SUSTAINABLE FUTURES SYMPOSIUM

Tuesday 24 November
The Long Room, Wintec
Hamilton, New Zealand

Wintec
WAIKATO INSTITUTE OF TECHNOLOGY
Te Kuratini o Waikato

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Kia ora koutou and welcome to Wintec's first Sustainable Futures Symposium. The event arose from the recognition that a number of researchers across Wintec are working on a variety of projects that fit under the umbrella of sustainability – whether in terms of environmental concerns, educational changes, cultural enrichment, or personal health and well-being. Moreover, it has been exciting to see some projects (several of which are on the bill today) involving researchers from different centres, disciplines, and institutions. We hope that from today there may be some possible sparks of interest amongst participants, and encourage the possibility of exploring future projects that will have a sustainable life of their own.

Symposium and Review Committee

Monjur Ahmed
Nick Braae
Lotta Bryant
Anna Matuszek

With thanks to

Linda McPhee
Megan Allardice
Gravitas Printing
Wintec ITS and Events

Wintec
WAIKATO INSTITUTE OF TECHNOLOGY
Te Kuratini o Waikato

Programme – morning

9:00 am Registration and coffee

9:20 am Mihi and introduction – Nick Braae

9:30 am Session 1 – Environmental Concerns
Chair: Anna Matuszek

Barbara Dolamore (ARA, Applied Science) – ZOOM presentation
Impacts of cyanobacteria blooms in Lake Forsyth/Te Wairewa, Canterbury

Emre Ertuk (EIT, Computing) – ZOOM presentation
The Role of Big (Green) Data and Data Analytics in Environmental Sustainability

Rebekah Harman (Wintec, Media Arts)
Unpicking the hidden toxicity in activewear

Krishna Reddy and Kim Watson (Toi Ohomai, Health)
Environmentally Sustainable Management Practices by Health Care Providers in New Zealand

10:50 am Morning Tea

11:15 am Session 2 – Implementing Change
Chair: Monjur Ahmed

Jaikaran Narula (EIT, Business)
The potential to enhance the use of public transport by tertiary institutes to support climate change mitigation

Gabriela Baron (University of Auckland, Design)
Design for Conservation: lessons and opportunities

Nadia McGregor (Ministry of Justice)
Empathy and Sustainability

Natalie Waran and Emma Passey (EIT, Education) – ZOOM presentation
Developing an Outdoor Learning Centre at EIT

Programme – afternoon

12:30 pm Lunch

1:15 pm Session 3 – Environmental Concerns II
Chair: Anna Matuszek

Michelle Thompson and Greer Smit (ARA, Nursing) – ZOOM presentation
How do we get the buy in? Incorporating Education for Sustainability into the nursing curriculum

Nicolas Sandoval, Dip Barot and Sasha Dowling (Wintec, Applied Science)
Pest bird management at Lake Rotopiko

Sanaz Ghoreishi (Wintec, Applied Science) – short presentation
Hydrothermal processing of dairy DAF sludge

Mashanta Mohsin (Wintec, Applied Science)
Eco–cultural wastewater treatment using NZ native filamentous algae

2:15 pm Coffee Break

2:30 pm Session 4 – Artistic Responses
Chair: Nick Braae

Horomona Horo, Hagen Tautari, Dr. Joe Citizen (Wintec, Media Arts and Māori Achievement Unit)
Te Maramataka

Alex Wilkinson (Wintec, Media Arts)
Capturing Aesthetic Experiences of Installation Art

Julia Christey (Wintec, Media Arts)
Why matters of matter, matter in contemporary art

Kent Macpherson (Wintec, Media Arts)
Tuateawa

3:45 pm Closing remarks

Abstracts

Session 1 – Environmental Concerns

Impacts of cyanobacteria blooms in Lake Forsyth/Te Wairewa, Canterbury

Lake Forsyth/Te Wairewa is a brackish coastal lake in Canterbury, New Zealand. Local Māori have depended on shortfin eels (A. australis) from Te Wairewa as a source of mahinga kai for centuries. Since early 1900 Te Wairewa has suffered cyanobacterial blooms caused by Nodularia spumigena which produces the potent hepatotoxin nodularin. Stock deaths related to blooms have been reported along the shores of Te Wairewa for decades. Nodularins can accumulate in aquatic organisms, sometimes invoking negative effects in fish.

In 2016 this author and collaborators reported that eels harvested from Te Wairewa accumulated nodularin in muscle and, to a greater extent, liver tissue. Since nodularins are heat stable it was recommended that livers be removed from eels before consumption. The current focus is to culture pure strains of NZ Nodularia ssp to determine the nodularin production of each strain under different conditions. This knowledge may assist in lake management.

Dr. Barbara Dolamore
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The Role of Big (Green) Data and Data Analytics in Environmental Sustainability

Environmental managers and scientists analyse data to better understand specific problems and to help come up with more accurate solutions. This vast and up-to-date data comes, for example, from geographic information systems, open data sets from government and scientific organisations, and new sensors being installed by researchers. The use of data dashboards and analytics software also continues to proliferate as these tools are becoming more accessible to the general public in terms of cost and ease-of-use. Green Data is a new catch phrase to describe the potentially powerful use of big data to promote environmental sustainability. A global example is the geodata.grid.unep.ch repository hosted by the United Nations. Within New Zealand, niwa.co.nz, data.govt.nz, and local councils provide large datasets related to the environment.

This presentation discusses two research questions. First, how does the academic literature cover Green Data (i.e. big environmental data)? Second, how can general-purpose tertiary data analytics and data science courses feature environmental data in ways that may contribute to sustainability education and efforts? The first one will involve an explorative survey of literature; and the second one will involve the researcher's own critical thinking and reflection as well as a discourse with the other stakeholders and interested tertiary educators. The outcome of these questions can inform further research and practical steps in teaching.

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Unpicking the hidden toxicity in activewear

Nonylphenol (NPs) and Nonylphenol-Ethoxylates (NPEs) are man-made chemicals used in domestic cleaners (until being phased out in the 1990s) and in the textile processing industry. Research shows that if NPs and NPEs reach open water they enter the food of aquatic life and cause damage through disrupting hormones.

This research seeks to examine whether one of the possible causes of NPs and NPEs entering wastewater streams at Pukete Treatment Plant in Hamilton, New Zealand could be from the initial home laundering, by consumers, of activewear garments. Reports from 2013 and 2015 from water samples at Pukete Treatment Plant, Hamilton show the presence of phenols. The small pilot study that we have run indicates that phenols are present in some textiles; this is consistent with studies undertaken by Greenpeace in 2011. Further testing is currently being conducted to confirm these results.

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Environmentally Sustainable Management Practices by Health Care Providers in New Zealand

Because environmental issues rank increasingly higher on the public and political agenda now than ever before, as witnessed by social movements such as Fridays for Future or international treaties such as the Paris Agreement, organizations in most sectors are facing more and more pressures to reduce their environmental footprint. Addressing environmental issues through an organization's management not only contributes to environmentally sustainable development, it has also been shown to create considerable other benefits for the organization, such as cost savings or improved public image (Ambec & Lanoie, 2008; Endrikat, Guenther, & Hoppe, 2014). So far, especially manufacturing and other highly polluting industries (such as farming) are shown to be active and address increasing demands by researchers, politicians, media, NGOs, and others (Heras-Saizarbitoria, German, & Boiral, 2015). However, some research extends the attention beyond the highly polluting industries and considers more 'hidden' actors, i.e., service actors such as consulting companies (Penela & Castromán-Diz, 2015) or hotels (Cespedes-Lorente, de Burgos-Jimenez, & Alvarez-Gil, 2003; Sanchez-Medina, Diaz-Pichardo, & Cruz-Bautista 2016), and their potential contribution to sustainable development.

This research investigates the nature of organizational environmental performance (OEP) of the hospital in New Zealand. So far, in health care provision, it has been discussed good financial performance and management is relevant for the sector. However, whether the environmental issues and what influences hospitals regarding their adoption of certain environmentally sustainable approaches remains unclear. Therefore, this contributes to the knowledge by seeking answers to the following research questions: (i) What is the organizational environmental performance of hospitals? (ii) Based on the hospitals' organizational environmental performance, what classifications of environmentally sustainable approaches exist? (iii) What determines the environmentally sustainable approaches?

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Session 2 – Implementing Change

The potential to enhance the use of public transport by tertiary institutes to support climate change mitigation

Most students who study at tertiary institutions in New Zealand do not live on campus. Therefore, travel to and from the campus has an impact on carbon emissions. This presentation will discuss the relationship between tertiary students understanding of, and attitude to, climate change; and their behaviour in respect to adopting public transport to mitigate climate change. The literature indicates:
a) Most students appear to believe that climate change is a key societal issue. However, this does not always translate into action in their daily lives
b) The public transport system is considered by many tertiary students as inadequate to facilitate shift from cars to bus.
c) Pro-environmental behaviours are influenced by norms and attitudes and there is a rising demand for campus transportation services by both students and staff.

McKelvie-Sebileau (2020), examined transport modalities used by staff at a regional ITP campus and found: 85% of staff come to campus in their own car and nearly 50% always drive a car alone. This pattern is also evident for students: 70% of students take their own car to campus in 2018, compared to 50% in 2014. Tertiary institutions can do more to mitigate climate change. The study is examining the attitudes and behaviour of students at a regional ITP campus about climate change and how this impacts their willingness to adopt public transport as part of their commute to and from campus.

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Design for Conservation: lessons and opportunities

Design for Conservation (D4C) is an open-access methodological toolkit that environmental conservation groups can use to maximise innovation outcomes and ensure meaningful community engagement. This project will allow communities to create and be a part of their own solutions autonomously, upholding their values and their independence. The ultimate purpose is to foster a more resilient landscape characterized by local communities, connected to the land and each other, that are able to adapt and change as needed. All these individual projects will benefit from the small-scale, local approach, but will be connected in a large-scale platform that will provide strength, resiliency and support, making global a network of locals (www.design4conservation.com).

A D4C preliminary toolkit had been developed and tested as the main methodology used in the “Design and the Natural Environment” paper at the University of Auckland. This paper is part of a new Design Program that has been launched in 2020 based on the premise that the designers of the future do not contribute to the environmental crisis we are experiencing, but instead use their skills to propose alternative models of well-being that are aligned with our ecosystem. UoA students not only design following models where circular and regenerative design, systems thinking and impact measurement are mandatory components of each project, but they also follow a dematerialization path, focusing on new technologies, services and experiences to achieve positive changes in people’s habits.

This presentation will provide an overview of the methods used in “Design and the Natural Environment”, the lessons learned in our classroom and the future opportunities for the D4C project.

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Empathy and Sustainability

Empathy, or rather a perceived lack thereof, is an emerging theme in studies of how human beings relate at emotional level to the environment (Rifkin, 2009). Empathy is usually defined in terms of Human to Human interactions and described by elements like “Empathetic towards people’s needs and context” (Schweitzer et al., 2016) and “being open, avoiding being judgmental and being comfortable with people with different backgrounds and opinions” (Carlgren et al., 2016, p. 46). However, emerging research from environmental psychology and philosophy claims that building empathy with the non-human world also stimulates pro-social and pro-environmental identities and action (Rifkin, 2009; Krznaric, 2014).

Exploring some of these emerging innovative methodological approaches to observe, measure and potentially stimulate empathy for sustainability is the focus of this talk. I highlight why empathy as a ‘natural’ characteristic of humans and other species (de Waal, 2010), has a particular role in human-environment interactions. And explore ways to stimulate empathy as a (design thinking) mindset in order to shape sustainability transformations (Brown et al., 2019).

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Developing an Outdoor Learning Centre at EIT

A focus on the future, including sustainability, is a core principle in the NZ Curriculum and one that benefits all. The Government wants teachers to incorporate these principles within their teaching practice, but teachers need support and resources to achieve this. 'Learning in Nature' is an innovative collaboration between the Eastern Institute of Technology (EIT), Ngāti Pārau (the mana whenua hapū), Department of Conservation, Predator Free Hawke's Bay, Hawke's Bay Regional Council, EnviroSchools and others. Funded through a grant from the AirNZ Enviroment Trust, our mission is to develop connections, positive attitudes and future behaviour through supporting learning in an environmental context. To achieve this, the Ōtātara Outdoor Learning Centre (OOLC) was created to, develop, support and promote initiatives where nature is used as a context for learning across all areas of the curriculum, for all levels from Early childhood to tertiary education. The underpinning objective of this initiative is to improve awareness of the importance and relevance of environmental issues such as; sustainable use of natural resources, biodiversity conservation and promotion of ecological intelligence. The outdoor learning facility provides our region's communities, local schools, EIT staff and students with the opportunity to develop a greater sense of personal responsibility in relation to ensuring a sustainable future for all. In this presentation we will discuss the way in which the centre was developed, the research that is being undertaken and the ways in which this project has connected us with communities, schools and each other.

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Session 3 – Environmental Concerns II

How do we get the buy in? Incorporating Education for Sustainability into the nursing curriculum

At Ara we want our nursing students to be equipped with knowledge and skills to contribute to a fast-changing healthcare system. As nursing lecturers, we want to strengthen an understanding of sustainability and how this links to health care to promote skills that enable nursing students to lead in the transformation and change that is needed for the future (Ara Institute of Canterbury, 2020; Keating, 2017).

We have identified barriers in achieving this, including space in the nursing curriculum, culture, and the understanding of how sustainability can be implemented within the programme. To overcome these barriers, we have put sustainability on a platform within the nursing department through starting conversations, forming an education for sustainability committee, and encouraging other people's ideas (Grose & Richardson, 2016; Seatter, 2017). We have and are role modelling change within our own practices, such as altering assessments and managing clinical waste within the department and becoming the champions for sustainability. Our plan to achieve our goal is to have several small discussion groups within the nursing department, to share ideas and to develop a sustainability paradigm within the lecturers, to help them identify areas within their own courses where sustainability fits and create learning outcomes that fit with this mindset.

We want to have further kōrero with others who are championing sustainability in their specialties, to share practice and ideas, and to ensure an interdisciplinary approach is encouraged and that this kōrero is for anyone who wants to develop transformation and change.

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Pest bird management at Lake Rotopiko

Lake Rotopiko is located just south of Ohaupo. As with most peat lakes, it has unique characteristics such as low nutrient levels and naturally acidic waters. This provides habitat for animals and plants adapted to these special characteristics. Since the completion of the pest proof fence in 2013 and successful eradication of rats in 2014, there has been a great increase in the number of roosting and resident exotic birds at the lake. The eradication of mammalian pests (except mice) has created a sanctuary for unwanted pest birds such as starlings and sparrows. The Waikato Regional Council and Landcare research have expressed their concerns regarding the high concentrations of nutrients resulting from the large amount of bird faeces produced each day.

The issue of exotics birds benefitting from successful predator operations has not yet been studied in New Zealand; however, it could become the next big issue as mammalian predators are reduced towards the goal of Predator Free 2050. A collaborative research group between the National Wetland Trust, Wintec and Toi Ohomai has been formed with the intend of mitigating the issues caused by exotic birds. Ultimately, the aim of the research is to control the population of exotic birds at Lake Rotopiko before ecological negative effects are irreversible and public health and safety are risked. The initial focus was to develop and validate a bird abundance index procedure in order to estimate the efficiency of managements measures.

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Hydrothermal processing of dairy DAF sludge

The dairy industry is one of the most stable and expanding industries globally over the last two decades. Milk processing generates massive amounts of wastewater effluent. The wastewater effluent is rich in fats and contains a significant level of oil and grease (FOG). Its chemical oxygen demands (COD) is more than 200,000 ppm and its biological oxygen demands (BOD) is around 70,000 ppm. Dissolved air flotation (DAF) technique releases micro bubbles that carry the FOG in the wastewater to the surface, and forms a sludgy material, called float or dairy sludge. Discarding the DAF dairy sludge in nature is problematic since it decomposes quickly and releases strong foul odours causing nuisance conditions due to its high FOG and SS levels. Hydrothermal carbonization (HTC) is a technique that operates between 180 °C and 250 °C, to degrade the organic content of waste in the presence of water and produce a solid product, known as hydrochar (HC). DAF dairy sludge seems to be a perfect candidate for this process due to its high-water content.

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Eco–cultural wastewater treatment using NZ native filamentous algae

Human activities have resulted in excessive nutrients like nitrogen, phosphorus and chemicals and sediments to enter New Zealand freshwaters causing harm. This is an issue of major concern because it has caused the concentrations of pollutants to rise greatly in urban, forestry and farming wastewaters in New Zealand. Pollution of waterways is irreversible and threatens native species and habitats in New Zealand as well as has an impact on human and cultural well-being (Ministry for the Environment , 2019). The need to manage pollution of waterways as well as to replace and rehabilitate current conventional methods of wastewater treatments in New Zealand is huge. Hence, based on the principle of RNEW technology (Recycle Nutrients Energy Water) technology, a wastewater treatment procedure using New Zealand native filamentous algae is proposed (Water Environment Federation, 2016).

Symbiosis between microalgae and bacteria enables the removal of BOD and nutrients to reclaim water from wastewater. During wastewater treatment, microalgae produce molecular oxygen through photosynthesis, which is used as an electron acceptor by aerobic bacteria to degrade organic pollutants (nitrates and phosphates). The released carbon dioxide by bacteria could be consumed by microalgae as a carbon source for photosynthesis, hence, proving to be a sustainable form of wastewater treatment practice.

The research project performed aimed at comparing the performance of five NZ native filamentous algal wastewater mesocosms by investigating nutrient removal efficiency (mainly ammonium nitrogen and phosphorus).

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Session 4 – Artistic Responses

Te Maramataka

Te Maramataka is a collaborative rangahau-creative arts practice-led research project that aims to explore maramataka Māori for health through the creation of a knowledge repository using spatialised sonics and lighting effects. Starting with latent potentiality we consider what we already know about the Maramataka and how spoken word whakataukī, taonga pūoro and natural sounds can be integrated into participatory interactive environments.

Existing local knowledge of maramataka is situated within the wider community with well-regarded experts. A goal of this project is to make aspects of their knowledge accessible to local community and wider communities in a manner that is readily understood. Of particular importance is to help to support the intergenerational transmission of knowledge, in order to increase understanding of the importance and applicability of mātauranga Māori for people's wellbeing, in daily life.

Since one aspect of this project starts with the unknown, we're not interested in defining or positioning the project by what others have done or what it is not. We're interested in exploring a new space that has not been traversed so that the practice itself is normalised. We will portray the story as we see it unfolding, with parts of our storytelling incorporating performance and performative aspects.

Another foundational aspect is the assertion that there are things greater than us that have influence over what we are doing. Our current focus is to explore how sound performance unlocks triggers within people to help understanding. As parts of this is creative arts experimentation – where experiments are understood as improvisation – we don't know yet if it will work.

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Capturing Aesthetic Experiences of Installation Art

This project aims to capture the aesthetic experiences of an art installation called *It's Blue* made by Alex Wilkinson. The project uses an art installation as an investigative tool to develop and record a response to artistic experiences. The response will be collected via two methods to compare these methods and ultimately determine if there is a more 'meaningful' form of final data. *It's Blue* is a room entirely coated or painted the same shade of 'swimming pool' blue. The room contains a blue desk, two blue chairs, a blue clock, a blue artwork, and various other things found in a lounge room painted blue. The work is a biographical glimpse of the depressive episodes I go through and simulates real life but with a slight warp, therefore bringing into focus the notion of sustainable mental well-being. As well, this work is an investigative look into how viewers interact with and perceive their relationship to the environment. The goal of this project is to see if the intended message of the artwork is received by the viewers, or if not what their perception of the artwork/the environment is. The combination of positivist style research and installation art will allow me as the artist to see if I was successful in conveying my message or possibly show me different iterations of the space individuals experience.

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Why matters of matter, matter in contemporary art

This presentation will outline the content of my Masters research, as a work in progress. It will examine two diverging theoretical approaches to the climate crisis. New materialism (under the broader umbrella of posthumanism) and contemporary anthropocentrism will be compared in their philosophical alignment to the Anthropocene. It will further examine the role of contemporary art in this discussion and explore notions of new materialism in the work of two contemporary artists (Terike Haapoja and Siobhan McDonald). Finally, I will show some images of my work and my personal response to notions of new materialism.

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Tuateawa

The Tuateawa project seeks to inform ecological understanding using analyses of soundscapes. Sound recordings are made in specific locations near Tuateawa in the Coromandel peninsula. This area is being monitored for the eradication of pests such as possums, stoats and rats. The research looks at how the soundscapes change over time, in particular: how is bird life affected by the presence of introduced noxious pests? And, how does human activity influence natural behaviours?

The project is a form of documentary capturing detailed sound recordings every season for three or more years. The sound data is analysed for noticeable shifts in frequency and loudness, and output as various visual abstractions, the first of which is an audio visual work for LCD screens and speakers at Ramp Gallery 7-11 December 2020. The intended audience is intermediate age children to get them thinking about how these soundscapes might be understood and focused on through a less ‘scientific’ medium.

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Poster Presentation

Project to launch sustainable fashion label, THOMPSON | AOTEAROA

This project intends to provide the key foundational aspects of launching a sustainable fashion label. I have conducted a survey consisting of 52 respondents from around New Zealand, held a focus group of 13 individuals, and interviewed several industry professionals. The goal of this research was to determine the viability of launching a sustainable fashion label, where all our pieces will be handmade here in Hawke's Bay by co-founder Ashford Thompson.

Traditional methods of clothing manufacture have led the fashion industry to being the second largest polluting industry, just behind oil.

What we do to combat this:
- Manufacture using natural fibres or repurposed garments
- All production happens on-shore to minimise transport emissions
- Design pieces to be worn over and over again

Transcend traditional ideas of fashion, gender and self-expression by bringing high quality, locally made garments to market in a responsible, sustainable way. – THOMPSON | AOTEAROA

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