

# Centre for Sustainability

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The Centre for Sustainability is a University of Otago premier research centre with an international reputation for its innovative interdisciplinary research on local and global sustainability challenges.

We collaborate closely with communities, iwi, industry and government agencies and form teams with other researchers from across New Zealand and internationally to generate high-quality research.

## SECONDARY STUDENTS' INVESTIGATE RESILIENCE

As part of a project commissioned by the Ministry of Business, Innovation and Employment (MBIE), schools were invited to enter a geography research competition on building community resilience.

Greymouth High School students' demonstrated how understanding local social and physical attributes of a place can assist in building understanding of resilience. The students' work showed that geographical isolation, familiarity with local hazards, active engagement in community activities and participation in adverse event preparation and restoration enhanced the personal and collective capacity of Greymouth residents to respond effectively to a catastrophic event.

The Centre's involvement in the project was led by Senior Research Fellow Dr Ann Pomeroy with assistance from Emeritus Professor Peter Holland.

“Interdisciplinary research on sustainability challenges”

**Transport** is a growing area of research for the Centre for Sustainability. We have a number of **interdisciplinary** projects underway in this area.

### Responding to increased home delivery

Do you ever consider how products make their way from source to shops or your doorstep? Do you use internet shopping and home delivery? Interest in these questions motivated Dr Debbie Hopkins (Research Fellow, Energy Cultures 2) to explore urban freight delivery trends affecting the industry, and how the industry is responding.

Freight delivery managers and drivers in Auckland, Tauranga, Wellington, and Dunedin described significant and rapid changes in freight delivery – mostly related to internet shopping, customer expectations, and legislation. The Internet and other technologies are making online shopping easier, quicker and trackable.

The freight industry is designed to deliver full truck-loads to shops, but delivery to homes can be a burden. Home deliveries are time consuming for drivers and business administrators, as several visits may be required because people are at work during the day.

Three types of innovations can help the industry to respond to these challenges: technological innovations (e.g. drones, electric vehicles), practice innovations (e.g. evening deliveries), or norm innovations (e.g. changing delivery expectations). We are now interested in which of these will be most important for the freight industry in the future.

### Encouraging efficient driver behaviour

Did you know there are smart phone apps that can give you feedback about your driving and fuel efficiency at the end of your trips? Dr Michelle Scott is currently running a study comparing different types of feedback to drivers to find out what works best. The study focuses on how people engage with smart phone feedback, whether some ways of presenting feedback are more effective than others and whether they can actually affect driver attitudes and behaviours.



Photo: Susan Davies

One group of drivers has already completed this study, but the work is still ongoing. If you are interested in participating, please email Michelle: [michelle.scott@otago.ac.nz](mailto:michelle.scott@otago.ac.nz)

### From non-renewable to renewable

Electric Vehicles (EVs) are much cheaper and more efficient to run than petrol or diesel cars, and have far fewer greenhouse gas emissions due to the fact that our electricity is largely generated from renewable sources. The Energy Cultures national survey showed over 60% of Kiwis feel positive about EVs; around 30% are currently 'thinking about' purchase: and 30% would 'likely' or 'definitely' buy an EV if it was the same price as an equivalent petrol or diesel car. Unsurprisingly, people's main concerns were purchase cost, charging time and maximum travel distance.

EVs are slowly being adopted in NZ - around 1000 by January 2016 – but modelling in the GREEN Grid project suggests that uptake in New Zealand will be slow because of the nature of our car market and Kiwis' relationships with their cars. Unless measures are brought in to encourage uptake, they are likely to only make up around 5% of the light vehicle fleet in 20 years.

# Director's Notes



## WHAT IS SUSTAINABILITY?

At a Centre for Sustainability you'd think that we have a definition for sustainability down pat. After all, that's what we do, isn't it? Our Strategic Plan says that our mission is Collaborative research for a sustainable future. And there are many definitions we could choose from.

But funnily enough we've never officially adopted a definition. I'm not sure if that's a problem.

In its most basic meaning, sustainability is the capacity to endure or be maintained, but in recent decades it has been adopted by nations, businesses, organisations, cities and communities as a rationale for thinking and acting in ways that do not just benefit themselves. The first widespread use of the word 'sustainable' in its contemporary meaning was in the term 'sustainable development' which was adopted and defined by the World Commission on Environment and Development in 1987 (which is well before most of our students were born). The definition used was "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs". I like that – it's asking us to consider the fact that resources are limited, so we need to think about sharing them with people as yet unborn.

Another way of thinking about sustainable development, promoted for example by the World Summit on Social Development in 2005, is simultaneously achieving economic development, social development and environmental protection. This suggests that it will always be possible to achieve a win-win-win for all three... but this comes in for a lot of criticism as most humans aren't too good at constraining their development aspirations in order to protect the environment. Green economics argues that environmental sustainability should have the highest priority, as social

and economic sustainability goals are not possible without a healthy well-functioning environment. The United Nations Agenda 21 argued for a fourth goal to sit alongside the other three – cultural sustainability – recognising that the world's diverse cultures, many of which are based on philosophies of caring for the earth, also need to be sustained.

And it is increasingly clear that current development trajectories are not sustainable. Research on 'planetary boundaries' (published in 2009 and endorsed by the UN secretary general in 2012) shows that humans have already impacted several global systems to the point where human survival is threatened, because of risks created by irreversible and abrupt environmental change which could make Earth less habitable. Boundaries that have already been crossed are climate change, biodiversity loss, and nitrogen in soils and water, with other 'boundaries' looming.

In the research we undertake at the Centre, we are informed by all of these ways of thinking about sustainability (and more), and we think carefully and critically about how they apply to our research topics. And ideas about sustainability keep evolving, so we need to keep up to date with this, and hopefully contribute to new thinking about 'what is sustainability?' as well.

So, bearing all that in mind, does the Centre need to define what we mean by sustainability? I don't think we do. But, that being said, my favourite personal definition is from my late father, Gordon Stephenson, who simply used the 100 year rule: What will happen if I continued to do this for 100 years? "This way of thinking", he wrote, "has to enter the fabric of our beings."

Nāhaku noa, nā

Janet  
Dr Janet Stephenson

## Energy and the Poor

One in four households in New Zealand are fuel poor! When households need to spend more than 10% of their income on energy bills, they are considered to be fuel poor. Fatima McKague's PhD study aims to understand fuel poverty better and to find ways to reduce this in New Zealand.

Stories shared by participants in this study were heart-breaking. An elderly man said; "During the day I avoided being inside the house so I didn't have to turn the heating on." A retired woman revealed that her house was so cold that "there was no quality of life... confining myself to one room... my life shrank to one room."

Along with the technical and economic facets, policy makers should consider the wider social attributes and the integrated energy culture of inhabitants in designing future interventions to alleviate fuel poverty.

## Co-management - taking the pressure off nature reserves

Yuan Lu's recently completed PhD thesis studied co-management of a huge nature reserve in China. Economic development constantly threatens reserves which are vital to preserving biodiversity and natural ecosystems. Co-management, where local community members work with reserve managers, is one way of helping reconcile this tension between development and conservation. Local knowledge can also make a valuable contribution to management of reserves.

Yuan's case study was the Yancheng National Nature Reserve – the first and largest tidal flat biosphere reserve in China dedicated to protecting rare migratory birds and their habitats. Yuan explored the challenges and opportunities of co-management in China. She found local people had limited knowledge about the rare birds, but detailed knowledge about low-impact fishery and farming. However, this isn't recognised and valued by the staff of the nature reserve. Further, there is resentment as access to the natural resources of the reserve is restricted so their livelihoods have been constrained. At the same time, there are weak controls on development in the reserve by other (non-local) interests, and industrialized large scale aquaculture ponds and mechanized farming have replaced subsistence living and encroached into the reserve.

One solution to this impasse could be sharing power and responsibility through co-management. This should lead to more local support and take off some of the huge pressure of economic development from the reserve.

## Making sustainability easier

The New Zealand Sustainability Dashboard project aims to make it easier for producers to monitor progress towards sustainability and resilience goals.

The Dashboard is a web application for growers and industry that requires input only once, and synchronizes information to enable producers to analyse their practices and identify opportunities for change. Prototypes have been developed and adopted by New Zealand Wine, Zespri and Ngāi Tahu, and other producers and industries will follow.

Our staff in the project are Prof Hugh Campbell, Dr Marion Sautier, Dr Chris Rosin, and Dr Katharine Legun. They research the social dimensions of sustainability, such as working conditions, decision-making processes and power inequalities. They also investigate the way different styles of sustainability auditing evolve and are influenced by industry development trajectories.

Another interesting line of research looks at the influence of measuring and how we choose some things instead of others to be measured. People's behaviour is unconsciously influenced in some unexpected ways: a farmer behaves differently when measuring the number of sprays on crops instead of the total quantity of spray.

The team is researching different dimensions of how sustainability audits and tools work in industry settings: tools as platforms for discourse and deliberation, how to encourage knowledge sharing and innovation, environmental ethics, governance and relationships between practitioners – all to develop the right sustainability tools for producers.

## Where does Dunedin's energy come from?

The Energy Baseline Study has shown for the first time how much energy Dunedin uses and where the energy comes from. In 2014, Dunedin used about 10.5 Petajoules – a common measure of electrical, mechanical, and thermal energy. That is roughly the same amount of energy as contained in 120 Olympic swimming pools filled with unleaded petrol. The total value was about 10% of Dunedin's GDP. The energy came for 66% from fossil fuels and for 31% from electricity (of which interestingly 86% was renewable!).

The Otago Chamber of Commerce commissioned the study and the Dunedin City Council and the Centre for Sustainability co-funded. Scott Willis, Chair of the Chamber's Energy Committee, says the report shows business opportunities, vulnerabilities in energy supply and provides input for the Energy Plan 1.0, an action under Dunedin's Economic Development Strategy, and for the long term aims of Dunedin's Environment Strategy.

## Publications

Chhun, S., Kahui, V., Moller, H., & Thorsnes, P. (2015). Advancing Marine Policy Toward Ecosystem-Based Management by Eliciting Public Preferences. *Marine Resource Economics*, 30(3), 261-275.

Hopkins, D., Campbell-Hunt, C., Carter, L., Higham, J. E., & Rosin, C. (2015). Climate change and Aotearoa New Zealand. *Wiley Interdisciplinary Reviews: Climate Change*, 6(6), 559-583.

Manono, B. O., Moller, H., & Morgan, R. (2016). Effects of irrigation, dairy effluent dispersal and stocking on soil properties of the Waimate District, New Zealand. *Geoderma Regional*.

Pomeroy, A. (2015). Resilience of family farming 1984-2014: Case studies from two sheep/beef hill country districts of New Zealand. *New Zealand Geographer*, 71(3), 146-158

Rees, D., Stephenson, J., Hopkins, D., & Doering, A. Exploring stability and change in transport systems: combining Delphi and system dynamics approaches. *Transportation*, 1-17.

Scott, M. G., McCarthy, A., Ford, R., Stephenson, J., & Gorrie, S. (2016). Evaluating the impact of energy interventions: home audits vs. community events. *Energy Efficiency*, 1-20

Stephenson, J., Barton, B., Carrington, G., Doering, A., Ford, R., Hopkins, D., Lawson, R., McCarthy, A., Rees, D., Scott, M., Thorsnes, P., Walton, S., Williams, J., Wooliscroft, B. (2015). The energy cultures framework: Exploring the role of norms, practices and material culture in shaping energy behaviour in New Zealand. *Energy Research & Social Science*, 7, 117-123

## Staff Feature

### Dr Caroline Orchiston



We are excited to welcome Dr Caroline Orchiston to the Centre as a Research Fellow and Deputy Director at the Centre.

Caroline's undergraduate degree was in Geology, and during this time she found herself mapping a section of the Alpine Fault near Fox Glacier on the West Coast. While spending many days up in the hills, she observed the tourist vans and cars on the highway below and wondered what would happen to those people when the Alpine Fault unleashed its predicted magnitude 8 earthquake. This idea came to fruition ten years later in Caroline's PhD research which investigated seismic risk and tourism activity around the Southern Alps. The switch to social science was driven by curiosity about the outcomes of natural disasters on communities, businesses and individuals, and her work continues to focus on the nexus between earth and social sciences.

Caroline will lead a research stream in the Resilience to Nature's Challenges research programme, involving work on rural and cultural aspects of resilience to natural hazards in New Zealand. Aligned with this, she has been awarded QuakeCoRE funding to develop a model for post-disaster tourist decision-making, using data from

the Canterbury earthquake sequence to illustrate the impact of the earthquakes on tourism flows throughout New Zealand. Caroline is also funded by the Earthquake Commission to develop a multi-agency collaboration for Alpine Fault research and policy, to build a stronger network of collective effort on 'all things Alpine Fault'.

In addition to her role at the Centre, Caroline is a research affiliate at the Joint Centre for Disaster Research at Massey University (Wellington), and has been involved in a joint field project in Washington State, USA, since 2010. This research investigates community awareness and preparedness for tsunami and earthquake hazards in coast communities in west Washington. There are many similarities between this region and the east coast of the North Island in New Zealand, with major offshore subduction zones in both countries having the potential to generate large earthquake-tsunami events. Community-led initiatives being developed in Washington State are resulting in some exciting improvements in resilience within some communities, and this work attempts to cross-pollinate ideas between the two countries to help save lives when the big one happens.

## Postgraduate Profiles



PhD Candidate **Karly Burch's** research focuses on issues relating to food safety following the onset of the Fukushima Daiichi Nuclear Power Plant disaster in 2011. Karly is conducting her research from the standpoint of people living in the Kansai region of Japan, to better understand how official food safety policies and

discourses affect them in their everyday lives. Born and raised in Hawaii, Karly spent almost five years in Wakayama, Japan. She has a University of Otago Doctoral Scholarship and is supervised by the Centre for Sustainability and the Department of Sociology.



Masters student **Letisha Nicholas** is writing her thesis as part of the Energy Cultures 2 project. The aim is to understand the energy cultures of landlords in the private rental sector and what this means for the energy performance of rental properties and energy practices of tenants. Alongside her studies, she was involved

in the independently organised Chateau housing project and 'Rate My Flat'. Both led by local Otago Uni students, these projects aimed to understand how rental properties could be made warm, healthy and energy efficient and inspired her to undertake research on the challenge of good quality rental housing to the Masters level.



**Imran Khan** is a PhD candidate in receipt of a University of Otago Doctoral Scholarship. His multi-disciplinary research will focus on reaching a sustainable energy solution by managing and conserving electrical energy through changes in consumer behaviour. Imran completed his Master's degree in Engineering at the University of Ottawa,

Canada and the Khulna University of Engineering and Technology in Bangladesh. Before starting his PhD, he was involved in a number of research projects and taught undergraduate engineering in Bangladesh.

## Upcoming Events

The Energy Cultures International Conference, 'Sustainable Energy Futures: Understanding Behaviour and Supporting Transition' will be held on 6-7 July 2016 in Wellington, focusing on behaviour change including households, businesses and governments; energy and mobility. For information and registration: <http://otago.ac.nz/centre-sustainability/seminars>

The Centre also hosts a regular Seminar Series with speakers on a variety of topics. For more information on our Seminar Series: <http://otago.ac.nz/centre-sustainability/seminars>

## Summer Scholarship Projects

Summer scholarships are a great way for students to get a taste of research, improve their research skills to aid them with future study. This year three students worked on projects ranging from transport in Māori communities to understanding the electricity grid.

**Ngarangi Haerewa** explored the individual and cultural factors that contribute to the use of shared transport in Māori communities on the East Cape of the North Island. This research was linked to the Energy Cultures Project and may lead to recommendations on how to increase the uptake of shared transport in non-Māori communities. Ngarangi recently completed an Honours degree at the University of Otago, and is about to embark on Masters study.

Global trends in collectives of energy prosumers was the focus for **Juliet Whitaker** this summer. Prosumers are people who both consume and produce energy. Juliet looked at the drivers and barriers in prosumer collectives in the energy sector, where they are located and how they have evolved. Juliet completed a Bachelor's degree at Otago University and realised she "actually enjoys research". Her summer project was funded by the GREEN Grid Project and Smart Grid Forum.

In order to try to reduce costs and maximise efficiency of electrical grids, **Jefferson Dew** researched opportunities to shift the demand-side management on household electricity. The work was partially funded by PowerCo and also the GREEN Grid research project. It aims to understand the future of the New Zealand electricity grid and particularly the changing role of households.

## Visitors to the Centre

The Centre for Sustainability hosts many international visitors with aligned research interests. Visits range from a few days to several months. In addition to carrying out research and enjoying New Zealand, visitors are encouraged to share their expertise (particularly in the regular morning tea quiz!).



Fridtjof Nansen Institute's Senior Research Fellow **Dr Tor H Jackson Inderberg** visited the Centre from Norway in January and presented his preliminary findings on why and how a market mechanism for emissions reductions has been adopted in New Zealand.

**Prof. Dr Hilde Bjorkhaug** and **Dr Jostein Brobakk** from the Centre for Rural Research in Norway brought expertise on organic and family farming from a sociological perspective, and agricultural policies from a political perspective.

**Kyle Artelle**, a Canadian biologist with the Raincoast Conservation Foundation and a PhD candidate at Simon Fraser University, works on environmental management and the ecology and conservation of black and grizzly bears. Kyle visited for three months studying Indigenous values in environmental management gathering knowledge from Otago researchers also working in this area.

Each year our Centre hosts an international visitor for an extended visit. This year we welcomed Danish researcher **Dr Hugo Alroe**. Hugo is an independent scholar of philosophy of science and ethics who mainly applies his knowledge to interdisciplinary and participatory research on topics related to food, agriculture and environment. In a recent seminar, Hugo explained how the concepts of sustainability assessment and complementarity relate to each other in the context of organic agriculture – or in other words: how do we know if organic is good?

### CONTACT INFORMATION

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