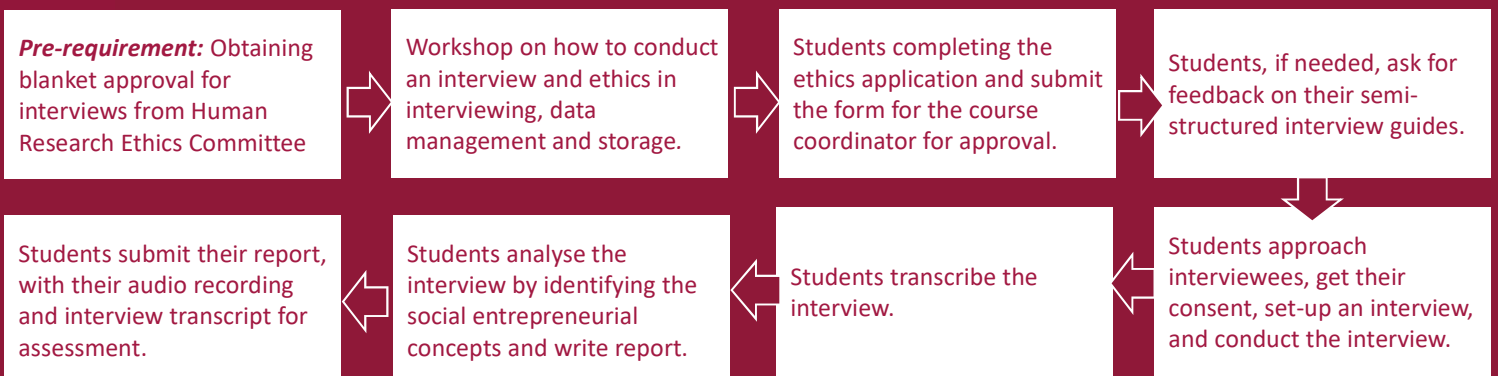
*"We also gained great communication and presentation skills from promoting our project solution to unfamiliar people in the exhibition event"*

*"The project exhibition event was entertaining, and it was interesting to see the solutions the other groups had come up with."*

### Example 2: Interviews with Social Entrepreneurs in MGMT 343 (Social Entrepreneurship)

**Overview:** Students interview a social entrepreneur, or an individual engaged in social entrepreneurial activities (e.g., funder, trainer, employee, consultant, policymaker, technology provider, etc.) to learn of their journey and social impact.

#### Process



**Planned experiential education activities facilitate students learning that sustained, inclusive, and sustainable economic growth can be achieved through use of innovative and entrepreneurial processes.**

# Accessing New Zealand's Sustainable Wood Products

**Campbell Harvey**  
Kura Ngahere | NZ School of Forestry

**Lecturer – Forest Engineering**  
University of Canterbury

## Safe & Productive Forest Harvesting Systems

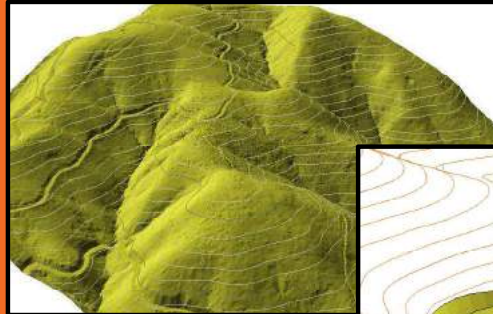
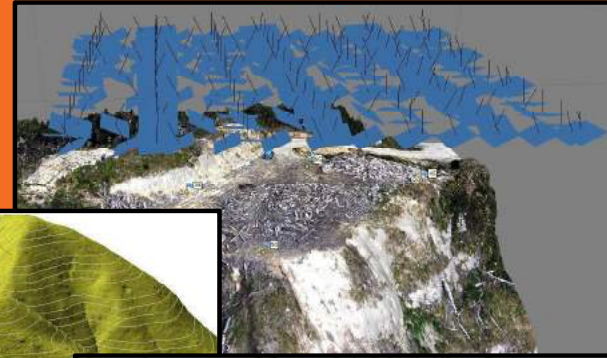
Forest harvesting has a confronting history of injuries and deaths, both in New Zealand and overseas. Consumer and industrial demand for wood products continues, while placing ever higher expectations on the producer for supplying commodities at reasonable cost, and without harming workers.

New Zealand is now amongst the forefront of international efforts to mechanise forest harvesting. New technologies and ways of working such as 'winch assisted felling', and 'motorized grapple carriages' are a valuable export product, isolate forest workers from hazards and also make forest harvesting more productive.



## Improved Design: Integration of Advanced Remote Sensing & Computer-aided Design for Infrastructure

Over 35 million m<sup>3</sup> of forest is harvested annually and delivering produce to sawmills, pulp mills, peeling plants and ports requires infrastructure. Over 1600 km of new forest roads are constructed annually to enable access to first-rotation forests. New Zealand has a proud history of constructing harvesting infrastructure in difficult terrain. As time goes on, the forest industry demands greater levels of service and reliability from that infrastructure. This requires greater attention to design and construction practise. Te Kura Ngahere exposes students to the latest remote sensing data, methods (photogrammetry and airborne laser scanning) and computer-aided design. This ensures graduates are prepared to identify risk, make sound decisions for the safety of forest users and care for our whenua.



## Tiakitanga – Care for our Awa & Freshwater Taonga

New Zealand has a number of taonga freshwater fish species that are at risk or declining, at least in part due to human activities. Forest headwaters are refuges for many of these species and important breeding grounds, especially for those that fall prey to introduced predator species (Trout & Salmon). Roding infrastructure undeniably intersects these vulnerable ecosystems and can have some effect on their functions. Forest Science and Forest Engineering students learn the diversity and importance of our taonga, but also sympathetic crossing design, to allow the passage of ever more frequent floods, but also those vulnerable fishes, for a variety of access scenarios.



**Harvesting plantation timber with care, to build and fuel New Zealand's growing bioeconomy.**



Daniel Holland, Head of Department  
Chemical and Process Engineering, University of Canterbury

Process engineers are responsible for large scale production across all industries and hence supply the needs of the world. It is essential this is done sustainably. Therefore, sustainability is embedded throughout the Chemical and Process Engineering degree.



## Teaching the next generation

We develop engaging, practical tools to introduce high school students to complex process engineering ideas. Examples include:



Electrochemical cells for the production of renewable hydrogen

Bicycle powered water purification to demonstrate the advantage of membrane technology



## Designing sustainable production

Students design industrial processes to produce food, medicine, fuels and materials. These projects must examine how to produce the resource sustainably.

Other examples include:

- Low impact food and protein production
- Renewably generated synthetic and bio-fuels
- Medicines and products from bio-processes



Designing hydrogen generation for Antarctica



Providing safe drinking water in the Pacific Islands



Throughout the degree students are introduced to real industrial equipment and taken on tours of process industries around New Zealand. These tours show how chemical engineers contribute to sustainable production.

## Engaging with New Zealand Industry



Companies we work with include:

- |                             |           |
|-----------------------------|-----------|
| • Methanex                  | • Hexion  |
| • Leafit                    | • Beca    |
| • Ngai Tahu Forestry        | • Deta    |
| • Christchurch City Council | • Jacobs  |
| • Pharmalink Extracts       | • Indevin |

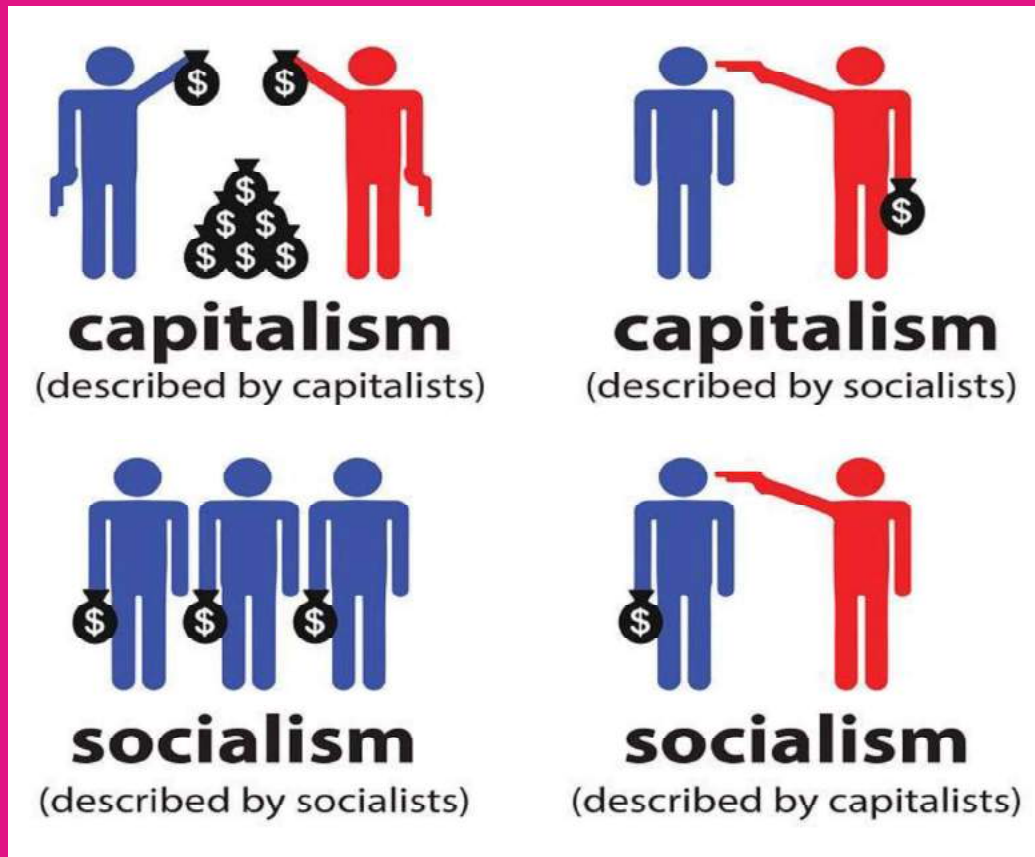


*“Chemical engineers are ideally placed to...consider sustainability and the sustainable development goals.”*

Ian Shott, Fellow and Former President of IChemE

# SOCI 368: The Politics of Need

Assoc. Prof. Mike Grimshaw, Sociology



**What causes the collapse of social cohesion and the social contract?**

**What is the future of the welfare state?**

**The fact is, we actually have all the data and research we require to make informed decisions and policy to improve things...so why don't we?**

A critical engagement with global society and the issues that have arisen and continue to arise. What does – and can – society mean? What are the debates, challenges and possibilities as we find ourselves in the third decade of the 21st century? Why does Need still occur? How can we think critically past the all-too-often simplistic pieties and blames of both the left and the right? How are governments, think tanks, NGOs, social movements, intellectuals and public debate responding?

Throughout the course two central questions drive our thinking and discussion:

**Why, in late modern society do inequalities exist?**

**Is the welfare state actually a way to manage inequalities for the benefit of the middle classes?**

# SDG 10: Reduced Inequality

## “Reduce Inequality Within and Among Countries”

Dr Kate Prendergast, Research Manager, Hei Puāwaitanga, University of Canterbury

### Reducing inequalities matters

- Inequalities exist in various forms, such as income, age, gender, ethnicity, social inequality, and different forms of discrimination.
- Inequalities within and among countries have left people and groups falling short on life's essentials. Those who are marginalised and disadvantaged are also disproportionately impacted by climate risk and uncertainty.
- Addressing inequalities within and among countries is critical for meeting the needs of current and future generations within ecological limits, so that “no one is left behind”.

### CYCLES: A study highlighting youth perspectives of inequalities

- CYCLES (Children and Youth in Cities – Lifestyle Evaluations and Sustainability) is a comparative, seven-city study that examines young people's (12-24 years) views on how to live well in low-carbon, sustainable ways.
- Across the seven cities, researchers interviewed 332 youth in focus groups in 2018 about what they liked about their city and what they would change.
- A survey across the seven cities in 2020 asked 2,147 young people about their wellbeing, communities and lifestyles.
- Initial focus group and survey findings give insight into young people's perspectives and experiences of inequalities within and among countries.



CYCLES is a seven-city study led by University of Canterbury Professor Bronwyn Hayward with Dr Kate Prendergast and funded by the UK Economic and Social Research Council with the University of Surrey, UK.



Young people **don't always feel included** in public and political spaces.

- “ I feel like our city could have more for our age to do” (Christchurch, NZ)
- “ I feel like adults and like the government won't listen to us, and they won't take notice of us and what we're trying to say” (Christchurch, NZ)



Young people told us “richer” and “high income” areas of their cities had **greater access** to greenspace, nature and services:

- “ While there may be some greenery in this part of the city, over my way there's none at all” (Yokohama, Japan)
- “ The quality [of transport] depends very much on the place” (São Paulo, Brazil)

### In focus group interviews, young people across seven cities spoke of inequalities relating to income, age, gender and ethnicity

Participants were concerned about **ethnic, racial and cultural** discrimination in their cities:

- “ We do not have the privileges white people have” (Makhanda, South Africa)
- “ like people always like tell them to take their um ... turbans off ... and it's like really, really sad” (Christchurch, NZ)



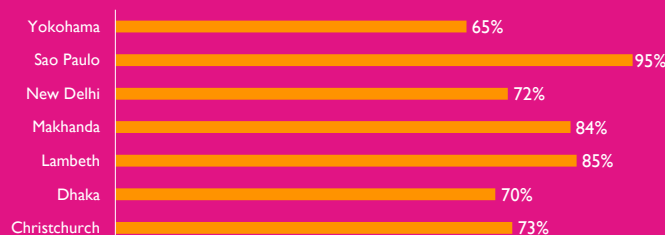
Young people told us **gender discrimination** was embedded in “society”. Young women shared experiences of discrimination, fear and harassment:

- “ We are scared often, like we are scared to walk down the street by ourselves” (Christchurch, NZ)
- “ As a girl I'm not usually allowed to go out on my own” (New Delhi, India)

**44%** of young people surveyed indicated “Having Enough Money for the Basics” was important for a “Good Life”

**4 in 5** young people surveyed “sometimes”, “often” or “always” worried about money.

### Proportion of young people surveyed who worried about money “sometimes”, “often” or “always”



**The CYCLES study indicates reducing inequalities relating to income, age, gender and ethnicity is important to young people across cities. Transformational change requires bold leadership to address the structural conditions that ‘lock in’ the inequalities that young people and their families experience.**



# The RES Model for SDG 11: Sustainable Cities & Communities

Dr Billy Osteen, Associate Professor of Community Engagement  
University of Canterbury, Christchurch, New Zealand

## Responding



The devastating earthquakes of 2010 and 2011 in Christchurch killed 185 people, destroyed 80% of the CBD, and left 11,000 homes uninhabitable. Immediately following both events, over 10,000 University of Canterbury students organised themselves into the Student Volunteer Army (SVA) and provided assistance across the city. In addition to those efforts being appreciated and significant, impacted residents felt immeasurably energized and positive through engaging with so many caring and compassionate young people.

This spirit of coming together after a disaster was observed by Rebecca Solnit in her case studies of communities that had experienced tragedies in *A Paradise Built in Hell* (2009). She found that: “human beings reset themselves to something altruistic, communitarian, resourceful and imaginative after a disaster.” With both the SVA and Solnit, the challenge is how to sustain this when the disaster response is over.

As a way to do this, a course, *CHCH101: Rebuilding Christchurch*, was created to provide SVA members with opportunities to reflect on their volunteering experiences within an academic context. It was designed as a traditional service-learning course containing academic content, critical reflection, and volunteering but differed in that the volunteering had been done beforehand. Additionally, *CHCH101* also extended the ethos that the SVA had worked so hard to create.

## Extending, long-term



In shifting from disaster response to extending the volunteer ethos and reflecting the fact that many new students had not been at university during the earthquakes, *CHCH101* changed with students volunteering within the course. During its 12-year history, over 1,000 students have taken it and contributed more than 30,000 hours to the community. As a way to extend this high level of student interest in community engagement, we designed and launched the Bachelor of Youth and Community Leadership in 2019. It is an outwardly facing degree with students having a number of community engagement experiences.

In a similar response of extending, Leadership in Communities (LinC) was created in 2015 as a support system for the numerous, small organisations that arose from the earthquakes. LinC is a year-long professional development programme where participants have opportunities to reflect on their successes, challenges, and questions within a supportive structure that includes local and international experts sharing advice and ideas. Several hundred people have participated with many describing the experiences as essential to sustaining their community work.

Another earthquake response that has resulted in extending an initial impulse has been Gap Filler. Following the 2010 earthquake, a damaged building in the CBD was razed and a group of artists got permission from the landowner to hold a two-week festival there that included a poetry reading, a film, a dance party, and a barbecue. They called it a gap filler as it filled an artistic and physical gap. The 2011 earthquake provided many more gaps and Gap Filler has now curated over 100 temporary uses of vacant spaces. Their shift from an urban guerilla group to being consulted by Christchurch City Council about the use of spaces is evidence of their sustainability and critical role in the city's rebuild.

## Extending, short-term



If, as Solnit suggests, tragedy can unite the immediate community where it has occurred, what is the potential to extend that to communities further afield? And, are there elements that could enable this to occur? On 14 February 2018, a former student opened fire on his teachers and classmates at Marjory Stoneman Douglas High School in Parkland, Florida killing 17 of them. Amidst their grief, a number of students quickly went into action and organised a massive march to raise awareness of gun violence. Soon after, we invited those students to New Zealand to connect with the SVA and, collectively, collaborate on creating and sustaining youth-led movements. This led to a practical guidebook that young people can use for activism. Not surprisingly, these US students were some of the first people to contact us in 2019 to express their sympathy after the mosque shooting in Christchurch. The local responses to that tragedy were instantaneous and followed Solnit's observations about coming together. Many expressions of solidarity were contextually appropriate and included a “paddle out” of surfers in the beachside community of Sumner.

## Sustaining



The Residential Red Zone in Christchurch is where the 11,000 homes were deemed uninhabitable. Within this unfortunate situation, there are several attempts to use the space in creative and informative ways. The Avon-Ōtākaro Network is looking at how the land in this area dropped a meter, which makes it more susceptible to flooding and perhaps indicative of what the sea level rise from climate change will do. Their work has significant implications for the sustainability of the wider city and region.

In this same area, there is a school that is no longer in use. Several social entrepreneurs obtained access to the facilities and created the Climate Action Campus where young people can have hands-on experiences with a community garden, free vegetable pantry, organic farming, and sustainable practices.

In considering SDG 11, these examples that all stemmed from the earthquakes in Christchurch suggest that the seeds for sustainable cities and communities can be planted by responding, extending, and sustaining. However, the seed will only grow with intentional nurturing to extend those responses and have them bloom into sustainability.

*Though I do not believe a plant will spring up where no seed has been, I have great faith in a seed. Convince me that you have a seed there, and I am prepared to expect wonders (Henry David Thoreau).*

# Responding + Extending + Sustaining = SDG 11

# SDG 11 Teaching for Sustainable Cities

## Professor Bronwyn Hayward



How can we make cities and human settlements inclusive, safe, resilient and sustainable? UC course Pols 216 City Politics and Urban Policy

This is the century of the city. By 2050, seven in ten people on the planet will be living in an urban area. How do cities make decisions? How do citizens in cities create change? This course examines local and regional community politics in rapidly developing urban areas and struggling regions; in particular the course includes field work with Westport, NZ.



Students stay at the University of Canterbury field station in Westport & meet with the Mayor, Chief Executive, local businesses, social workers, and diverse community projects including māra kai gardens, local museums, churches, and sports organizations to understand how flooding risks and the transition from coal impacts the community. Students learn how local voices can lead community planning, relocation and rejuvenation projects.

Our students are set a real problem by the local council to research in small groups and then present their ideas and suggestions back to the community- we are grateful for the opportunity of real life learning, community engagement and professional development



“Enhancing inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management”

# Ensure Responsible Consumption and Production Patterns in Tourism

**Dr Richard S. Aquino**  
Lecturer, Department of Management, Marketing and Tourism  
UC Business School

The tourism sector needs to adopt responsible consumption and production practices to accelerate the shift towards sustainability. Tools to monitor sustainability practices for tourism, including energy and water consumption, waste management, biodiversity conservation and job creation, will result in enhanced economic, social and environmental outcomes for destinations and communities.<sup>[1]</sup>

UC's Bachelor of Commerce in *Tourism Marketing and Management* equips students with the knowledge to develop innovative solutions that will inspire and enable tourism organisations to drive sustainable tourism. Collaborating with industry partners, we deliver experiential learning and authentic assessments allowing students to become sustainability practitioners and create impact throughout their studies.



## Sustainable Destination Management

Adventuring into the wonder of nature, students of MKTG317 *Sustainable Tourism Enterprises and Destinations* embarked on a field trip to Aotearoa New Zealand's first and only UNESCO-recognised Global Geopark, the Waitaki Whitestone Geopark in Waitaki District. Throughout the 2-day visit, the students had the opportunity to gain insights into the potential for sustainable tourism development at the different geosites, through assessing the sites' aesthetic, scientific, and cultural significance.

The students used the knowledge they acquired on this field trip to develop and propose tourism initiatives that could be offered by the Waitaki Whitestone Geopark, in line with delivering regenerative and sustainable outcomes within the Waitaki District.



Figure 1. Site assessment at the Elephant Rocks, Waitaki District.



Figure 2. Restaurants, commercial kitchens and the food waste hierarchy.<sup>[2]</sup>

## Review of Sustainability Practices

Students of MKTG241 *Hospitality Marketing and Management* evaluated the effectiveness of food waste management practices of food and beverage (F&B) establishments in Christchurch and beyond. Each student chose an F&B establishment (e.g., restaurant) and interviewed at least two managers (e.g., owner, head chef, etc.) working in their selected organisation. During interviews, students probed into the establishments' waste management practices. Applying frameworks such as the Waste Management Hierarchy, students critically evaluated food waste management practices, and provided recommendations to improve the practices of their selected establishment based on current industry standards.

## Students as Sustainability Consultants

We recognise the need for tourism practitioners with strong critical consciousness to solve the sustainability issues faced by the sector. Through partnerships with and providing recommendations for destinations and businesses, our Tourism Marketing and Management students become sustainability consultants during their studies. Learning activities stimulate students' critical thinking skills, deliver experiential learning, and provide them the opportunities to apply innovative problem-solving for tourism destinations and businesses.



Figure 3. Industry engagement at The George, Christchurch.



Figure 4. Students presenting their sustainable tourism ideas.

### References

- [1] United Nations World Tourism Organization. (2023). *SDG 12 - Responsible consumption and production*. <https://tourism4sds.org/sdg-12-responsible-consumption-and-production/>  
[2] Gössling, S., & Hall, C. M. (2022). *The sustainable chef: The environment in culinary arts, restaurants, and hospitality*. Routledge



# Sustainable Design in Action - SDG 12

## Ensuring Sustainable Consumption and Production Patterns in Product Design

School of Product Design, University of Canterbury

### 12 RESPONSIBLE CONSUMPTION AND PRODUCTION



#### SDG 12 in Product Design:

At the School of Product Design, we integrate SDG 12 into the curriculum for students from various majors:

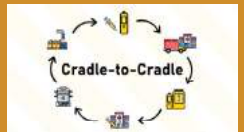
- Industrial Product Design
- Chemical Formulation Design
- Applied Immersive Game Design

Courses such as PROD111, PROD211, PROD314, PROD232, and PROD331 incorporate SDG 12 elements through: **Lectures, Workshops, Labs, Assignments**

Our students learn and apply SDG goals to their design projects, ensuring responsible consumption and production patterns.

#### SDG 12 in Product Design Students' Coursework and Assignments

Courses like PROD211 and PROD331 feature major projects where students analyse supply chains of waste streams and materials. They creatively upcycle these materials into innovative solutions, addressing real-world problems.



#### Sustainable Design Workshops in the School of Product Design

Our labs and workshops support material recycling:

- Plastic Recycling Lab equipped with shredder, filament extruder, hot press, and more.
- Processing equipment like laser cutting, water jet cutting, CNC machining, and additive manufacturing.

Students learn to recycle waste plastics and practice Cradle-to-Cradle design principles, contributing to sustainable consumption and production.

#### Waste Material Product Design Challenge and Dragon's Den Competition

Annually, our 2nd and 3rd-year students engage in a design challenge where they create innovative products using waste resources, including plastics and organic compounds. They:

- Study the supply chain of chosen waste streams
- Ideate creative solutions
- Prototype their ideas
- Perform business and cost analysis

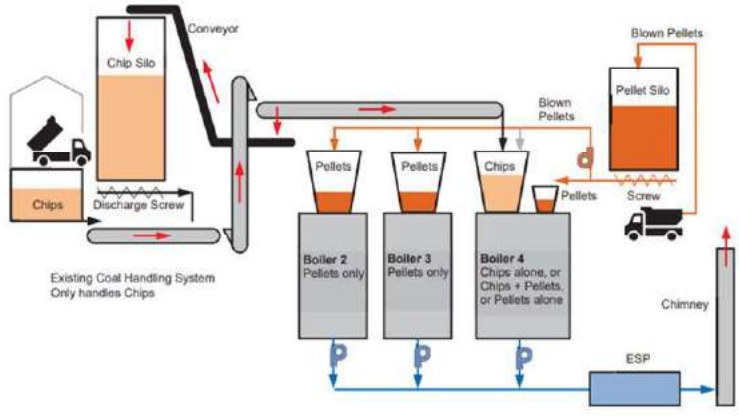
In the Dragon's Den competition, students present their work to judges for a chance to win up to \$5000 for their venture. Past projects have led to successful startups, such as KiwiFibre.

This year, UC Entrepreneurship Centre offers support to our winners, including participation in the summer scholarship program. Entre also allocates prizes for the best sustainable design projects.



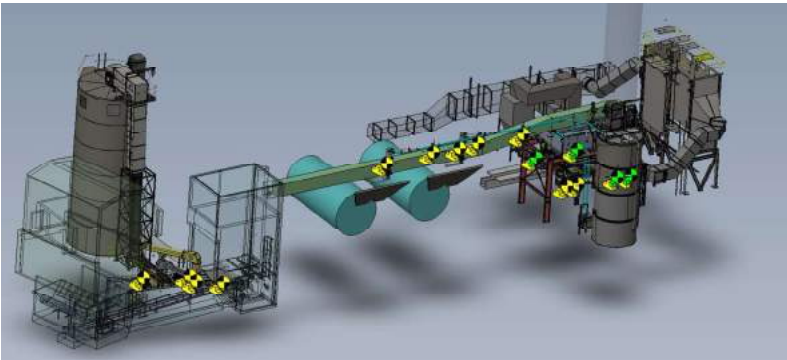
We, at the School of Product Design, are dedicated to nurturing the passion of our aspiring design students by imparting the diverse facets of sustainable design

# 13 CLIMATE ACTION



## ELIMINATING COAL

UC is eliminating coal for campus space heating, and 50% of its carbon emissions, in a multi-million-dollar project to upgrade the boilers.



## BIOMASS

The upgrades make it possible to burn wood chip and wood pellets, which are considered carbon net neutral. Works are well underway and the system will be operating in 2024.

## ELIMINATING COMBUSTION

UC is also working to eliminate combustion as a form of heating altogether, although this will take many years to achieve.

Currently, two UC buildings are heated entirely by renewable Ground Source Heat Pump technology, while another precinct in in development.





# 13 CLIMATE ACTION



## UC Sustainable Food and Drink Plan

### COMMUNITY GARDEN

UC has two community gardens. Te Ngaki o Waiutuutu celebrated its twentieth anniversary in 2022.

The garden was designed along Permaculture principles and has always been managed organically.

Thousands of students have participated in this garden and have benefited from its food.



### EDIBLE CAMPUS

The University is developing an edible campus, with several plantings of fruit and nut trees, currants and berries.

The produce from these gardens is available to anyone.

The UC Sustainability Office regularly runs edible campus tours, which are always extremely popular.

### COMMUNITY FEAST

In 2023, UC celebrated its 150<sup>th</sup> anniversary with a large community feast in the central city.

The event was co-created with a wide range of community partners, highlighted SDG 2, and fed over 300 people.

The feast featured a hāngi and food grown in local community gardens. The ground-breaking event showcased UC's leadership in community food resilience.





Dr Frances Charters, Senior Lecturer



Civil & Natural Resources Engineering  
Pūhanga Metarahi me te Rawa Taiao

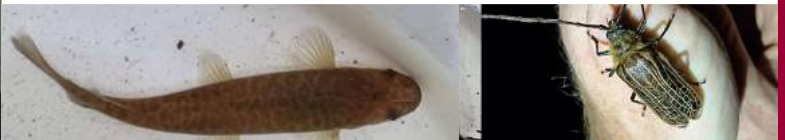
**Water Quality Sampling at a Treatment Wetland – Year 2 Field Camp**

All our Year 2 Civil and Natural Resources Engineering students attend field camp at Living Springs. We visit Whakaora Te Ahuriri constructed wetlands to learn water quality sampling skills. The students assess how well the wetland is removing pollutants such as excess nutrients. This engineered treatment wetland has been constructed at the site of a former natural wetland feeding into Te Waihora/Lake Ellesmere. It improves water quality and ecosystem health in a catchment polluted by agricultural and urban runoff, as well as enabling the return of mahinga kai practices such as harakeke harvesting. This year, the students saw kōtuku (white heron) return to the site – evidence of the developing aquatic food web and habitat.



**Identifying Stream invertebrate as Evidence of Ecosystem Health – Year 2 Field Camp**

We bring in the freshwater ecologists to help our students gain an interdisciplinary perspective on how their engineering relates to the health of the receiving environment. Here the students are learning about the invertebrate life that underpin our stream ecosystems. Samples have been taken from the local stream and the ecologists help the students identify the stream life and understand how key freshwater invertebrate species indicate the success of catchment management and stream restoration practices.



**UC's Living Laboratory right here on campus – All years, across disciplines**

We are fortunate to have the Waiutuutu/Okeover, Haere roa/Upper Avon and Ka Waimaero/Iim Streams running through our campus. We make the most of our 'Living Laboratory' for hands on teaching labs across our UC Departments, such as macroinvertebrate assessments (Biology), water quality sampling, Civil and Natural Resources Engineering (CNRE), stream restoration assessment (CNRE) and stream flow gauging (CNRE). Each year our CNRE Honours students undertake field-based research projects in our campus waterways, which not only provides an excellent learning experience right on our doorstep but also generates valuable data and analysis of the stream conditions to support UC's ongoing catchment improvements and restoration initiatives.



**Fish Screening Field Trip – Year 4 Ecologically Engineered Designs**

The Canterbury region is a diverse range of stream habitats that support both native fish and sport fish (trout and salmon) populations. A key consideration in any waterways engineering is the provision of fish passage and protection for the fish against entrainment into engineered irrigation systems. We make the most of local Canterbury sites to have students learn from real-world examples from this ever-developing technology.

# Conserving life on land

James Briskie, Professor  
School of Biological Sciences, University of Canterbury



## Saving life on land by training future scientists

Biological Sciences provides a range of undergraduate courses in conservation, ecology and animal behaviour. Field courses are particularly popular as they provide first-hand experience for students to develop the practical skills they will need for professional careers as scientists.

In BIOL305 (Practical Field Botany), Assoc Prof Pieter Pelter uses UC's field station at Cass to teach students the basic skills in field botany, and is targeted for those who intend to seek employment in ecology, conservation, biosecurity, and systematics.



UC Biology 305 - Practical Field Botany



## Saving endangered species

Nearly 4,000 species in New Zealand are Threatened or At Risk. UC students are at the forefront of using genetic data to develop innovative conservation management strategies for some of New Zealand's rarest species.

Prof Tammy Steeves uses her experience with Department of Conservation recovery groups—which aim to ensure the recovery of species like the Critically Endangered kākāriki karaka—to teach BIOL429 (Conservation Genetics) students how to effectively communicate conservation genetic recommendations to diverse audiences.



Melissa Boardman



UC Ilam campus, today

UC Ilam campus, 1990

## Saving life on land in cities

Most of humanity now lives in cities. Building cities that sustain biodiversity increases the quality of life for its human inhabitants as well.

UC is striving to restore biodiversity across its campus through increased plantings of natives and control of introduced predators. Surveys by undergraduate summer scholarship recipients provides training for students to learn how to survey and monitor populations of birds and reptiles. Since 1991, the number of native birds on campus has increased from 4 to 11 species today.



## Saving life on land overseas

UC has more field stations than any other New Zealand university. Our facilities at Cass and Kaikoura are the most commonly used by students for field courses in Biological Sciences but we have graduate students working as far afield as Antarctica and Nigeria.

In Nigeria, Prof Hazel Chapman runs the Montane Forest Project Research Station. One of her current PhD students, Gboyega Awoku, is determining which species are most effective as pollinators of different crops and understanding which habitats are most important for pollinators.



**Conserving life on land is critical to both human survival and the survival of Earth's biodiversity**

# Sustainable forest management

Euan Mason, Professor  
University of Canterbury

## Forests are vital



Forests provide habitat, wood, fuel, and many other benefits that are essential for humanity. History shows many civilisations flourished until they exhausted their forests. Some early examples:

- Gilgamesh (ruler in c. 2700 BC) used cedar forests to build Uruk, leading to upland erosion, salination, lowered crop yields, and ultimately invasion.
- The Sumerian civilization collapsed due to poor upland forest management leading to siltation & salinity reducing crop yields, and scarce wood fuel.
- Phoenicia relied on Lebanese cedar to become a maritime power that fell when Mediterranean cedar forests were depleted.
- Rome destroyed its forests and was weakened by scarcity of wood.
- Easter Islanders completely destroyed their forests and consequently their culture

Wood & wood products are only part of the story. Forests and trees:

- Provide habitat for wildlife
- Reduce erosion on sloping land, when compared to grassland
- Sequester carbon dioxide and emit oxygen
- Stabilise and clean stream and river flows from catchments
- Offer fabulous scenery for recreation that warms our hearts
- Shelter crops and livestock from wind, enhancing farm yields
- Grow edible fruit, such as apples, lemons, & walnuts
- Enhance, shade and enliven our city environments
- Are used for paper, chemical products and fuel
- Are our heritage, especially in places like Aotearoa/New Zealand

## It's not just about wood



## Forest management



Forests thrived on their own for millennia, but human influences have often led to their decline. We've destroyed over half of the world's area of primeval forestland since the dawn of neolithic civilisation 10,000 years ago, and human migration has spread invasive plants and animals. Aotearoa/New Zealand's native forest ecosystems, for instance, covered ~80% of our land area but we've reduced them to ~24%, and what remains cannot flourish without intensive management of invasive pests such as possums, deer, rats, weasels, stoats, goats and wasps. Establishment of exotic plantations saved remaining native forests from logging that was essentially mining for wood with scant regard for forest ecosystem health. We work to ensure that our plantation forest management is sustainable and provides myriad benefits as well as jobs for our communities.

## Forests and climate change

New forests are temporarily carbon sinks, finally becoming reservoirs of carbon that, as atmospheric CO<sub>2</sub>, would otherwise heat our planet and change our climate in dangerous ways. Studies show that in order reach our goal of net greenhouse gas (GHG) neutrality by 2050, we need new forests to fill a gap in our GHG accounts while we learn to live without emitting GHGs. In Aotearoa/New Zealand as little as one M ha (our total land area is 27 M ha) of unharvested exotic forest would fill our GHG account gap. Unfortunately native forest species grow too slowly to effectively fill the gap, but after the job is done exotic carbon forests can be converted to native forests that will be long-term carbon reservoirs.



**Forests are essential for humanity**

# The home of Criminal Justice in Canterbury

## The only specialist criminal justice programmes in Aotearoa New Zealand

Located within the Faculty of Law, the Criminal Justice programmes at the University of Canterbury | Te Whare Wānanga o Waitaha are closely aligned with United Nations Sustainable Development Goal 16 (SDG 16), which focuses on promoting peaceful and inclusive societies for sustainable development, ensuring access to justice, and building effective, accountable, and inclusive institutions. By offering comprehensive education and research opportunities, our programmes empower students with the knowledge and skills essential for fostering justice, peace, and strong institutions. Through interdisciplinary approaches, students are encouraged to explore the complexities of the criminal justice system, including social, cultural, and ethical dimensions, aligning with SDG 16's emphasis on inclusivity and the rule of law.

Our approach is deeply rooted in the principles of Te Tiriti o Waitangi, embracing the spirit of partnership, participation, and protection. Through a culturally sensitive lens, the programmes emphasise the importance of a Te Ao Māori worldview, acknowledging the significance of Māori knowledge, traditions, and legal systems within the criminal justice framework. By integrating Te Tiriti o Waitangi principles into the curriculum, students gain a comprehensive understanding of the historical and contemporary issues faced by Māori in the criminal justice system.

Programmes:

- Certificate in Criminal Justice
- Bachelor of Criminal Justice
- Master of Criminal Justice
- Doctor of Philosophy (Criminal Justice)

### CRJU101 – Introduction to Criminal Justice

In this award-winning course, participants embark on an enlightening exploration following the experiences of Jimmy, who is Māori, and Chris, a Pākehā, as they navigate the complexities of the criminal justice system. Through compelling storytelling, learners gain insights into the disparate treatment faced by Jimmy and Chris. Engaging in innovative assessments, participants are encouraged to contemplate proactive measures that could prevent Jimmy and Chris from entering the prison system. Moreover, the course offers a unique opportunity for self-reflection, prompting participants to consider their own roles within the system and inspiring them to become agents of change. By empowering individuals to envision and enact the transformations they desire, this course serves as a catalyst for shaping a more equitable and just society.



Chris and Jimmy



Criminal justice academics: Dr Jayson Ware, Associate Professor Helen Farley, and Dr Marozane Spammers

### CRJU302 – Prisons and Corrections

This course equips learners with a profound understanding of the challenges faced by those in prison and the broader issues within corrections. Through an emphasis on restorative justice, rehabilitation, and evidence-based practices, learners are encouraged to explore solutions aimed at reducing recidivism and fostering societal reintegration. By cultivating awareness of social inequalities, cultural sensitivities, and human rights, the course empowers learners to advocate for fair and accountable institutions. By encouraging critical thinking and policy analysis, the course prepares future leaders and practitioners who can contribute meaningfully to the development of effective, humane, and equitable corrections systems worldwide, directly contributing to the realisation of SDG 16's objectives.

# SDG 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"

Dr Marozane Spamers  
University of Canterbury

## Goal 16 Targets and Teaching at UC

### The Bachelor of Criminal Justice – The case of CRJU201: Crime and Justice

Crime and Justice is a core course in the Bachelor of Criminal Justice, and an elective on the LLB schedule, which enlightens students how scholars over the centuries have sought to understand crime and the people who commit it. The course also explores the practical aspects of particular types of crime in Aotearoa | New Zealand and examines the history of conceptions of punishment and the role of corrections.

The course content promotes achievement of the following SDG 16 Targets:

- 16.6 Develop effective, accountable and transparent institutions at all levels
- 16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels
- 16.B Promote and enforce non-discriminatory laws and policies for sustainable development

The 'problem' of crime and its remedy through the criminal justice system has been of crucial and ongoing concern to urban societies. It was out of a desire to find what causes crime and how it can be prevented that people first became interested in criminology. But it soon became clear that criminal behaviour has *many and various aspects*, and that understanding it is far from simple. This caused some to develop even more complex theories about its causes, while others began to wonder if the causes even mattered. If criminal behaviour refers to *the breaking of rules*, the latter reasoned, the *behaviour may be less pertinent than the rules* which make it so.

It was from this type of reflection that modern criminology emerged. What criminology does now is look at *the character of rules*, which necessarily prefaces any understanding of rule-breaking. The nature of rules, the acts which violate them, and the responses of society to these violations, are all themes which run like a leitmotif through crime and justice theory today.

CRJU201 aims to educate students on the importance of evidence-based decision-making and policy-making in the criminal justice context to promote safe and effective justice and the protection of human rights. The course also challenges students to consider the social and political context in which the criminal justice system operates to encourage critical thinking and an understanding that values, bias and internal beliefs saturate all criminal justice policy and practice.

16 PEACE, JUSTICE AND STRONG INSTITUTIONS



*Criminal Justice - The importance of critical thinking, evidence and politics*



### CRJU201: Crime and justice – Course Content

#### CRJU201 covers three separate areas:

1. The first section of the course covers the evolution of ideas about crime and deviance in the modern world. After tracing the emergence of beliefs from as far back as Greek times, section one considers the 20th Century in some depth, examining the changes in notions about crime and the reasons for their transience. The section closes with a consideration of modern 'critical' criminology and why it grew popular when it did.
2. The second section is concerned with specific aspects of crime and justice in New Zealand. It examines the dimensions of crime in its various forms, how these changed in the last century and how they compare with other countries. How the definitions and incidence of crime have been influenced by the political economy lies behind the factual analysis.
3. The last section of the course deals with corrections, tracing the development of criminal justice through history, and considering how conceptions of punishment have changed in New Zealand over the past one hundred years.

Crime: Theoretical Perspectives	
Week 1	Course Introduction Defining deviance
Week 2	Philosophical Origins of Criminological Thought Positivism
Week 3	Functionalist Foundation Marxist Foundation
Week 4	Cultural Transmission: Chicago Anomie: Harvard
Week 5	Labelling: Neo Chicago The Need for a New Perspective
Week 6	Critical Criminology Victimology
Crime: Practical Perspectives	
Week 7	Property Crime Gender and Deviance
Week 8	Violent Crime Sexual Deviance
Week 9	Feminism and Sexual Offences Legislation Crimes of Intoxication
Week 10	Organised Crime Environmental Crime
Week 11	Hate Crime
Punishment and Corrections	
Week 11	History and Philosophy of Punishment
Week 12	Development of NZ Correctional Policy Course summary and Review

**Graduates with a strong knowledge of criminal justice and the ability to critically reflect on evidence and politics will contribute to achieving SDG 16 targets through their work in the sector.**



# Our National Memberships

## NZ Green Building Council

New Zealand Green Building Council advocates for better buildings, because better buildings mean healthier, happier Kiwis. They are New Zealand's leading sustainable building not-for-profit and represent hundreds of companies and organisations who believe they can transform the built environment. Current membership is over 700. The University of Canterbury has been a member since 2006.



## Universities NZ Expert Working Group on the SDGs

The SDG Expert Working Group makes a sector contribution to New Zealand's Voluntary National Review, a follow-up and review system for progress on the SDGs through the UN High-Level Political Forum, by delivering a coherent series of SDG Summits and supporting sustainable development work. The co-ordination of the Summits has proved beneficial in generating greater collaboration across the sector and increasing engagement with other sectors.

## Aotearoa New Zealand SDGs Summits

Aotearoa New Zealand Sustainable Development Goals Summits (a signatory of the SDG Declaration) were inspired by people wanting to collaborate across sectors to drive meaningful change for the SDGs. The Summits bring together people from civil society, government, the business community, and with strong mana whenua and Pacific peoples input they have helped shape a uniquely Aotearoa New Zealand response to the SDGs. The University of Canterbury, Lincoln University and Ara Institute, with support from Christchurch City Council, co-hosted the Summit in 2020-2021.



## Toitū Envirocare

Toitū is a team of scientists and business experts who have come together to protect the ecological and economic future of this place. Toitū lead positive change through a system of robust environmental programmes that are internationally recognised. Toitū help businesses be more sustainable by giving them the science-based tools, actions and evidence they need to make real progress. The University of Canterbury is a Toitū carbon reduce certified organisation.

# Our International Memberships

## Australasian Campuses Towards Sustainability

ACTS engages, empowers and exemplifies organisations working to tackle complex social, economic and environmental challenges and support meaningful change towards a more sustainable future. It is the only independent not-for-profit member-led organisation of its kind in Australasia. ACTS offers a range of programs, resources, developmental and networking opportunities for members and organisations, including a United Nations award-winning program called Green Impact designed to support environmentally and socially sustainable practices within organisations. The University of Canterbury recently launched the Green Impact program on our campuses.



## Australasian Universities Air Travel Consortium

The AUATC is a group of academics within New Zealand and Australian universities, founded in 2020 as a collective voice to coordinate and advise on academic flying policies and practices. The terms of reference of AUATC are to develop a network of academics from Australasian universities to address high carbon tertiary sector mobility practices, and to provide science-based air travel advice and recommendations to key system elements, regionally and internationally.

## Race to Zero Campaign

Race to Zero is a UN-backed global campaign for a healthy, resilient, zero carbon future. All members are committed to accelerating the delivery of climate action. Commitments pledged under the Race to Zero campaign now cover at least two thirds of the global economy. Universities worldwide are at the forefront of efforts to understand, mitigate, and adapt to climate change.



## Sustainable Development Solutions Network

SDSN promotes integrated approaches to implement the SDGs and the Paris Agreement on Climate Change, through education, research, policy analysis, and global cooperation. In 2012, the UN SDSN was launched under the auspices of the UN Secretary-General. SDSN is an independent nonprofit organisation. SDSN synthesizes knowledge for sustainable development through its work on SDG pathways, data, policies, and financing. As of 2023, SDSN has over 1,800 members in 53 networks across 146 countries.