Integration across the SDGs and the role of research
A symposium for early career researchers and practitioners

17-18 October 2018, Melbourne, Australia

A joint initiative of Future Earth Australia (Australian Academy of Science) and the Sustainable Development Solutions Network Australia, New Zealand and Pacific

BOOK OF ABSTRACTS

Symposium attendees with speaker Professor Jeffrey Sachs, Columbia University, 17 October 2018

Introduction

On 17–18 October 2018, Future Earth Australia and the Sustainable Development Solutions Network (SDSN) Australia, New Zealand and Pacific hosted a symposium for early career researchers and practitioners (ECRPs) looking at how research can help address integration between the Sustainable Development Goals (SDGs).

SDG integration is a new and important area of research, with important implications and practical applications for SDG implementation more broadly. Many ECRPs are at the cutting edge of this work.

A core area of activity for Future Earth Australia is capacity building for the next generation of Australian scientists and researchers. In joining with SDSN Australia, New Zealand and Pacific, which mobilises universities and knowledge institutions to work on the SDGs, the aim was to both link together ECRPs working in areas related to the SDG integration and to help them advance their work in this area.

Participants were selected via a competitive application process, based on submission of an abstract and expression of interest to attend the symposium. Preference was afforded to attendees whose work clearly demonstrated integration of the SDGs towards societal transformation. Future Earth Australia members were eligible for scholarships to offset the costs of participating.

The highly interactive symposium provided participants substantial opportunity to connect, network and share their work with other ECRPs and experts working in this area.

Academic experts included Professor Jeffrey Sachs (Columbia University), Professor David Griggs (Monash University), Professor Brett Bryan (Deakin University), Associate Professor Lauren Rickards (RMIT University), and Dr Mark Stafford Smith (CSIRO). Experts from other sectors also joined the discussion, including Professor John Thwaites (Monash University and Melbourne Water), Dr Caroline Lambert (International Women's Development Agency), Nikki Jordan (City of Melbourne) and Aisha Reynolds (ClimateWorks Australia). Many of the ECRPs presented their work at the symposium, either through brief "elevator style" pitches, or through longer presentations.

Participants also spent time brainstorming new ideas and methods for addressing SDG integration through "ideas cafés". In these sessions, the participants could nominate a topic or project they wanted to discuss, and the most popular ideas were given time for discussion. Our purpose for this was to provide space for these ideas to develop into future research collaborations. We will be checking in with participants on these collaborations in 2019!

The participants were also given opportunities to connect through the use of an event app – which allows attendees to get to know more about one another with trivia questions and the opportunity to share contact details with a click of a button – enabling longer term relationships and paving the way for future collaboration.

This publication aims to share the abstracts received from the ECRP participants as part of their application to the symposium. They are enclosed here, alphabetised by surname. Note that some are short or extended abstracts, others may include rationales for attending, etc; they are included as provided.

Dr Tayanah O'Donnell
(Director, Future Earth Australia)

Dr Tahl Kestin
(Network Manager, SDSN Australia, New Zealand & Pacific)

January 2019

Symposium Agenda

Day 1: Wednesday 17 October

08:30–09:00	Registration
09:00–10:00	**Welcome and opening address** Opening address Prof Jeffrey Sachs (Columbia University and SDSN) – *The importance of addressing interlinkages and key SDSN projects* Overview of symposium and objectives, and introductions
10:00–10:30	Morning tea
10:30–12:00	**What is SDG integration and why is it important?** Invited speakers - Dr Mark Stafford Smith (Future Earth Australia) – *SDG integration and interactions* - Prof Brett Bryan (Deakin University) – *Finding pathways to national-scale land-sector sustainability* Table discussions and report back
12:00–13:00	Lunch
13:00–14:45	**Exploring diverse approaches to researching SDG integration** Invited speaker - Dr Lauren Rickards (RMIT University) – *Does Responsible Research and Innovation (RRI) provide a vehicle for addressing the SDGs?* ECR presentations with examples of different research approaches - Cameron Allen (UNSW) - Michaela Prescott (Monash University) - Amanda Taylor (Australian Council for Educational Research) - Dr Arunima Malik (University of Sydney) - Table discussions then discussion with speakers as panel
14:45–15:15	Afternoon tea
15:15–16:30	**Research "Ideas café"** *Participant proposed and led discussion groups on topics related to SDG integration research or how such research can be advanced. Topics will be sought before the session.*
16:30–16:55	**Putting SDG integration into practice: Day 2 preview** Invited speaker Prof Dave Griggs (Monash University) – *Mapping SDG interactions for stronger national policy development* [via videoconference]
16:55–17:00	**Day 1 Wrap Up**
17:00–19:00	**Symposium reception**

Day 2: Thursday 18 October

9:00–10:20	**Putting SDG integration into practice: A cross-sectoral organisational perspective** *This session will look at how organisations in different sectors currently address integration and how this practice can be expanded.* Moderated panel discussion: • Prof John Thwaites (Monash University and SDSN AusNZPac) • Dr Caroline Lambert (Director of Research, Policy & Advocacy, International Women's Development Agency) • Nikki Jordan (City of Melbourne) Discussion with audience
10:20–10:50	**Morning tea**
10:50–12:10	**Putting SDG integration into practice: Tools, processes, skills and approaches** Invited speaker • Aisha Reynolds (ClimateWorks Australia) – *The Strategic Mitigation, Adaptation and Resilience Tool (SMART) for low emissions development planning* ECR flash presentations with diverse examples: • Mitzi Bolton (ANU) • Clare Brolan (UQ) • Vanessa James (Victoria University of Wellington) • Ray Maher (UQ) • Kangmin Moon (Office of the Commissioner for Environmental Sustainability, Victoria) • Renzo Mori Jr. (RMIT University) • Paul Satur (Monash University) • Aero Leplastrier (Geoscience Australia) [presenting on behalf of Erin Telfer] • Ryan Wong (ANU) • Yan Zhang (ANU) Discussion
12:10–1:10	**Lunch**
1:10–2:25	**Practice "Ideas Café"** *Participant proposed and led discussion groups on topics relating to how research can help put SDG integration into practice.*
2:25–3:00	**Wrap up and review**
3:00	Close

Submitted Abstacts

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Systems analysis and modelling to support implementation of the SDGs

The 17 goals and 169 targets of the SDGs were conceived as an 'indivisible whole'. The integrated nature of the SDGs means that progress towards each target is linked through complex feedbacks to other targets, resulting in synergies and trade-offs. A science-informed analysis of these interactions can support more coherent and effective decision making and planning responses to the SDGs. However, a comprehensive assessment of these interactions in different country contexts remains lacking.

Sustainability interventions in the past have often targeted highly tangible, but essentially weak, leverage points with limited potential for transformational change. To overcome this, it is critical that implementation of the SDGs is based upon sound evidence and science, taking advantage of contemporary approaches grounded in systems thinking and analysis and quantitative modelling.

This research focuses on the application of a range of different systems analysis methods and approaches for exploring interactions among the SDGs to improve understanding of SDG interlinkages, enhance policy coherence, and inform integrated national planning responses. These methods enable the quantification of interlinkages, trade-offs and synergies between policy objectives, and more coherent advancement of competing objectives relating to economic development and the wellbeing of people and planet.

There is emerging international practice in the application of systems analysis and modelling to explore the integrated nature of the SDGs and to better understand the complex feedbacks and interlinkages between the SDG targets. These range from qualitative approaches such as systems maps and causal loop diagrams, to semi-quantitative scoring and network approaches, through to quantitative system dynamics modelling and simulation. Such approaches will be useful at different stages of the policy cycle to support SDG implementation.

For example, qualitative approaches may assist with problem scoping and identification of causal relationships between SDG targets; semi-quantitative analysis can assist in exploring interlinkages and potential leverage points and facilitate target prioritisation; while quantitative modelling can provide detailed investigation of interlinkages, target feasibility testing, scenario or pathways analysis, and policy evaluation. Such methods can be easily combined with other common analytical approaches such as indicator-based assessment, policy gap analysis, and benchmarking to provide a more comprehensive analysis. Multi-criteria analysis can be used as a coherent decision framework to bring together different analytical outputs to support evidence-based decision-making.

This research will practically demonstrate how countries and other stakeholders can best adopt and apply systems analysis and modelling approaches to support different stages of the policy cycle and implementation of the SDGs. Initial stages of the research have included a review of national experience and gaps in implementation of the SDGs and the adoption of systems-based approaches, as well as the application of semi-quantitative systems analysis to support SDG target prioritisation in a group of 22 developing countries. The next phases will apply advanced system dynamics modelling and quantitative pathways analysis to support target setting and policy evaluation in both a developed and developing country context (Australia and Fiji). Lessons learned from these various case studies will be synthesised to provide practical guidance to catalyse action on the SDGs.

Mitzi Bolton

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Mitzi Bolton has over a decade of experience in the public sector. Her experiences have seen her work with community, industry, government and academia, on a wide array of projects including ones of state significance. She has spent a considerable part of her career in the Victorian Public Sector, and recently moved to the Australian Public Service where she is part of the What Works team at the Productivity Commission.

In addition to being a public servant, Mitzi is a PhD Candidate at the Australian National University, a non-Executive Board member at the Australasian Land and Groundwater Association Pty Ltd, and Deputy Chair for the IPAA Victoria, Sustainability Community of Practice.

Mitzi's research looks at what factors influence public decision-makers' ability to integrate sustainable development in their decisions. Without understanding and acknowledging these factors, public decision-makers will continue to make decisions in siloes and fail to see the applicability of and/or pathway from the SDGs as a whole (or indeed as individual goals) to their area of public decision making.

To date Mitzi has interviewed and surveyed Victorian public decision makers across all departments and at all levels to understand their decision-making practices, and understanding and knowledge of ESD and the SDGs. Their responses serve to underscore the lack of understanding and application of the SDGs in current practice, and highlight that public decision-makers are time poor and need robust research that delivers practicable, actionable, solutions to help inform their work.

Mitzi's research aims to enhance sustainable development practices within government by increasing awareness on three fronts:

- the existence and breadth of the Goals;
- the barriers to achieving them, and
- the solutions available to make them possible.

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Interdisciplinary research is important - but *equally* important is ensuring our collective SDG research endeavors are supported by strong national governance frameworks for inter-sectoral and multi-jurisdictional SDG action, monitoring and review

The Sustainable Development Goals (SDGs) articulate a series of complex problems facing all countries today, many of which are transboundary in nature. Responding to these multi-dimensional challenges will require three key elements: (1) Interdisciplinary collaboration and research involving government, communities, civil society, academia, business, industry and the private sector; (2) A focus on systemic change grounded in strong governance (including participatory governance) frameworks; and (3) SDG policy, planning, implementation and monitoring that involve effective, transparent and path-breaking synergetic partnerships at sub-national, national, regional, and global levels.

The need for innovative, path-changing research approaches to SDG implementation, monitoring and review became apparent when I was working as a Research Fellow (2012 – 2016) on the European Commission funded Go4Health-Goals and Governance for Global Health, a consortium of 13 academic research and human rights institutions from the Global North and South tasked with tracking the evolution of the SDGs, and provide ongoing policy advice. As part of my Go4Health research role, I interviewed high-level policy officials within key global health, multilateral and bilateral agencies and the development banks around the emerging actors, interests and influences that were shaping SDG 3 (and broader SDG) metrics content. I was also engaged in a series of consultations with marginalized communities in the five global regions on SDG 3 (Health and Well-being) priorities. Indeed, their multitude of voices collectively emphasized the urgent need for the post-2015 global health goal to embrace and articulate the broader social determinants of health - such as access to clean water, sanitation, education, housing, gender empowerment and women and girls rights - as opposed to prioritizing receipt of traditional healthcare system provision and supports. Communities also collectively emphasized the need for social accountability for post-2015 health goal (and SDG) implementation, and the need for governments at all levels to authentically and meaningfully partner with communities in SDG roll-out.

Following on from my Go4Health Project experience, I am now engaged in a network of internationally-based, multidisciplinary institutional partners progressing a body of research that seeks to devise a path-breaking, integrated research-methodology that flexibly and comprehensively responds to a complex of health and sustainable development governance, policy, planning, monitoring and review challenges that present with social, cultural, economic and environmental challenges. For our research network, community leadership, participation and voice within interdisciplinary SDG research is central, especially if research results are to be up-taken by communities and research-investment is sustainable and optimised in the longer-term.

However, what is striking from systematically reviewing the content of the 150 plus submissions to the Australian Parliamentary Inquiry into the UN SDGs, is the pressing need to ensure that – especially in the Australian context - SDG research is embedded and supported by strong national governance frameworks for inter-sectoral and multi-jurisdictional SDG action, monitoring and review. This is particularly imperative given much SDG research will likely need to take a multi- and interdisciplinary, and multi-stakeholder, approach. Therefore, cogent national implementation frameworks for co-ordinated SDG effort (including translation of SDG research efforts) will be utterly crucial.

Matthew Caulkins

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Available evidence demonstrates that our cities are presently locked into unsustainable trajectories. There is growing literature on sustainable urban transformations in general. Yet we lack studies shedding light on the actual day-to-day governance challenges of steering cities to better development paths. We urgently need research that looks at the actual constraints on transforming governance practices in the twenty first century. We need to understand how local planning and administrative cultures mediate these transitions within existing institutional constraints, regulations and policies. It is crucial we learn more about how official texts (policy documents, regulations, etc.) are used in everyday practices of governing with a particular focus on the cultural practices of public officials as they interact with the multiplicity of actors involved – including elected officials, community members, business community – at times facilitating and at others resisting transitions.

This research directly addresses the need sketched above with the innovative methodological choice of bringing institutional ethnography principles to address how public officials are constrained in their work of adapting to new modes of governance. Recent scholarly work has highlighted the need for a greater focus on the actual work processes that govern local politics. Institutional ethnography is well positioned to address the new challenges facing local state administrations and their planning departments. As ethnographies can help us understand the relations, attitudes and dynamics in local administrations. Institutional ethnography focusses on the way official texts organise actions within institutions by defining what Dorothy Smith calls the 'ruling relations'. These texts do not make subjects 'conform to rules' rather they limit the scope of valid actions in planning contexts for public officials and community members. The innovation of this research is to adapt the methodology of institutional ethnography from an analysis of the effects of state policies on marginalised groups to the underexplored context of institutional practices inside the state.

This project analyses the pilot phase of the UN Cities Partnership Challenge being implemented by the UN Global Cities Compact in the state of Paraná, Brazil. The challenge seeks to build capacity in local administrations to respond to the UN SDGs by linking local governments to innovative sources of investment from local businesses. Each partner city will complete one fully funded project regarding a locally relevant SDG challenge (e.g. citizen and sustainability frameworks for informal settlements, bulk purchase of sustainable electricity, ecotourism, etc.).

The project follows the transition being implemented in the projects of 6 of the 18 UN Cities Partnership Challenge cities in the state of Paraná. Sources of data include semi-structured interviews, participant observation and official documents. The design of the project provides a focus on impacts to governance cultures in cities of widely varying size and on substantial outcomes of projects. Emerging findings from the research will be shared with participant cities in capacity building seminars during the middle and at the end of the project timelines. This phased feedback seeks to promote 'inclusionary argumentation' and impact on the development of current projects as well as feedback for future ones.

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SDG Organisation Transformation Framework

A compelling characteristic of the SDGs is the interrelated nature of the goals. Not only does the agenda provide individual objectives but also more importantly, a holistic aspiration for societies future. An example of this holistic nature can be found in the application and integration of the SDGs into the operation of organisations, both public and private. Ideally, organisations would engage with the SDGs as a collective, using them to critically transform various components of their operation. Some organisations do engage the goals in this way but the more common form of SDG action from organisations is rather one-dimensional. There is a variety of possible reasons for this promising yet ultimately superficial SDG engagement - particularly the goals relative infancy – but a significant reason is the type of tools and frameworks available to organisations to support SDG action. A large proportion of these tools/frameworks are related to organisational reporting and mapping. More specifically, they aim to identify which SDGs are relevant to organisational activity but only after it has occurred. This is a useful first engagement with the goals but it only engages with the goals that are directly related to core operations rather than engaging the agenda as a totality. The silo effect this creates results in the organisations being unable to leverage the inter-linkages between goals and therefore missing the transformational potential that the goals have as an aggregate.

The key flaw in the existing organisational SDG tools/frameworks is their application only after operations have occurred. If the SDGs are to be engaged with in unison, an approach which can be applied earlier in organisational decision making is required. A project conducted by Jarrod Grainger-Brown and Shirin Malekpour (for the Monash Sustainable Development Institute) aimed to produce a framework which could be applied directly during an organisations strategic planning in order to truly embed all of the SDGs into the foundation of the organisation. A review process was firstly conducted to confirm that no other SDG tools or frameworks are currently available that explicitly engage with organisational strategy development. A framework was then constructed which consists of four iterative stages: define, analyse, develop and execute. These four, broad components guide organisations through the entire strategic process, embedding SDGs holistically at each stage. Each component is composed of a number of different tools which can be tailored to the organisation in question, examples including: value mapping, visioning, SDG interrelation analysis, scenario planning, backcasting, stress testing and capacity building. By leveraging the SDGs as a whole at every stage of the organisational planning process – from ideation to implementation – it is anticipated that organisations will be able to more readily transform themselves in alignment with the SDG vision.

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Oceans and marine resources play an essential role for millions of people in providing food, income and well-being. However, food security and livelihoods of many countries, mainly developing countries, are jeopardized by overfishing. Regional Fisheries Management Organizations (RFMOs) have the important task to stop overfishing and are authorized to establish binding conservation and management measures. RFMOs differ between their objectives and their competence area, however, almost all areas in the oceans are under the management of at least one RFMO. Many important international environmental agreements influence RFMOs and one of the most important ones is the United Nations Fish Stock Agreement 1995. In 2015 the United Nations established the Sustainable Development Goals (SDGs) which seek sustainable development in the social, economic and ecological sectors. One of the 17 goals, SDG 14 calls for conservation and sustainable use of the oceans, seas and marine resources for sustainable development. Another agreement, which has the potential to affect fisheries management, is the 2016 Paris Agreement for Climate Change and its scope to keep global temperature rise low. The aim of my research is to examine the response and connection of RFMOs to the SDGs and the Paris Agreement. Objectives will be addressed via a content analysis of relevant documents and expert interviews. This study will be a valuable contribution to the growing literature regarding the SDGs and the Paris Agreements. Furthermore it will improve our understanding regarding the connection between RFMOs and the SDGs and the Paris Agreements and will help to set a next step into better managed fish stocks through outlining practical steps forward for RFMOs to start to apply the SDGs.

Vanessa James

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I am currently employed as principal advisor to the Cancer Services team in the New Zealand Ministry of Health. In this role I am responsible for leading the Ministry's work on improving outcomes for people with cancer in New Zealand. I have just enrolled to complete a PhD in Law, examining the utility and application of the Sustainable Development Goals to publicly funded healthcare in New Zealand, and in particular to the work of the Cancer Services team and the wider Ministry of Health.

In New Zealand, officials are working across agencies to align the goals with government priorities and develop indicators and reporting mechanisms. While the SDGs are intended to be integrated and indivisible, lead agencies have been identified for each goal. The Ministry of Health (MOH) is the lead agency for Goal 3: Good Health and Well-being: Ensure healthy lives and promote well-being for all at all ages. MOH has not progressed its approach due to limited resourcing and lack of clear government direction. This provides an opportunity for the research for this thesis to inform MOH's approach to implementing the SDGs.

The Cancer Services team is developing quality performance indicators across the cancer care continuum to support improved outcomes and improve the quality of services for people with cancer. A key question is whether Cancer Services, on behalf of MOH, should adopt the SDGs targets and indicators. A reduction in cancer deaths is specifically provided for in Target 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being, and its corresponding indicator 3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease. However, the current priority for the Cancer Services team, as determined by the Cancer Programme Leadership Board1 is to achieve equity. While New Zealand ranks in the middle of comparable countries for cancer performance, outcomes for Māori are significantly worse than for other population groups. Achieving equity is not only a Te Tiriti (Treaty of Waitangi) obligation, it is one of two specific directions from the Minister of Health to MOH (the other being a focus on system integration). Examination of whether a goal of achieving equity conflicts with a target to reduce overall mortality is a key question to answer when determining the best approach to the SDGs for health services related to cancer.

The second direction from the Health Minister, a focus on system integration, also lends itself to research consideration with regard to the SDGs. The Minister has initiated a review of the New Zealand health system https://www.beehive.govt.nz/release/major-review-health-system-launched) and it is likely that the review will result in a more integrated system. This presents an opportunity to embed the SDGs in the new approach to health service delivery, and to take a cross-agency approach to the implementation and attainment of the SDGs in relation to publicly funded healthcare.

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1 The Cancer Programme Leadership Board is a governance board which guides the work of the Cancer Services team.

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MetaMAP – a graphical tool for integrating SDGs and transforming social-ecological systems

In this research I present MetaMAP: a graphic tool for helping people from diverse backgrounds to connect their research and practice to multiple SDGs, and design initiatives which transform society. Seeing scalable value in its application, Future Earth and the Stockholm Resilience Centre selected MetaMAP as one of 21 'SDG Labs' (against a 94% rejection rate in a globally competitive application) to be presented in Stockholm at the SDG Ideas and Innovation forum – part of the 7th International Conference on Sustainability Science.

Sustainable Development Goals rarely align with the conventional boundaries of our disciplines, institutions and means of communication. As such they can be challenging to understand and difficult to communicate, restricting effective collaboration. Siloes among disciplines and governance structures often lead to isolated approaches to addressing SDGs. Sustainability initiatives designed in isolation lack synergy, so advances in one area may setback others and increase conflict. This narrow focus also leads to blind spots which cause many sustainability initiatives conceived in theory to fail in practice. To achieve these goals amid real-world complexity, we need to think holistically and collaborate across disciplines. To achieve SDGs in an integrated way, we require tools which help us to understand social-ecological systems holistically, synthesise knowledge across disciplines, develop innovative proposals and communicate complex relationships vividly to a wide audience. To address these needs, I designed MetaMAP.

MetaMAP is an interactive graphic tool which helps users to gain insight into sustainability challenges by seeing relationships among parts of the natural environment, built environment and society across multiple spatial and temporal scales. Just as architects use graphical tools to design complex buildings and coordinate consultants, MetaMAP helps sustainability advocates to design social-ecological systems and coordinate diverse stakeholders. MetaMAP was designed collaboratively involving over 170 people from diverse disciplines in workshops, case studies, interviews and critique. At its core, MetaMAP provides a new conceptual framework which synthesises important sustainability concepts drawn from multiple schools of thought. These include Social-Ecological systems, Planetary Boundaries, Design Thinking, Integral Theory, Collective Intelligence and Ecosystem Services among others.

Combining the methods of science and design to the pursuit of sustainability goals can deliver initiatives which provide more benefits with greater synergy, face fewer objections, and are better adapted to their unique context. By synthesising multiple design, systems and theoretical approaches into an interactive graphical format, MetaMAP has the potential to transform how we think, communicate and collaborate to achieve multiple SDGs simultaneously. This critical and timely symposium provides an excellent opportunity to share this tool and approach with an interdisciplinary audience and develop collaborative partnerships for its future development and application.

Arunima Malik

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Integrating global trade database and comprehensive frameworks for sustainability – tracking progress towards Sustainable Development Goals (SDGs)

In this talk, I will outline the role of multi-regional input-output (MRIO) databases for tracking progress towards the Sustainable Development Goals (SDGs). Global MRIO databases capture domestic and international trade links between different countries, hence serve as a valuable tool for consumption-based accounting. I will showcase the integration of a suite of indicators representing the economic (e.g. stimulus generation, dependence on imports), social (e.g. employment, poverty, corruption, child labour) and environmental (e.g. greenhouse gas emissions, water use, energy use, land use, biodiversity) spheres of sustainability.

I'll present an approach that is governed by the United Nations accounting standards, and can be used for the quantification of economic, social and environmental impacts in one common and integrated framework, allowing the study of trade-offs across the indicator suite. In particular, I'll discuss the use of a comprehensive virtual laboratory platform (Global IELab) for the construction of customised global trade data-sets for sustainability assessments. The Global IELab has the potential to facilitate the analysis of interactions and progress towards SDG implementation, for all world nations.

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Taking slum upgrading to scale: How to facilitate progress towards achievement of Sustainable Development Goals (SDGs)

Informal settlements have become integral to cities of the global south, posing a persistent challenge to sustainable and resilient urban planning and management. During last decades, a considerable amount of literature has been published on 'best practices', 'lesson learnt' and effective or successful 'pilot projects' which indicates that planners, designers and policy-makers know how to design and implement effective small-scale projects (the so-called 'pilot'), yet the governments fail to scale up them in order to progress towards achievement of Sustainable Development Goals (SDGs) and facilitate poverty alleviation and improving health and quality of life of people living in informal settlements.

As indicated in SDG17, a stronger commitment to collaboration and partnership between different stakeholders is required to ensure integrated actions at all levels and minimise trade-offs between Sustainable Development Goals. However, there are many challenges associated with collaboration between different aid agencies and international developers (such as UN-Habitat), as a result of conflicting interests and priorities particularly when they are working on the same context and towards achievement of same goals. In this sense, although policy coherence, within and between SDGs, is one of the innovative and significant aspects of the SDG, duplication of the projects and inconsistent and conflicting approaches impede the progress towards achievements.

On the other hand, there is little or no mention of 'context' in SDG agenda as well as United Nations' (UN) definition of 'improved situation' (as a basis for tracking and monitoring the achievement of SDGs). As a result, differences in geography, governance and technology limits the effectiveness of solutions for different contexts.

As a global agenda, the Sustainable Development Goals (SDGs) have neither a project-driven approach nor a narrow sector approach. SDGs, as a global approach to sustainable and resilient communities, form the core of the recent national and local urban development policies in Pacific towns and cities. However, contextual challenges such as the increased spatial, environmental, and socio-economic challenges that emerge due to rapid pace of urbanisation, limited resources, climate change and exposure to natural hazards, act as barriers to move from policies to effective and integrated practices.

The first aim of my research is to understand how the integration of SDGs (both at policy and action level) might facilitate the scalability of the effective small-scale projects, unravelling current failures for future success. Secondly, to develop a planning tool to integrate 'spatial' and 'non-spatial' layers in decision-making in order to prevent this failure in the future if the SDG6, SDG11, SDG3 and SDG17 are to be achieved.

My research looks at provision of basic services (particularly water and sanitation) for informal settlements, particularly in Pacific towns and cities currently using Suva (Fiji) as a case study. I hope that my research will impact the lives of the people living in slum areas by directly influencing the achievement of the Sustainable Development Goal 6, while also addressing SDG 3 (achieve good health and well-being for people), SDG11 (resilient and sustainable human settlements) and SDG 17 (developing public-private partnership to share financial support as well as sharing knowledge, expertise, new technological development in water and sanitation provision).

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The United Nations (UN) Sustainable Development Goals (SDGs) replace the Millennium Development Goals as the UN's post development agenda and to end extreme poverty, fight inequality and injustice, and protect the planet by 2030. Recently, the Australian Government released the inaugural, voluntary national review on SDG progress in Australia. Sub-national levels of Government have also been making efforts to raise awareness, form partnerships and address the challenges and opportunities inherent in the SDGs agenda.

The Australian Government and most States including Victoria, commission an independent report on the state of the environment every 5 years to assess the health of the environment, how effectively the environment is being managed, make recommendations to government that identify opportunities to deal with key environmental issues. The independent Commissioner for Environmental Sustainability in Victoria is currently preparing the 2018 Victorian State of the Environment (SoE) Report and as a part of that work program has designed a method to apply the SDGs to SoE reporting, at a sub-national level. This is the first attempt in Australia to apply the SDGs framework to state-wide, environment reporting by a sub-national government and ultimately, will use the SDG framework as a basis on which to recommend monitoring and reporting actions for the Victorian Government to improve social and environmental outcomes and develop socio-economic indicators, aligned with the SDGs, to demonstrate how our actions impact on natural capital and how natural capital (through ecosystem services) provides benefits to society.

An extensive mapping exercise was undertaken to determine which SDG targets would be taken forward into the 2018 SoE and a broad stakeholder group including multiple government departments, have provided datasets to support this work. To date, data has been received for more than half of the SoE indicators and associated SDG targets. This will enable partial assessment and confident reporting against some SDG targets in the 2018 SoE report. Knowledge gaps have been identified and will inform recommendations for future reporting. A key finding of the work to date is that existing SoE indicators are not comprehensively covered by SDG Goals and Targets: for example, approximately half have linkages with Goal 14: Life below Water and Goal 15: Life on Land whereas less than 5% of those were linked to Goal 2: Zero Hunger – a potential socio-economic indicator of a healthy environment.

Consideration of the interlinkages and interdependencies with socio-economic SDG indicators assists us in contemplating the 'indivisible whole' of the SDG framework. This is a challenging next step in our work. Efforts to date suggest that the current approach to SoE reporting by all levels of Government in Australia can benefit from the work currently underway by the Commissioner for Environmental Sustainability in Victoria to apply an SDGs framework to SoE reporting. Building on the existing SoE data collection processes will ensure a cost and time-effective approach to data collection for future reporting against the SDGs.

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Interoperability is the degree to which diverse systems, organisations and individuals are able to work together to achieve a common goal. From a systematic perspective, the UN Sustainable Development Goals (SDGs) are an indivisible organism composed by 17 separate goals interlinked and interrelated with one another. This abstract presents findings of an applied research project looking into the interoperability of the SDGs and other 17 sustainability initiatives relevant to mining and minerals sectors. The research was undertaken by the Centre for Social Responsibility in Mining (CSRM) at The University of Queensland and funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The research project aims to assist civil society, business and governments to better co-ordinate and align efforts to ensure that interoperability plays a key role recognising and addressing the interlinkages between SDGs, SDG targets and SDG indicators, as well as to ensure that sustainability initiatives lead to improvements in the sustainability performance of the mining and minerals sectors. Results demonstrate that the SDGs and other sustainability initiatives are part of the global governance landscape that is always changing to accommodate competing interests and multiple points of view. Setting norms in any sector is never a neat, systematic process as the political exercise of consensus-building doesn't often result in the policy that technically makes the most sense. However, the UN SDGs demonstrate that, at the highest level, there are common sustainable values and goals with which the majority of human beings can agree. One of the challenges lies in designing and implementing more effective approaches that not only identify the interlinkages between and within the SDGs, but develop solutions that support and value integrated thinking, decision-making and actions that focus on the creation of long term value. The mining and minerals sectors are grappling with many ethical choices for responsible conduct, as well as issues that are specific to certain commodities, scales of mining and mineral processing techniques. It is inevitable that the more attention that is paid to these issues, the more duplication and confusion may arise. The responsibility of all actors involved in these initiatives, however, is to put aside vested interests and commit to greater collaboration and harmonisation of their efforts. Interoperability has become a topic of significant importance to the SDGs and other sustainability initiatives. We understand that there are different industries, goals, contexts and design characteristics impacting the interoperability among the SDGs and the sustainability initiatives analysed. However, the existence of an alignment between SDGs and the common thematic scope of the majority of the sustainability initiatives demonstrate the potential interoperability has to avoid duplication, promote sustainable development and improve interactions.

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I'm writing to indicate my interest in taking part in the "Integration across the SDGs and the role of Research" symposium. I'm a PhD researcher at Monash University enrolled in the Graduate Research Interdisciplinary Program for Water and Sustainability in Asia, and currently working towards submitting my thesis by early October 2018. I believe the symposium offers an excellent opportunity to connect with researchers from various disciplines and identify future pathways where I can leverage my research on urban transformations to contribute to the SDGs agenda.

In my PhD research I developed a diagnostic approach that helps reveal the mixture of activities and arrangements that underpin urban transformative capacity within developing infrastructure sectors. In doing so, my research advances understanding of the spectrum of institutional constraints and opportunities that can hinder or facilitate changes within a particular societal system. As it stands, the development of the diagnostic tool forms the first step in the design of processes and mechanisms that can support institutional reforms—a critical requirement for enabling integration of the SDGs across societal subsystems.

While my research has focussed on examining the infrastructure sectors in developing cities, I believe there is a potential for utilising the tool to identify the specific opportunities and constraints facing the agenda of promoting and implementing the integration of the SDGs in various other contexts. Despite increasing calls for embracing coordination and collaboration to enable such integration, markedly there remains limited practical understanding of the roles and legitimacy of those involved and how interactions may be ordered in relations to those processes.

The symposium with its focus on bringing together researchers from various disciplines, therefore, provides a platform to stimulate conversations to reflect on our own roles as experts in transforming practices or, potentially, reproducing old barriers. Furthermore, I hope by sharing insights and exchanging ideas with others concerned with the common question of enabling the integration of the SDGs in a range of sectors, fertile grounds for actions in various domains (and their crossovers), e.g. policy and planning arena, community initiatives, and private markets, can be identified. My aim is to continue the conversations beyond the symposium, which may lead to future pathways for investigating the scope and set of transformative actions essential for the SDGs delivery across different domains.

To this end, I'm motivated to contribute to the conversations and share with the other symposium participants to advance existing knowledge and push the agenda for delivering the SDGs in an integrated manner. I believe in leveraging science-practice interfaces across various domains as one of the key approaches for enabling such integration. To bear fruits, however, the science of integration must be translated in operational terms for the stakeholders involved. I hope to be able to reflect on this particular challenge during the symposium to drive my contributions.

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Initiating Field and Design Strategies for Rivers in Mega-Urban Regions

Rapid urban transitions result in changes which often lead to a number of human environment conflicts. Landscapes that are a product of this urbanity increasingly face unprecedented challenges brought by these changes. These have led researchers to depend on the prominent contribution of spatial sciences as a medium to prepare information for the general public. As such, the product of ubiquitous sensing is the dominant form of media which constructs our landscapes today. Two questions are investigated through extensive fieldwork within a riverine landscape in Jakarta, Indonesia.

First, how can landscape architects equip themselves to engage with the mega-urban region? I propose that designers should become surveyors of the mega-urban environment. By using sensing instruments to document and understand the environment, they are able to produce high fidelity and precise local observations of complex urban sites that can be used in design.

Second, how can the precise local observations of landscape architects contribute knowledge to multidisciplinary work? This question is broken down into two contexts. Within the context of the work of the landscape ecology module, four contributions are discussed: a) generation of a digital design toolkit to use the observations to augment design; b) communication of corridor scale design-led scenarios using local information; c) improvement of design relevance through the integration of social and spatial information; d) enhancement of the mapping techniques which are used by communities to understand their everyday environments. External to the landscape ecology module, one contribution is discussed: the disclosure of temporal urban processes.

The contributions of this thesis are twofold: first, the location of landscape architecture within the mega-urban context; and second, the contextualisation of its value to multidisciplinary work. These contributions are manifested through the excellent and crucial test case, Jakarta, as a mega-urban city. In conclusion he larger realisation of the research is that its value is demonstrated by its contribution to how others can re-understand their own fields. Only through this grounded approach, which positions one's work relative to the work of others, can we tackle the mega-urban issues at hand.

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Localizing SDG 11: integration between targets and local strategic planning in Niteroi city

This research was carried out in Niterói city, in June of 2017, to support the municipal government in formulating the local 2030 Agenda, mainly the implementation of SDG 11 – "Make cities and human settlements inclusive, safe, resilient and sustainable". Niterói is a big city located in the metropolitan area of Rio de Janeiro state, Brazil and has an estimated population of 499,028 inhabitants, with 100% of the total population living in the urban area (IBGE, 2015). This city has developed some participatory initiatives to promote sustainability in the city notably, the strategic plan "Niterói que Queremos 2033" launched in December 2013. This plan was built on participatory methodology and has seven priority areas: public security and transportation, health, education, economic development, environment, social inclusion, and public management.

Examining the ongoing initiatives of the local strategic plan and using the Multi-Actor Multi-Criteria Analysis – MAMCA (Macharis, 2004), an exploratory case study was developed involving the participation of key stakeholders from municipal government, business sector, universities, and state audit office. MAMCA consists of seven key steps and in this research, steps 1 to 4 were developed during a participatory decision-making workshop aimed to discuss the main challenges and opportunities regarding the forthcoming implementation of SDG 11 in Niteroi. During the workshop, seven preselect alternatives associated with the achievement of SDG11 targets were submitted for stakeholder evaluation. These alternatives are: 1) how to ensure access for all to adequate, safe and affordable housing (target 11.1)?; 2) how to provide access to safe, affordable, accessible and sustainable transportation (target 11.2)?; 3) how to enhance inclusive and sustainable urbanization (target 11.3)?; 4) how to reduce the adverse impact of waste management (target 11.6); 5) how to provide access to safe, inclusive and accessible green and public spaces (target 11.7)?; 6) how to strengthen local development planning (target 11.a)?; 7) how to increase the number of human settlements adopting and implementing integrated policies towards resilience to disasters (target 11.b)?

By analysing distinct stakeholder's expectations, this research identified main factors that can hinder or facilitate the forthcoming implementation of SDG 11 in Niteroi city. From the seven alternatives presented to be evaluated, a total of 32 criteria were identified by stakeholder groups. It became evident that local stakeholders are not looking in the same direction when it comes to establishing priorities to implement SDG 11. Overall, while municipal government and business sectors preferred to focus their analysis on the development of communities and urban issues, university experts and state audit office representatives were more concerned about their own activities and do not seem to share a common vision between with the other two stakeholder groups.

This research presents relevant gaps regarding expectations of distinct stakeholders and also offers a set of indicators to contribute to the performance evaluation of Niteroi city in terms of SDG 11 achievement. It concludes with recommendations to assist the municipal government to implement SDG 11 in a more integrative way.

References

IBGE - Instituto Brasileiro de Geografia e Estatistica. (2015). Pesquisa de Informacoes basicas Municipais. Perfil dos Municipios Brasileiros. Rio de Janeiro. Brazil.

Macharis C. (2004). The importance of stakeholder analysis in freight transport: The MAMCA methodology. European Transport (25–26):114–126.

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Building community resilience through water in cities in Indonesia and Fiji

How can research help address interactions between the Sustainable Development Goals? What are the new knowledge, approaches and tools relevant to the SDGs that the project is developing to help stakeholders address the SDGs in an integrated way?

A growing body of evidence shows linkages between human health and the health of the environment.[2] The planetary health approach explores the interdependency of the health of human civilization and the state of natural systems.[3,4] The Revitalising Informal Settlements and their Environments (RISE) program takes planetary health principles as its modus operandi, exploring the interlinking and interdependencies of changes to the built environment vis-à-vis health outcomes. The program seeks to build community resilience through water in cities in Indonesia and Fiji. Through a five-year action-research program, RISE integrates partners across academia, communities, governments and the private sector to deliver an integrated approach to water-sensitive revitalisation of informal settlements and investigate its environmental and human health impacts. Funded by the Wellcome Trust and the Asian Development Bank, the program's primary goal is to reduce faecal contamination in the environment by 80%. Beyond health research and assessment, the program includes the development of a series of integrated urban design interventions for two pilot sites and 24 informal settlements in the cities of Makassar (Indonesia) and Suva (Fiji), based on a design philosophy of community engagement, multi-functionality, and adaptability. The solutions are co-developed with communities through an extensive process of co-design and engagement with work from a diverse interdisciplinary team, which includes experts from engineering, ecology, hydrology, architecture, landscape architecture and community engagement. Recognising the interlinkages between and within the goals, this presentation will explore how innovative research models that integrate a cross-disciplinary, multi-sectoral approach to urban improvement can address challenges - such as urban resilience (SDG 11), water and sanitation (SDG 6) and good health & wellbeing (SDG 3) - for communities that are most vulnerable to climate change and its impacts (SDG 13).

Keywords
Sustainable Development Goals, RISE program, Monash University, Community resilience, Water sensitive cities, Planetary health, Informal settlement upgrading.

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[2] Whitmee et al. "Safeguarding Human Health". 2015.

[3] Horton, Richard, and Selina Lo. "Planetary health: a new science for exceptional action."*The Lancet* 386, no. 10007 (2015): 1921-1922.

[4] Whitmee, Sarah, Andy Haines, Chris Beyrer, Frederick Boltz, Anthony G. Capon, Braulio Ferreira de Souza Dias, Alex Ezeh et al. "Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health." The Lancet 386, no. 10007 (2015): 1973-2028.

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Government-funded building in remote Northeast Arnhem Land, Australia: the underperforming current approach and a possible alternative

Northeast Arnhem Land (NEAL), Australia is an extremely remote and distinctly Indigenous region. Due to market failure and Aboriginal land tenure restrictions, capital works investment is almost exclusively made by government. Currently government building policies tend to align with the Realpolitik. Policies are typically set at a national or state level as opposed to being region specific and have limited interaction with local needs. Capital works investments are centralised to the region's largest settlements; deliver limited functions; and prioritise the delivery of complete built units using mostly imported resources. The net result is a stifling of the economic and multiplier potential of construction and a perpetuation of the reliance on government for all building processes. This paper proposes an alternative process driven building approach entitled 'regional woven distribution'. It focuses on identifying local needs and transforming available resources to optimize resources invested to more effectively meet human needs and stimulate local sustainable economic development throughout both the construction and use phases of building.

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The Role of Research in Integrating the SDGs across Integrated Urban Water Management in Australia.

Monash Water Sensitive Cities is currently working with Integrated Urban Water Management authorities across Australia to achieve a more considered implementation of the Sustainable Development Goals in business planning and operations. A major challenge facing IWM and the SDGs is how a more integrated approach can be taken towards the goals to better recognise the contribution integrated water management can make to sustainable development in Australia. From a business case perspective, a key challenge to progressing an embedding of the SDGs lies in recognising the economic, social and environmental benefits an SDGs focus can bring to Integrated Water planning and management for organisations. Monash Water Sensitive cities (as part of the Monash Sustainable Development Institute) is engaged in research focussed on the development of tools, frameworks and implementation pathways to support water authorities in this transformative process. We propose a framework that draws on existing and proposed research outputs to articulate a pathway for the realisation, quantification and implementation of goals in the business planning and operational planning of water authorities. This framework marks a significant shift away from current approaches in IWM which have to date utilised the goals as a strategic reporting measure in guiding business as usual approaches.

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Prioritising human behaviours that impact biodiversity

Meeting United Nations Sustainable Development Goals (SDGs) 14 and 15—the sustainable use and protection of terrestrial and marine biodiversity—fundamentally relies on changing human behaviour. We identify specific consumptive behaviours driving domestic and international biodiversity loss, by using country-level biodiversity footprints generated from integrating an input-output analysis with the IUCN Red List of Threatened Species Database. We then use a social survey to explore the dimensions that underpin these consumptive behaviours, identify strategies to change them and investigate the likelihood that they can be changed. We find that consumptive behaviours differ with respect to drivers and barriers to change, dependent on context and thus must be considered individually in developing behaviour change strategies. This is a first step towards a prioritised biodiversity behaviour change program for targeting the most destructive behaviours and reducing impacts on biodiversity.

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Toward a Common Understanding of Sustainable Development through a Multi-Party Supply Chain-Wide Initiative: a Case Study of Indonesia

Initiatives to address the Sustainable Development Goals (SDGs) in an integrated manner have been emerging in developing countries such as Indonesia, involving local and international parties. It is partly a reflection of the countless number of unsustainable conventional development projects that primarily focus on capacity building without linking financiers, producers with buyers; a reflection of financiers for being risk-adverse; a reflection of corporate social responsibility (CSR) programs that are segregated from the core business activities of these companies. In order to address this kind of siloed approach, supply chainwide collaborative initiatives – from financing, production, sales, and consumption – are beginning to emerge in Indonesia.

Such multi-party initiatives should be welcome. Nevertheless, the problem with sustainable development is that 100 different people define the term in 100 different ways (Meadows 2012). If global goals such as the SDGs do not carry universal meanings but rather are socially constructed by people who are embedded in a particular social system, then it is important to understand how global norms are interpreted by local actors (Teubner 1998; Gerber 2001; Gillespie 2012). Systems theorists argue that modernisation divides societies into distinct functional sub-systems, such as bureaucratic, economic, scientific as well as legal sub-systems, each of which interprets external information in accordance with internal epistemic assumptions (Nobles and Schiff, 2012, p.270; Teubner, 1998). How do these subsystems interact with each other? Business and social relationships bring different sub-groups together and promote negotiations and discussions, leading to co-evolution of norms (Jessop, 2001). In order to reconcile differences and to identify common objectives, it is necessary for the sub-systems to share common normative and epistemic assumptions (Post, 1991). This process of 'structural coupling' ensures that people within different social sub-systems come to understand global norms (such as the SDGs) in similar ways. Based on this conceptual framework, my work-in-progress research project tries to investigate the degree of cohesiveness of different groups (financers, producers, buyers, consumers) within multi-party initiatives on business and sustainability. Thus, my research project proposes that 'structural coupling' among the relevant parties is one of the keys to a successful multi-party collaboration, and consequently presents an integrated approach to achieving the SDGs.

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The aim of Sustainable Development Goal (SDG) Target 4b is to increase the use of scholarships to enact social change by empowering those from disadvantaged backgrounds through international education and training to contribute to nation building.

In 2018, the Department of Foreign Affairs and Trade (DFAT) offered 4,031 Australia Awards scholarships, fellowships and short courses to individuals from over 60 developing countries at an estimated budget of $320 million.

The Australian Government is leading the world by investigating the impact of its scholarship program, the Australia Awards, by funding a 'Global Tracer Facility'. The Facility has found that alumni of development scholarships have substantially contributed to the development of their countries, often as high-level change-makers in academia, business and government.

Here we will provide four cases from our Year 1 research. These cases, undertaken in Fiji, Kenya, Nepal and Sri Lanka, illustrate how impact maps at different levels – the micro, meso and macro – and how these contribute to the achievement of the SDGs and partner-country development goals. These findings are useful for researchers and practitioners in SDG integration in understanding how SDG 4b can support to the broader SDG framework.

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Understanding water availability and drought in Cambodia - using Open Data Cube technologies to combine satellite data with climate forecasting and hydrological modelling

Cambodia continues to experience frequent drought events leading to severe economic and livelihood losses, which in turn greatly influences food security. The UN-ESCAP Drought Mechanism Project has integrated three major Australian water technologies – the Geoscience Australia Open Data Cube (ODC), Bureau of Meteorology (BoM) forecasting, and eWater Source hydrological modelling software – to estimate and forecast water availability and to understand drought in Cambodia. This project includes in-country capacity building and works towards the sustainable development of Cambodia. There are opportunities to further this technology to meet Sustainable Development Goals within other regions of the World.

The ODC is a free and open source global initiative that exploits satellite data and provides access to data management technologies and analysis platforms. An instance of the ODC, Cambodia Cube, was built for the UN-ESCAP Drought Mechanism Project and contains a wealth of temporal and spatial data. Datasets include 29 years of earth observation data, remote sensing metrics, and gridded environmental and meteorological datasets. Cambodia Cube can be used to examine drought and water availability through:

1. The generation and analysis of country-wide remote sensing products and environmental datasets. Cambodia Cube can enable the assessment of the land surface and its response to drought conditions. For example, satellites can be used to identify water on the land surface during drought and then measure the response of vegetation in parallel to water availability. When this capability is coupled with meteorological datasets, such as surface temperature, rainfall, and potential evapo-transpiration, the drivers behind environmental change can be identified. Cambodia Cube has also been used to calculate country-wide drought metrics such as the Standardised Precipitation-Evapotranspiration Index (SPEI); and
2. The delivery of remote sensing and environmental data directly into the eWater Source hydrological modelling software. The eWater Source software generates water balances and water availability estimates at a country or basin scale. The BoM are modelling rainfall for Cambodia to forecast future conditions. Cambodia Cube links this forecasted data directly into eWater Source which can be used to calculate water balances for these forecasts.

The collaboration of Geoscience Australia with eWater and BoM as part of the UN-ESCAP Drought Mechanism Project combines a range of technologies to better understand, model, and forecast hydrological conditions and drought in Cambodia. This capability directly aligns with several Sustainable Development Goals and enables the planning, preparation, management and mitigation of drought risk within Cambodia.

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Understanding immigrants' ethnic cultures and their consumption behaviours to effect the Sustainable Development Goals

Challenges such as resource depletion, climate change and increasing greenhouse gases emissions have influence on countries' developments in terms of economic, social and environmental. The approach and integration of the Sustainable Development Goals (SDGs) therefore needs all stakeholders from individuals to organisations and governments to effect changes for sustainable living and a sustainable earth. Current knowledge, for instance, on mitigations on resource and carbon reductions has focused on issues such as built environment, behaviour changes, installation of resource-efficient technologies and transport infrastructures (Newton & Newman 2013; Newton & Meyer 2012; OECD 2011). These studies relevant to SDG 13 Climate Action have found influential factors on household consumption levels ranged from socio-economic status, housing size and type and dwelling size and type to conservation behaviours, adoption of resource-efficient technologies and environmental awareness. The findings also bring to light the relations among SDG 13 and other SDGs such as 11 Sustainable Cities and Communities (that is, people, environmental awareness and consumption behaviours) and 12 Responsible Consumption and Production (that is, resource-efficient technologies and consumption behaviours). However, Ting's (2015) detailed investigation of sustainability practices among China-born migrants and Australia-born group in Australia found that ethnic and host cultures made significant contributions to the two groups' consumption levels, which have environmental impact. The discovery that culture as an enabler plays a central role culture in the pursuit of sustainability living aligns with the UN's Secretary General, Ban Ki-Moon's (2013) call that 'To mobilise people, we need to understand and embrace their culture'. To mobilise individuals, policy makers have to recognise the cultural differences and cultural influence on population groups and their behaviours, and how to approach the integration of SDGs for a sustainable environment and health and well-being of the population.

To integrate SDGs, it is necessary for with diverse population groups, including Australia, to recognise the migrants and the host society's differences in cultural practices towards sustainable living. Ting (2015) found that the Australia-born group's environmental awareness was related to their high adoption of resource-efficient technologies while China-born migrants' frugality motivated them to reduce resources use at home. The practice of frugality to conserve by a Sri Lankan migrant was also found (Maller 2011). Other migrants preferred to hang washing on outdoor clotheslines and in the garage to the use of dryer which was energy intensive (Maller 2011). Using the CALD Index, which measures individuals' strength of connectedness with ethnic culture, Ting (2015) found that China-born migrants who showed strong retention of Chinse culture had large post-migration footprint due to their adoption of Australia's high resource-intensive lifestyles. These studies have shown that migrants' contribution to the sustainable environment requires an understanding of the motivations and barriers to their sustainable living. This understanding will enhance the integration of SDGs into individuals' everyday living.

References:

Ki-Moon, Ban 2013, *Secretary-General's remarks at General Assembly thematic debate on culture and sustainable development*. New York: Statement at General Assembly of United Nations, 12 June 2013.

European Union (EU) 2013. Statistics Explained Archive: Volume 2 – Social Statistics. Luxembourg: Publications Office of the European Union.

Lutz, Wolfgang et al. 2012. Demographic challenges for sustainable development. Austria: Wittgenstein Centre, International Institute for Applied Systems Analysis (IIASA).

Maller, C 2011, 'Practices involving energy and water consumption in migrant households', in PW Newton (ed.) *Urban Consumption*, pp. 237-250.

Newton, PW & Newman, P 2013, 'The Geography of solar photovoltaics (pv) and a new Low Carbon Urban Transition Theory', *Sustainability*, vol. 5, pp. 2537-2556.

Newton, PW & Meyer, D 2012, 'The determinants of urban resource consumption', *Environment and Behavior*, vol. 44, no. 1, pp. 107-135.

OECD 2011, *Greening household behaviour: The role of public policy,* OECD.

Ting, C.Y.P. (2015). *Towards sustainable living in Australia's multicultural society: An exploration of cultural differences in attitudes to environment and consumption behaviours* (PhD Thesis, Swinburne University of Technology, Melbourne, Australia).

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Informal Infrastructures Can design incorporate existing ecologic and social dynamics into infrastructure provision?

Keywords: Design under deep uncertainty, infrastructure, landscape as infrastructure, ecological infrastructures, informal settlement upgrading.

Infrastructure played an essential role in shaping urban configurations throughout time, however an increasing number of researchers and practitioners agree that the approaches through which infrastructure has been traditionally provided need to be reimagined. Established infrastructural systems based on purely functionalist principles are arguably unsuitable for currents urban necessities and are particularly inefficient under conditions of deep uncertainty such as the contexts of urban informality, climate change and unprecedented urban growth experienced in many cities globally. This work is underpinned by the understanding that modelling uncertainty as a tool to design the built environment is not only enormously complex and costly but in many cases undesirable, instead, this work aims at understanding and incorporating the dynamics that thrive under uncertainty into architectural and engineering design practice. The method proposed explores how design can develop infrastructure-provision guided by ecological, adaptive and open approaches connected to existing cultural and ecological processes. The expected outcomes should expose that local ecologies and relationships between humans and their environments are the main strategies designers have into how to embrace and design for uncertainty aligned with the concepts of sustainability and resilience. This thesis intends to contribute to the field by developing methods and principles for future infrastructure provision that incorporate existing ecological dynamics as a strategy to upgrade informal settlements living conditions while coping with climate change and unprecedented urbanisation. In addition, this work attempts to contribute to the discussions on governance, democracy and ecology not only under informal conditions but in terms of infrastructure in general.

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Crafting an institutional monitoring framework for policy integration

Introduction

Policy integration should be tracked against a manageable set of 'essential sustainable development indicators' on synergies and trade-offs (Stafford-Smith et al. 2017). Literature on the institutions for implementing policy integration is either fragmented and confusing (Candel and Biesbroek 2016) or pessimistic about their effectiveness (Nordbeck and Steurer 2016). Therefore, an institutional monitoring framework is needed to document the state of policy integration and consolidate lessons on effective practices (Peters 2015).

Methodology

I have analysed the structure and content of three types of documents: 1) frameworks for monitoring cross-sectoral governance (e.g. Social Determinants of Health Action Framework); 2) evaluation reports on sustainability management (e.g. German peer review on sustainability governance); and 3) voluntary national reviews and case studies (e.g. OECD Policy Coherence Handbook). The synthesized monitoring framework is then tested for validity and feasibility with a small group of sustainability actors.

Findings

This study leans on practices in policy evaluation and knowledge of good governance. Firstly, it illustrates the pathways for implementation on a logic model. Secondly, the model takes the OECD eight institutional building blocks as a starting point. Thirdly, the model is highly adaptive to the evidence from comparative case studies.

The logic model spells out the resource inputs, institutional processes, and governance outputs. They are linked together in pathways that contribute to the overall improvement of sustainability outcomes.

The institutional building blocks as vague concepts are translated into indicators that can be measured concretely. The indicators represent what is desirable in terms of governance purposes and outputs.

An adaptive model recognizes the limits of current knowledge on what 'works' in policy integration. Therefore this model will be continuously tested to cover a range of contextual parameters: developed vs. developing, national vs. subnational, democratic vs. authoritarian.

Discussion

A supposedly universal framework will encounter significant implementation challenges. Most important is the comparability across frameworks, settings and times.

It may be difficult to complement this institutional framework with a performance framework (i.e. SDG indicators) without making the links explicit. However, the links between what is done and what can be achieved are always unpredictable.

Accounting for most of the factors influencing the political economy of a country is impossible. Country comparison is nonetheless desired despite inducing rivalry between countries and apathy from misunderstood parties.

As incremental as institutional changes are, there can be significant internal reforms to sustainability governance in a country. Without a routine reporting system, major shifts will not be captured timely.

Conclusion

We know little about institutional features that help with policy integration. Therefore, it is crucial to establish an institutional monitoring framework that is logical, concrete and adaptive. The Framework is more likely to be adopted if we tackle challenges around linking, comparison and continuity in monitoring.

References

Candel, Jeroen J L, and Robbert Biesbroek. 2016. "Toward a Processual Understanding of Policy Integration." *Policy Sciences* 49 (3). Springer US: 211–31. doi:10.1007/s11077-016-9248-y.

Nordbeck, Ralf, and Reinhard Steurer. 2016. "Multi-Sectoral Strategies as Dead Ends of Policy Integration: Lessons to Be Learned from Sustainable Development." *Environment and Planning C: Government and Policy* 34 (4): 737–55. doi:10.1177/0263774X15614696.

Peters, Guy. 2015. *Pursuing Horizontal Management : The Politics of Public Sector Coordination*. *Studies in Government and Public Policy*. doi:10.1111/gove.12238.

Stafford-Smith, Mark, David Griggs, Owen Gaffney, Farooq Ullah, Belinda Reyers, Norichika Kanie, Bjorn Stigson, Paul Shrivastava, Melissa Leach, and Deborah O'Connell. 2017. "Integration: The Key to Implementing the Sustainable Development Goals." *Sustainability Science* 12 (6). Springer Japan: 911–19. doi:10.1007/s11625-016-0383-3.

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Occupant behaviour and its impact on energy consumption of urban residential buildings

Buildings are an essential component of the urban system, and is critical for the transformation in urban environments. The building sector's crucial role in shaping a low-carbon and more sustainable future has been substantiated by a large number of studies to date (Zhang et al., 2015, Pérez-Lombard et al., 2008, Asif, 2016). Buildings are responsible for 32% of global final energy use and over 30% of global greenhouse gas emissions, and those shares could double or even triple by 2050 if we carry on business as usual. Rapid urbanization around the world foreshadows the growth of new buildings and increased access to energy services indoors. Technological innovation has taken a leading role in building energy efficiency improvement and associated carbon emissions reduction over the last few decades, becoming a focus of energy policy attention. However, significant energy savings and energy efficiency improvement of buildings have not ever been seen through energy-efficient technologies, largely due to the high cost of adopting new technologies (Allcott and Mullainathan, 2010) and the gap between expected and practical energy savings derived from technological innovation (Harvey, 2009, 2013). Technology alone will not guarantee the realization of building energy conservation goals and therefore humans and their energy-related behaviour in buildings must be included in building energy efforts.

The primary objectives of my research are to improve the understanding of occupant behaviour in residential buildings and the interaction between energy-related behaviour and building energy use in urban areas. Moreover, how the pattern of behaviour and interaction may vary across two different cities under different socio-economic contexts have been explored. Another vital objective of this research is to investigate the influence and implications of occupant behaviour on residential energy policy. Survey on occupant behaviour and household energy use in case cities will be employed to examine their relationship and inform better policy options. Comparative analysis between two case cities will be conducted to present different behaviour patterns and interactions. This research could enhance the understanding of occupant behaviour and its impact on urban residential energy consumption, highlighting the critical role of occupant behaviour in residential energy use as well as providing alternative policy solutions of improving building energy efficiency.