4th APRU
Sustainable Cities and Landscapes Virtual Conference and PhD Symposium

4 – 18 December 2020

APRU

THE UNIVERSITY OF AUCKLAND NEW ZEALAND

CREATIVE ARTS AND INDUSTRIES

FUTURE CITIES RESEARCH HUB

4th APRU
Sustainable Cities and Landscapes
Virtual Conference and PhD Symposium

14-18 December 2020

PhD Symposium
Book of Abstracts

The University of Auckland, New Zealand
School of Architecture and Planning
Future Cities Research Hub

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Contents

Introduction

Welcome to the 2020 APRU Sustainable Cities and Landscapes Conference and PhD Symposium

By 2050, urban areas will account for nearly two thirds of the global population and create three-quarters of the world's emissions.

In the face of unprecedented population growth and climate change, we need to better understand and manage the interconnections between cities and their surrounding ecology. We cannot ignore that our cities are inextricably linked and a part of nature, not separate from it. Understanding the interconnection between human activity, resource use, biodiversity protection and the interdependence between cities themselves is essential to solve the critical sustainability issues facing the Pacific Rim, one of the world's most rapidly urbanizing regions. Here, interconnection is key to solving critical sustainability issues, including supplying adequate food, water and energy, while preserving vulnerable populations, including indigenous communities and ecosystems.

The Association of Pacific Rim Universities (APRU), through the Sustainable Cities and Landscapes Hub, seeks to make these interconnections and draw on the strengths of differences across the region, using different viewpoints to solve urban and sustainability challenges that transcend city and country boundaries.

The APRU Sustainable Cities and Landscapes (APRU-SCL) Conference and PhD Symposium is an exciting opportunity for academics, practitioners and public officials from different disciplines to collaborate on research and advocacy projects that foster long-term sustainability and resilient city-landscape relationships.

The Conference and PhD Symposium are structured around plenary sessions involving eminent international and regional speakers and panellists, as well as working groups that bracket a range of social, economic and environmental issues.

Previous editions of the APRU-SCL Conference include:

The 2017 inaugural conference that was hosted by the University of Oregon in Portland, USA;

The 2018 conference that was hosted by The University of Hong Kong, HK;

The 2019 conference that was hosted by the University of New South Wales in Sydney, AU.

The 2020 Conference is hosted by The University of Auckland, NZ, and is organised by the Future Cities Research Hub of the School of Architecture and Planning. Due the limited possibility of travelling across the region resulting from the Covid-19 pandemic, the 2020 APRU conference is held entirely held online at times that suited all regions from the east to the west of the Pacific Rim.

Committees

Conference Organising Committee

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Emeritus Professor Errol Haarhoff

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Dr Mohsen Mohammadzadeh

Dr Alessandro Premier, Symposium co-coordinator

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PhD Symposium

In occasion of the 4th APRU Sustainable Cities and Landscapes Conference 2020, the host University, in collaboration with the Association of Pacific Rim Universities (APRU), promotes an online PhD Symposium organised in collaboration with the Future Cities Research Hub of the School of Architecture and Planning at the University of Auckland.

The Symposium takes place on Monday 14 and Tuesday 15 December 2020 and is entirely organised online. Accepted PhD students will have the opportunity to attend the whole conference too and to join a Working Group based on their research focus and interest.

The Symposium provides PhD students with opportunities to present their research work related to the topics of the APRU Sustainable Cities and Landscapes Hub (SCL) and to the United Nations Sustainable Development Goals (SDGs). A reflection on the implications of Covid-19 pandemic on their research needs to be included in the papers' conclusion.

Students receive high quality feedback and have the opportunity to participate in the broader conversations of the APRU SCL Working Groups during the entire conference. This enables doctoral candidates to interact and network with eminent researchers from the APRU SCL network.

The doctoral symposium has the format of a two-day virtual event, with live presentations of doctoral students' papers, feedback from the audience and a workshop session for discussion, networking and the development of a final document. Students present this collaborative document during the conference closing plenary.

The symposium is open to registered PhD students. APRU SCL 2020 conference participants and academic staff of the University of Auckland are invited to participate as discussants.

Students present their research aligned with relevant UN SDGs and one or more of the following topics:

Children, Youth and Environments	This topic explores the role of physical environments in children's health, wellbeing and development, and the relationships between the social and physical environments of children's lives.
Food Nutrition Security	This topic looks at how secure are the food systems of cities and their hinterlands, and what are some of the environmental and human health and wellbeing consequences of their current arrangements.
Future Energy Landscapes	This topic investigates which research paths should be prioritized to contribute to the achievements of the UN SDG No. 7 (Affordable and Clean Energy) within the Pacific Rim.
Indigenous Knowledge and Wisdom	This topic addresses sustainability challenges drawing on indigenous worldviews, knowledge, approaches, experience and practices.
Landscape and Human Health	This topic looks at action plans to enhance interactions with the landscape, and understanding benefits, by creating greens and vivid environment that reduce stress, increase productivity, and enhances good emotion responses.
Smart Cities	This topic investigates emerging smart technologies which generate new capacities to better understanding management and development of cities.
Sustainable urban design	This topic investigates sustainable urban design issues and approaches to better understand the particularities of each context as well as help identify more general, universally applicable solutions and ways of thinking about urban sustainability.
Sustainable urban design	This topic investigates sustainable urban design issues and approaches to better understand the particularities of each context as well as help identify more general, universally applicable solutions and ways of thinking about urban sustainability.
Transitions in urban waterfronts	This topic looks at the edge between aquatic and terrestrial ecosystems that has shouldered ongoing, significant impacts of urbanization, while also providing sites of transformative growth, symbolic inspiration, and reinvention/renewal.
Urban-Rural Linkages	This topic investigates cooperative and inclusive planning and governance approaches adopted in regions that help strengthen urban-rural linkages as nonlinear, diverse urban-rural interactions and linkages across space within an urban-rural continuum.
Vulnerable Resilient and Climate Justice Communities	This topic is focused on resilience and climate justice and investigates the theory of resilience and vulnerability in community and economic development.
Water and Wastewater	This topic addresses how wastewater and sanitation services can evolve to be truly sustainable.

A reflection on the implications of the Covid-19 pandemic on the research had to be included in the papers' conclusion.

PhD Symposium Keynote Speaker

Prof Bart Johnson

University of Oregon

Dr. Bart Johnson is a Professor of Landscape Architecture at the University of Oregon. His training in agronomy (B.S.), landscape architecture (MLA) and ecology (Ph.D.) reflect his lifelong passion for learning how to integrate people and their use of the land with native ecosystems and evolutionary processes. His research is collaborative and interdisciplinary, with the goal of enhancing society's capacity to adapt and innovate in the face climate change and human population growth. He believes that solutions must be founded in deep knowledge of how earth's ecosystems sustain the foundations of life and provide the key to life's and humanity's resilience.

He's been a PI or co-PI on research grants totally nearly $10 million U.S. and feels he's just figuring out how to write proposals that get funded.

PhD Symposium Programme

Day 1 – Monday 14th December 2020

NZ 14 Dec.	Hong Kong 14 Dec.	Portland 13 Dec.	Lima 13 Dec.	Programme
12:00 pm	7:00 am	3:00 pm	6:00 pm	Symposium goes live
WELCOME MESSAGES AND PHD SYMPOSIUM OPENING				
12:03 pm	7:03 am	3:03 pm	6:03 pm	**Welcome messages** Welcome and Introductions Paola Boarin, *University of Auckland, Conference Director* Opening messages Christopher Tremewan, *APRU Secretary General* Dennis Galvan, *University of Oregon, APRU-SCL* Yekang Ko, *University of Oregon, APRU-SCL Programme Director*
12:32 pm	7:32 am	3:32 pm	6:32 pm	**PhD Symposium Opening and Keynote presentation** PhD Opening Alessandro Premier, *University of Auckland* Keynote presentation Bart Johnson, *University of Oregon, APRU-SCL Committee Chair* Q&A session with live questions from participants
1:20 pm	8:20 am	4:20 pm	7:20 pm	Virtual Coffee Break
PARALLEL SESSIONS 1 AND 2				
1:30 pm	8:30 am	4:30 pm	7:30 pm	**PARALLEL SESSION 1** **Topics:** Future Energy Landscapes, Landscape and Human Health, Water and Wastewater **Moderator:** Alessandro Premier, *University of Auckland* **PhD Students (in order of presentation):** ▪ Yeongseo Yu ▪ Hamzan E. Al-Qudah ▪ Shin-Han Hung ▪ Yu-Chen Yeh ▪ Amrit Kumar Thakur ▪ Yuliang Wang
				PARALLEL SESSION 2 **Topics:** Sustainable Urban Design, Indigenous Knowledge and Wisdom, Transition in urban waterfronts **Moderator:** Manfredo Manfredini, *University of Auckland* **PhD Students (in order of presentation):** ▪ Yin Mon Naing ▪ Xintian Wang ▪ Marzieh Rezaei Ghaleh ▪ Octaviana Sylvia Caroline Rombe ▪ Nicola Short ▪ Rosa Grasso
3:00 pm	10:00 am	6:00 pm	9:00 pm	Virtual Coffee break

NZ 14 Dec.	Hong Kong 14 Dec.	Portland 13 Dec.	Lima 13 Dec.	Programme
PARALLEL SESSIONS 3 AND 4				
3:15 pm	10:15 am	6:15 pm	9:15 pm	**PARALLEL SESSION 3** **Topics:** Smart Cities, Urban-Rural Linkages, Food Nutrition Security **Moderator:** Mohsen Mohammadzadeh, *University of Auckland* **PhD Students (in order of presentation):** ▪ Pinglin Chen ▪ Son Phung Anh ▪ Mustika Sari ▪ Shuang Wu ▪ Yao Ji ▪ Chika Kondo
				PARALLEL SESSION 4 **Topics:** Vulnerable Resilient and Climate Justice Communities, Children Youth and Environment **Moderator:** Elham Bahmanteymuri, *University of Auckland* **PhD Students (in order of presentation):** ▪ Sainimere Veitata ▪ Reenate Willie ▪ Yang Wei ▪ Sung Lun Tsai ▪ Sameh Shamout ▪ Neda Afshar
5:00 pm	12:00 pm	8:00 pm	11:00 pm	End of Day 1

Day 2 – Tuesday 15th December 2020

NZ 15 Dec.	Hong Kong 15 Dec.	Portland 14 Dec.	Lima 14 Dec.	Programme
12:00 pm	7:00 am	3:00 pm	6:00 pm	Symposium goes live
PHD SYMPOSIUM PARALLEL ROUNDTABLES				
12:03 pm	7:03 am	3:03 pm	6:03 pm	**ROUNDTABLE 1** **Topics:** Future Energy Landscapes, Landscape and Human Health, Water and Wastewater **Moderator:** Alessandro Premier, *University of Auckland* **Students:** ▪ Yeongseo Yu ▪ Hamzan E. Al-Qudah ▪ Shin-Han Hung ▪ Yu-Chen Yeh ▪ Amrit Kumar Thakur ▪ Yuliang Wang
				ROUNDTABLE 2 **Topics:** Sustainable Urban Design, Indigenous Knowledge and Wisdom, Transition in urban waterfronts **Moderator:** Manfredo Manfredini, *University of Auckland* **Students:** ▪ Yin Mon Naing ▪ Xintian Wang ▪ Marzieh Rezaei Ghaleh ▪ Octaviana Sylvia Caroline Rombe ▪ Nicola Short ▪ Rosa Grasso
				ROUNDTABLE 3 **Topics:** Smart Cities, Urban-Rural Linkages, Food Nutrition Security **Moderator:** Mohsen Mohammadzadeh, *University of Auckland* **Students:** ▪ Pinglin Chen ▪ Son Phung Anh ▪ Mustika Sari ▪ Shuang Wu ▪ Yao Ji ▪ Chika Kondo
				ROUNDTABLE 4 **Topics:** Vulnerable Resilient and Climate Justice Communities, Children Youth and Environment **Moderator:** Elham Bahmanteymuri **Students:** ▪ Sainimere Veitata ▪ Reenate Willie ▪ Yang Wei ▪ Sung Lun Tsai ▪ Sameh Shamout ▪ Neda Afshar
1:30 pm	8:30 am	4:40 pm	7:30 pm	Virtual Coffee Break
FINAL PHD SYMPOSIUM PLENARY ROUNDTABLE				
1:45 pm	8:45 am	4:45 pm	7:45	Presentations and discussions of roundtables work
3:00 pm	10:00 am	6:00 pm	9:00 pm	PhD Virtual Happy Hour and Networking

Day 4 – Thursday 17th December 2020

FINAL PHD STUDENTS PRESENTATIONS				
4:15 pm	11:15 pm	7:15 pm	10:15 pm	**Introductions** Alessandro Premier, *University of Auckland*
4:20 pm	11:15 pm	7:15 pm	10:15 pm	**PhD Final Group Presentations** Group 1 Group2 Group 2 Group 4 Q&A session with live questions from participants
4:27 pm	11: 27 pm	7: 27 pm	10: 27 pm	
4:34 pm	11: 34 pm	7: 34 pm	10: 34 pm	
4:41 pm	11: 41 pm	7: 41 pm	10: 41 pm	
5:10 pm	12:10 pm	8:10 pm	11:10 pm	Virtual Coffee Break

PhD Symposium Abstracts

Children, Youth and Environments

The Significance of Outdoor Learning Environments in Innovative Learning Environments

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ABSTRACT

This paper examines the presently under-developed potential for school grounds to form part of learning environments, especially in the pandemic situation, when the schools face difficulties accommodating students in indoor classrooms. The article attempts to provide a connection between Outdoor Learning Environments (OLE) and Innovative Learning Environments (ILE), proposing Outdoor Innovative Learning Environments (OILE) on school grounds which can be used effectively by teachers and students. The paper includes a brief background of open-air schools as the first generation of OLE, a summary of the positive impacts of OLE, the definition of ILE, an ILE spatial typology, and evaluates some OILE examples in school grounds.

Keywords: *Outdoor Learning Environments (OLE), Innovative Learning Environments (ILE), open-air school, Outdoor Innovative Learning Environment (OILE)*

Food Nutrition Security

Are Farmers an Endangered Species?: New and Beginning Farmers Forging New Communities of Support between Rural and Urban Consumers

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ABSTRACT

Japan's aging and declining farming population continues to exacerbate the decline of rural regions. As a response, there have been strong efforts from governments and local organizations to provide avenues of support for new and beginning farmers via a certification process which provides access to funding and subsidized loans. While the Ministry of Fisheries, Forests, and Agriculture (MAFF) promotes SDG Goal 2 under the premise of sustainable agriculture through Good Agricultural Practices (GAP) certification and grants for environmentally friendly farming, this does not directly extend to supporting new farmers who hold strong interest in farming sustainably. Based on semi-structured interviews with farmers and government officials in Shiga Prefecture, we observe strong trends of new entry farmer collaborations and community building such as hosting unique opportunities for urban consumers to participate in agricultural activities, engaging with their surrounding rural residents to help uplift their region's rural revitalization efforts, and building organizations and spaces for mutual support.

The spaces of connection and relationship building that this current generation of new farmers is bridging between rural and urban areas provides insights on how best to support the future of rural areas and more holistically promote sustainable agriculture. New and beginning farmers especially those who promote sustainable agriculture serve critical roles in reshaping rural communities as they build capacity for solidarity between rural and urban areas.

***Keywords**: new and beginning farmer, urban rural linkage, rural revitalization*

Future Energy Landscapes

Techno-economic analysis of PV-based power systems for Cape York, Australia

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ABSTRACT

Fossil fuels are the world's main sources of power production. Because of the huge population, the energy demand and supply gap have recently escalated, and fossil fuels will not satisfy the gigantic energy demands. Meanwhile, they have harmful environmental effects as well. Remote rural areas far from the national grid have no way of meeting their energy needs. These concerns summarize the situation facing the population living in Cape York, Australia. The solar photovoltaic (PV) off-grid system has emerged as the best energy solution for the electrification of these remote regions. However, the local electricity providers struggle with the lack of area-specific data on generation capacity and economic feasibility of solar energy. To address this problem, this study aims to deliver a comprehensive techno-economic feasibility analysis of a solar PV system for Cape York, Queensland, Australia. This study investigates the economic viability for solar PV systems by means of Hybrid Optimization Model for Electric Renewables (HOMER) software. HOMER results suggest that the total cost of electricity generation from the solar PV stands significantly cheaper than conventional electricity. Besides, the system can reduce carbon emissions and other pollutants considerably.

Keywords: *PV, Solar energy, Cape York, HOMER, Pollutants*

A review of the attributes of successful agriphotovoltaic projects

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ABSTRACT

Climate change is causing massive environmental disasters, which increasingly damage human civilization. To cope with climate risk, the world is progressively converting its energy dependence from the fossil fuel base to renewable energy such as photovoltaic solar farms. Successful photovoltaic (PV) projects have demonstrated various benefits and positive effects in all environmental, economic, and social aspects. However, conventional photovoltaic projects tend to have a serious land-use conflict issue with agricultural farmlands in that solar farms require huge land areas to install PV panels. Responsively, the concept of Agrivoltaic (APV), a mixed system that deploys photovoltaic panels over farmlands, emerged and have been implemented. Although numerous studies demonstrate the multiple benefits of APV, there is a lack of studies analyzing the influential attributes that may lead to the success or failure of the APV project. Thus, this paper aims to review and analyze the influential attributes of APV that may be relevant to its success or failure, based on the triple bottom lines-economic-environmental-social aspects. This paper also aims to review the opportunities and challenges that may arise when implementing APV into the urban environment.

Keywords: *agrivoltaic, productive landscape, co-location, renewable energy, future energy landscape*

Indigenous Knowledge and Wisdom

Cultural approach to circular economy. Preliminary analysis of intangible Toraja's vernacular architecture and its potential application on the coffee value chain.

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ABSTRACT

The research found that the coffee value chain operates in a long linear path and has not adopted the local wisdom point of view. The real actors in the primary stage are community-based stakeholders. To employ the circular economy framework as the latest sustainable approach to the value chain, then the gap of the social value of the societal structure and the culture in a circular economy that mainly unexplored must be developed. Vernacular architecture represents the social and cultural value. This value has to be understood, translated, and employed in the framework. This research aims to create a framework for the community-based coffee value chain by adapting a circular economy framework with added social value and culture. It is done by analyzing the vernacular architecture values and the coffee culture where both are in the same frame of the cultural landscape, with case study Toraja. Furthermore, this paper will focus on the value of the carving motifs of Toraja vernacular architecture, which are part of the vernacular architecture's material symbols and its meaning in the social value and its interweaving with the coffee culture. The research employs a qualitative research methodology with a case study approach.

Keywords: *Cultural landscape, Toraja vernacular architecture, Toraja coffee culture, circular economy, Toraja carving motif*

Cultural heritage landscapes, ontological challenges and environmental justice in Aotearoa 1990-2020

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ABSTRACT

This paper summarises legal and planning statutes as they relate to cultural heritage landscapes and indigenous heritage. Since the mid 1990's government agencies and heritage groups have attempted to develop structures and drafted policies for better protection of Māori heritage and cultural heritage landscapes. They have covered a wide and complex range of needs and values but, to date, have failed to embed better protective laws and policies with more effective outcomes. Through a socio-political critique of heritage law, planning and policy development in Aotearoa over the last 40 years the power relationships between different heritage *ontologies* in Aotearoa is explored.

Further, this paper offers insights into Te Tiriti o Waitangi obligations, particularly principles of kāwanatanga (governance) and kaitiakitanga (guardianship). Expanding on the work of Huhana Smith (2013) shows how a cultural heritage landscape approach, if applied, would better address Te Tiriti obligations.

Finally, the paper will highlight elements of the #protectihumātao campaign in Auckland that demonstrates the current weaknesses of heritage planning regimes and environmental regimes in Aotearoa.

***Keywords**: heritage; landscapes, law, planning, social justice*

Landscape and Human Health

Using AI to Extract Biophilic Design Elements and Predict Health Benefits and Tradition Environmental Qi

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ABSTRACT

People release stress in urban environments by experiencing green areas, such as parks, grasslands, and areas with trees and hedges. For over 30 years, increasing studies have depicted the psychological and physiological health benefits of experiencing nature. However, recently, people have been staying in concrete environments without green spaces in their daily lives, especially during the COVID-19 pandemic, not only causing social isolation but also contributing to health problems. Biophilic attributes in built environments might improve people's connection to nature and provide health benefits and influence landscape design applications. To confirm this, the present study took photos in urban green spaces and imported them into Google Vision AI to label their biophilic attributes and to predict the tradition environmental Qi in the space. The study found that natural labels, such as "tree, plant, grass, and park" significantly influenced people's preference for a space, its tradition environmental qi, and people's experiences of recovery and reflection. However, urban labels, such as "building, architecture, city, and house" were significantly negatively related to the same psychological outcomes. Using AI to define biophilic labels could optimize the psychological benefits of designed spaces and provide a new view for related landscape design work.

Keywords: *Biophilic Elements, Tradition Environmental Qi, Google Vision AI, Environmental Information Labels, Urban Green Space*

Constructing an application for the data collection on landscape design planning to physical and mental health

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ABSTRACT

Background: For most people, the natural environment is recommended as an affordable health promotion method.

Goal: Develop an app to collect people's health information and return people's environmental health prediction scores. The data can also be used in landscape planning and design in the future to design healing fields for people to use.

Discussion: Experiment with a preliminary developed application. The research results show that the altitude of Toucheng Farm is slightly higher than that of flat land; when the temperature is low, the heartbeat in the physiological response increases, and the weather and relative humidity of the day will affect the preferences of tourists.

Conclusion: Climate and environmental factors affect personal physical and mental health and social distancing strategies caused by the global epidemic this year. The next step of the research is to consider the impact of climate and social distance factors on people's health and incorporate them into the health route system.

Keywords: *Mobile app, Health, Nature contact, Climate change, Landscape design*

Smart Cities

The utilization of machine learning techniques in the building design stage: a qualitative review

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ABSTRACT

Machine learning (ML) is a subdivision of artificial intelligence (AI) technology that has been extensively researched and applied in the building and construction industry for the past few years, particularly in the building design process. It yields significant benefits to the sector through its learning method that not only offers automation for repetitive complex design tasks and evaluation for decision-making functions but also optimization of building performances. This study investigates the existing exploration of the machine learning techniques utilized in the building design process to improve both the performance and result of the building design in the early design stage. From the 27 publications discussed in this paper, the Genetic Algorithm was the most utilized technique in the building design research area, followed by Neural Network. However, the employment of machine learning in this area mostly focused on particular building aspects, creating an opportunity for further studies to develop comprehensive building design solutions through the machine learning approach.

Keywords: *machine learning, building, design generation, algorithm*

Micro-mobility use in times of uncertainty: An Auckland Case Study

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ABSTRACT

The current worldwide COVID-19 pandemic has challenged urban mobilities of all kinds. Micro-mobility had been long recognised as an alternative transport mode for short-distance trips, but has been largely ignored in New Zealand cities in response to safe and alternative urban mobilities during the pandemic. Using Auckland in New Zealand as a case study, this paper explores micro-mobility devices used during the pandemic. It shows that in Auckland, the reactive way of comprehending micro-mobility in the city created confusion about the current and future use of such devices and services, impeded infrastructure management, especially the pedestrian environment, and challenged the right to the public realm. Apart from future research projects, this paper suggests that, with clear policies and regulations, not only can micro-mobility be an additional option for frontline workers and citizens during a time of uncertainty, but they can also be part of the integrated transport system and an alternative for short-distance trips that are mostly undertaken by cars.

Keywords: *Micro-mobility, E-scooters, post-pandemic, personal transport, pedestrian environment*

Digital twin in epidemic: How does a smart city cope with novel challenges through digital simulation, automation and visualisation

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ABSTRACT

At the beginning of the 21st century, as rapid urbanization becomes a global phenomenon, smart city becoming more and more a future-proof solution for cities with rising unprecedented challenges of congested infrastructure, population density, energy inefficiency and global public health. In this context, digital twin was initially introduced by Dr Michael Grieves in 2002 as a key enabler technology to improve product manufacture and complex systems, and later bloomed as a new concept to promote better design, system integration and troubleshooting of the physical city through simulation, automation and visualisation. This paper, in aiming to understand how digital twin was rapidly adopted by a number of pioneer entrepreneurs, cities and nations, provides a narrative and categorical perspective of digital twin appearance in literature and explores the extents where a real-time cyber presentation of the city can support mediating urban issues within the context of global pandemic. In result, a longitudinal section of digital twin and smart city development has been introduced, including the evolvement of digital model, digital shadows to digital twin, as well as the rising interest of academia and private sector to the technology.

Keywords: *Smart city, Digital twin, Smart infrastructure, Global epidemic*

Sustainable Urban Design

Assessing the effects of population growth and climate change on sustainable blue-green infrastructure (Case study – Qazvin)

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ABSTRACT

Over the past century, population growth and climate change have affected most cities in developing countries, being damaged extensively at different scales. For instance, in Iran, the historical sustainable blue-green infrastructure (BGI) is under pressing pressure. However, sustainable BGI could support the environmental, social, and economic sustainability and mitigate as well as adapt to climate change. Qazvin, the historical Persian garden city in the middle of Iran, is a valuable sample of sustainable adaptation to drought and water shortage. Due to the urban development process, population growth, and climate change during the last century, Qazvin has lost a significant part of its historical blue-green infrastructure. This paper aims to assess the effects of population growth and climate change on sustainable BGI in Qazvin and offer appropriate solutions for conserving and rehabilitating sustainable BGI. The research methodology is the case study method. Hence, the principles of environmental, social, and economic sustainability dimensions in the blue-green infrastructure are identified. Data related to population growth, climate change, and urban development in Qazvin are collected, and the effects of these factors on sustainable BGI are analyzed. Finally, the proposed mechanism implementing the sustainable BGI adapted to climate change and urban development has been introduced.

Keywords: *blue-green infrastructure, sustainability, Population growth, climate change, urban development*

Developing place attachment in high-density residential neighbourhoods in China: comparing the role of shared outdoor environments in two residential models in Qingdao

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ABSTRACT

Residential neighbourhoods in urban China have witnessed great change over the last forty years due to rapid urbanisation. This has placed great pressure on landscape urban design to provide quality outdoor environments that support community interaction, recreation, wellbeing and place attachment for residents. Currently, there are two typical residential models: one, mid-rise apartment blocks with unrestricted street patterns built in the 1980s and 1990s; the other, high-rise towers in gated superblocks built in the past 20 years. Using a comparative case study of these two residential models, this study investigates the attributes shared outdoor environments to identify those that may contribute to place attachment. Theories of place attachment, urban spatial design and environment-behaviour studies provide the conceptual framework for this study. Three methods were used: (a) semi-structured interviews with adult residents; (b) a questionnaire with adult residents; (c) and participant observation of the outdoor areas. Data analysis will be used to identify the convergence and divergence of residents' experiences of shared outdoor environments in each of the two residential models. This study is timely in relation to the COVID-19 pandemic and its implications for evidence-based design practice in landscape architecture in relation to the design of outdoor settings in residential neighbourhoods in China.

Keywords: *place attachment, shared outdoor environment, high-density residential neighbourhoods, China*

Study of self-modification patterns in community-led housing for low-income people in Yangon, Myanmar

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ABSTRACT

Community-led housing was initiated in Myanmar in the late 2010s to counter the housing shortage faced by the urban poor. It has been helping the urban poor to secure the tenancy and ownership of affordable houses. However, the lack of design guidelines with the limited technical knowledge and finance resulted in sub-standard housings which led to the residents implementing modifications in their own houses to fulfil their needs. This study, thus, identifies the self-modifications patterns and the responsible reasons in the community-led housings in Yangon. Using case-study method, the study found that the residents made spatial extension, material changes and added supplementary building elements. The changes are done mainly due to the low performance of house caused by problems such as material wear-off, space limitation and poor indoor environmental conditions. Unlike the initial design, the modified dwellings had become more urban-oriented, durable and aesthetically pleasing. This study reveals the residents' changing needs and preferences while also raise the awareness of the housing flexibility and the indoor environmental quality as the design considerations. It contributes to the development of design guidelines for community-led housing that is both liveable and affordable for low-income families.

Keywords: *Community-led housing; housing conditions; low-income people; self-modification; Myanmar*

Transitions in Urban Waterfronts

The future of ecological water landscape. Adapting the existing to sea level rise.

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ABSTRACT

Climate change is producing a radical mutation in the world of design, inviting designers to change their attitude from designers of the present to facilitators of the future, placing them before the challenge of planning the *unexpected* of a territorial structure that we know will change drastically, but in ways not actually foreseeable. The following research focuses on this change of attitude, probing the attention on the issue of sea level rise through a compositional and design exploration. If technical solutions such as dams and resistant waterfront are activated on one side, on the other it is necessary to identify coexistence strategies with the variation of the sea, especially for those peripheral areas where it is not possible to foresee heavy infrastructure investments. The challenge is to imagine new aquatic landscapes of the future, to create both the basis for dialogue and a reference tool for change.

For this purpose, the research started by wondering what the constitution of the current landscape is, how it can be defined and what the bases are for an imaginary of future water landscapes. The proposed solution is that of exploration through the representation of a compositional catalog of the water space, which allows to sample the current elements

the territory is composed, and then, through the instruments of drawing and composition, probing its evolution according to the scenario of sea level rise. The result is therefore that of a large table of elements that speaks of the territory and its transformation, of the current relationship between architecture and water and of what could come, an orientation abacus for the composition of the future water landscape.

Keywords: *sea level rise, spontaneous heritage, adaptation, peripheral areas, waterfronts*

Urban-Rural Linkages

Rethinking the socio-ecological resilience of *linpan* rural landscape under the threat of COVID-19

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ABSTRACT

The rapid expansion of COVID-19 is incurring the rethinking of human society's capacity for coping with major public health events. While "big data" have been widely used to analyze the impact of COVID-19, very limited study was found in rural areas where such kinds of "data" are lacking. This situation will inevitably lead to an incomplete understanding of the pandemic impacts and biased decisions due to the fragmentary information. In this study, I focused on the agrarian communities in rural areas of Chengdu city where linpan system (wooded lots) characterizes as a cultural landscape. Considering COVID-19 as a threat, this study hopes to understand the socio-ecological resilience of linpan system under the external pressures both qualitatively and quantitatively, combining ethnographic interviews with geospatial analysis, landscape ecology and graph theory. It was found that the spatial pattern of linpan system managed by local communities shows a dispersed distribution pattern, which naturally maintaining a "social distance" while keeping socio-economic connections tightly through periodical rural-market systems. This indigenous knowledge and traditional practices have not been well understood and integrated into development planning, which led to a decrease of socio-ecological resilience against external shocks such as the pandemic or climate change.

Keywords: *Socio-ecological resilience, dispersed settlements, connectivity, rural markets, Covid-19*

Alternative forms of rural revitalization in post-growth Japan

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ABSTRACT

Japan is one of the first countries to enter a post-growth era characterized by demographic and economic decline. The pressing issues of a rapidly decreasing and aging population call for an evaluation of current planning and governance. This paper examines existing urban-rural linkages in Japan under the framework of a post-growth society to learn how both top-down government-initiated strategies in conjunction with creative approaches at the grassroots level can work together to address the urban rural divide. The rise of socially engaged design practices and the increasingly important role of rural migrants are playing a key role in the shaping of a 'new rural' that is no longer viewed as backwards but one associated with potential and opportunity. The research draws on ethnographic data collected during fieldwork from the town of Onomichi, Hiroshima Prefecture, and Kamijima, Ehime Prefecture in 2019. Interviews with rural migrants, local community residents and staff of non-profit organizations shed light into current experiences of people living and working in these remote but active communities. The study of rural Japan is an important case as a non-Western industrial nation currently facing demographic and social challenges that many developed nations are likely to encounter in the future.

Keywords: *Japan, revitalization, rural, community, post-growth*

Vulnerable Resilient and Climate Justice Communities

Adapting to climate change through the strengthening of asset management practices in Kiribati: Examples from the water sector

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ABSTRACT

Kiribati is representative of a Pacific Island nation, which is both a Small Island Developing State and Least Developing Country with very real climate change challenges and weaknesses in asset management. Climate change adaptation and infrastructure development in this nation are already intricately linked. Despite this, Kiribati is still heavily hampered with the build neglect paradigm which impacts on both development and adaptation efforts. Furthermore, the parallels between climate change adaptation programmes or projects and infrastructure development has become increasingly hazy and given rise to a growing dependency on external funding. This paper aims to understand the role of asset management in this ongoing paradigm. Consideration is given on how asset management practices could be strengthened for effective adaptation to climate change in Kiribati, with specific examples from the water sector. Further understanding of how asset management works in this context is important including more support for its ongoing implementation and sustainable funding. The methodology employed for this research include, literature review, document analysis and interview with the Government of Kiribati Ministry staff.

***Keywords**: climate change adaptation, asset management in small islands, infrastructure development, sustainability of funding, dependency on external funding.*

Social capital in community response after Cyclone Winston: Case study of three different communities in Fiji

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ABSTRACT

This paper examines the roles of communities' response to Tropical Cyclone (TC) Winston in 2016. The paper will aim to understand how communities responded to TC Winston and to analyze social capital in their response activities. The study investigates three community case studies in Fiji where community prioritization of activities and community responses used both bonding and bridging social capital. The data was collected by using household interviews, focus group discussions and key informant interview. This study highlights that communities in Fiji have potential to coordinate response activities internally before external sources of assistance or aid is given. Strong family networks, community cooperation (solesolevaki), existing governance structure for good leadership and the interactions with religious organizations in the communities are several factors that contribute to effective community response. Strengthening social capital in communities in Fiji has the potential to form a safety net for all communities whilst waiting for government assistance and other relief organization to arrive. Findings from this research highlights the community's capacity in relation to social capital and contributions towards strengthening linkage between government and community in Fiji.

Keywords: *Cyclone Winston, Fiji, community response, traditional villages, social capital*

Retrofitting for resilience: A multi-hazard approach

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ABSTRACT

Resilience has received increased attention in urban-related research, policies and practice in recent years. Many urban development-related international initiatives have been established, such as the Making Cities Resilient Campaign and 100 Resilient Cities Programme, aiming to assist governments in enhancing urban resilience. Although the building stock is a significant component of the built environment, little work has been done on the scale of buildings compared to the work developed for the city scale. Resilient buildings can deliver their functions in the face of stresses and shocks, which are the converse of buildings that are vulnerable to the city's weaknesses and hazards. Enhancing the resilience of buildings boosts the urban fabric's resilience at a larger scale. This paper discusses what defines resilient buildings, focusing on existing building retrofits as it offers great opportunity to enhance the resilience of the built environment on a larger scale. It establishes a comprehensive understanding of resilience in buildings that consider both stresses and shocks threatening the built environment. Since resilience is a context-specific approach, the study also takes Jordan as an example and identifies the resilience challenges of its buildings according to 200 local professionals' perception who responded to an online questionnaire.

Keywords: *Multi-hazard; resilience; resilient buildings; resilient architecture; retrofitting for resilience*

A policy and satisfaction evaluation of post-disaster temporary housing

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ABSTRACT

Given the rise of natural disasters, post-disaster reconstruction plays an essential role in forming resilient communities. However, among the multiple post-disaster reconstruction processes, temporary housing had been ignored by most post-disaster reconstruction practitioners. The 2009 Typhoon Morakot post-disaster management process was no exception. Therefore, this study uses literature research, interviews, and a time-series questionnaire to understand the temporary housing policy, stakeholders' opinions associated with the post-disaster management process, and the temporary shelter and housing living satisfaction trends. Two typhoon-affected indigenous communities located in southern Taiwan were selected as case studies owing to similarities in their social structure and conditions. Findings from this research shows that past experience and collaborating NGO might be the principal factors that influence the decision making on temporary housing policy. Moreover, an ideal environment and location for temporary housing are essential for living satisfaction. Finally, this research suggests an ideal pre-established policy, community-centered considerations, and spatial design are crucial for the future of temporary shelter and housing programs.

Keywords: *Temporary housing, Temporary shelter, Post-disaster reconstruction, Typhoon Morakot, Indigenous population*

Rural Community Resilience in the Chengdu Plain, China: A Comparative Study of Three Community-Scale Cases

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ABSTRACT

Dujiangyan Irrigation District is located in the heart of the *Chengdu* Plain. Since ancient times, it has been the most economically developed area in the Sichuan Province and even the west of China. Historically, we created a sustainable and harmonious human settlement, especially in the rural areas, and it has shown great resilience and adaptability in dealing with natural disasters such as floods and droughts. However, with the acceleration of globalization and urbanization, the local communities in this rural area are increasingly facing different pressures of disturbance and change. This study analyses the environmental and socio-economic resilience of three communities in this area, by spatial date collection and analysis, as well as questionnaire interview. The results show that due to the centralized resettlement policy, the ecological pattern and landscape heterogeneity of some villages have been broken. Moreover, urbanization has also reduced social economic resilience of rural communities, such as household livelihood, age structure and social network, etc. At last, a strategic framework for community resilience planning is proposed in this paper. During the COVID-19 crisis, community resilience to withstand and recover from the COVID-19 outbreak has become a topical issue for addressing the pandemic, and other disturbances in society.

Keywords: *community resilience, social-ecological system, environment, socio-economy, China*

Water and Wastewater

Augmenting the clean water generation rate of solar desalination unit through novel absorber under Indian climatic conditions: Thermal performance, energy and carbon credit analysis

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ABSTRACT

This work aimed to explore a novel method for augmenting the freshwater production rate of solar stills (SSs) through utilizing nanoparticles of reduced graphene oxide (rGO) and copper oxide (CuO) mixed black paint coating on absorber to increase the solar absorption and evaporation rate. The three types of SS with absorber plate only coated with black paint (CSS), absorber coated with rGO doped in black paint and absorber coated with CuO doped in black paint (SS-CuO) were fabricated and investigated under Indian climatic conditions. The obtained results showed that the daily water productivity was enhanced by 11.8 % and 6.3 % for SS-rGO and SS-CuO, respectively in comparison to that of CSS. Moreover, the efficiency of the SS reached about 39.9 % for SS-rGO; while, it reached about 38.1 % and 35.7 % for the SS-CuO and CSS. Moreover, it is perceived that the proposed SS with rGO coated absorber has reduced 13.19 tons of CO_2 emissions for 0.01 m water depth during its life cycle. In addition, quality of water samples achieved from experimental investigation is suitable for drinking purposes and also meets the requirements of the Indian Council of Medical Research.

Keywords: *Clean water, Solar Desalination, Energy storage material, Environment-economic, Water quality*

Ecologically-based Urban Design in Sustainable Stormwater Management

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ABSTRACT

Urban stormwater problems are indisputable, many countries have suffered from such problems and will be exposed to greater threats due to urban sprawl and climate change. For controlling urban stormwater, conventional stormwater approaches rely on underground pipeline systems to drain stormwater away as soon as possible. With people paying more attention to urban stormwater issues and environmental quality, multiple strategies which could be collectively called Sustainable Stormwater Management (SSM), have been proposed and implemented for solving different local stormwater problems, enhancing the natural water cycle and protecting receiving waters and aquatic habitats. This paper reviews the literature and describes how ecologically-based urban design (EBUD) interfaces and improves SSM during urban development. SSM covers planning and engineering aspects and EBUD plays an important role for keeping and mimicking nature and also sketching out the best plan for arranging SSM measures. EBUD provides stakeholders with a philosophy and guidelines from an urban design perspective for SSM development, spanning from stormwater mitigation and control to protection of the natural water ecosystem of the receiving water bodies. Subsequent research will use a case study approach to identify priority issues to address when formulating guidelines for EBUD in SSM.

Keywords: *Sustainable Stormwater Management, Urban Design, Ecological Wisdom, Resilience*