NCCARF
National
Climate Change Adaptation
Research Facility
Adaptation Research Network
SETTLEMENTS AND INFRASTRUCTURE

NCCARF
National
Climate Change Adaptation
Research Facility

PROCEEDINGS

9th Early Career Researchers' National Forum & Workshop
University of New South Wales
11-13 March 2013

Australian Climate Change Adaptation Research Network for Settlements and Infrastructure

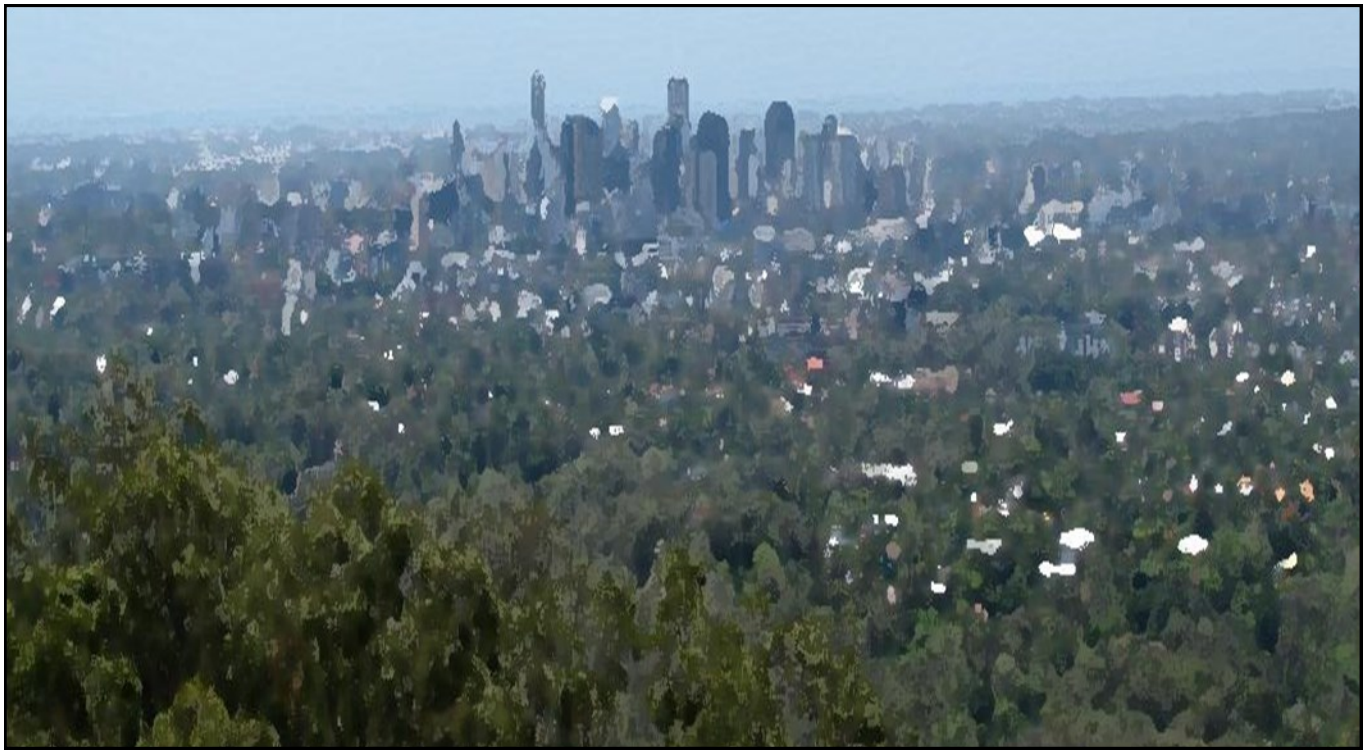

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Photo courtesy of Blythe McLennan

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ACCARNSI 9TH NATIONAL ECR FORUM AND WORKSHOP PROGRAM

Day 1: Monday 11 March 2013 - UNSW Water Research Lab, Manly Vale

9.45	*TEA AND COFFEE ON ARRIVAL*
10.00	**ECR Forum Welcome:** ACCARNSI Network Convenor Associate Professor Ron Cox
10.15	Managing Estuaries Under Climate Change: An Adaptive Decision Making Framework Erica Davey, *University of New South Wales , NSW*
10.30	Storing Energy: An appraisal of pumped hydroelectric potential in NSW Matt Phillips, *University of New South Wales , NSW*
10.45	Discussion lead by Associate Professor Bill Peirson
11.00	*MORNING TEA*
11.30	Design Flood Estimation in Vietnam under Future Climate Regimes Phuong Cu Thi, *University of Technology Sydney, NSW*
11.45	Developing Systemic Understanding Of Community And Adaptation Options Within The Tonlé Sap Region, Cambodia Amelia Travers, *University of Tasmania , TAS*
12.00	Discussion lead by Associate Professor Bill Peirson
12.15	Portland Victoria 2012 - 2050: Is the Settlement Sustainable? Murray Herron, *Deakin University, VIC*
12.30	Green Infrastructure and its role in mitigating Melbourne's Urban Heat Island Richard Harris, *Monash University, VIC*
12.45	Public awareness of and attitudes towards the use of alternative water sources for residential purposes: the potential for use of treated wastewater, to minimise discharge to the environment and reduce demand on existing potable water supplies in South Australia Pearl Tassell, *University of Adelaide, SA*
1.00	Discussion lead by Associate Professor Ron Cox
1.15	*LUNCH*
2.00	TOUR OF WATER RESEARCH LABORATORY
2.45	**GUEST PRESENTATION**: People, Vehicle and Building Stability in Floods Grantley Smith, *Manager, UNSW Water Research Laboratory , NSW*
3.15	Bus to Field Trip
3.30	FIELD TRIP: WARRIEWOOD WETLANDS/NORTHERN BEACHES

5.30	Bus back to the Q Station, Manly
7.00	GROUP DINNER: Meet at Boilerhouse Restaurant, Q Station, Manly

Day 2: Tuesday 12 March 2013 - UNSW Water Research Lab, Manly Vale

9.15	*TEA AND COFFEE ON ARRIVAL*
9.30	**GUEST PRESENTATION**: Insurance initiatives to improve the resilience of the built environment and connections to local government policies Jacqui Bonnitcha*, Edge Environment Sydney*
10.00	Green Hubs: Enticing and Harnessing Readiness for Change across Institutions, from Community to Home and Work. Gabriele Fitzgerald*, University of South Australia, SA*
10.15	Impact of Climate Change on disadvantaged groups: Issues and Intervention Arusyak Sevoyan*, University of Adelaide , NSW*
10.30	Discussion lead by Associate Professor Ron Cox
10.45	*MORNING TEA*
11.15	Bridging the gap between climate science and decision making to increase adaptive capacity Emma Austin*, University of Newcastle , NSW*
11.30	Psychological Adaptation: The influence of perceptions of risk and adaptive capacity within a high risk community Amanda Tunbridge, *University of the Sunshine Coast, QLD*
11.45	Defining acceptable risk in a changing coastal zone Tom Fitzgerald*, University of New South Wales , NSW*
12.00	Implementing tools to increase adaptive capacity in the community and natural resource management sectors Alianne Rance*, University of Melbourne , VIC*
12.15	Discussion lead by Associate Professor Bill Peirson
12.30	*LUNCH*
1.15	Students, Shakes and Silt – The Student Volunteer Army, Social Media and its impact on Local and Central Government Gina Scandrett*, Horowhenua District Council, NZ*
1.30	Students and aftershocks - The ongoing impacts of the Canterbury Earthquakes on local infrastructure and 'business as normal' Erin Jackson*, University of Canterbury Students' Association , NZ*
1.45	Complex Unbounded Problems and Emerging Threats in the 21st Century Peter Weiske*, Australian National University , ACT*
2.00	Discussion lead by Associate Professor Ron Cox

2.15	**PRESENTATION & DISCUSSION:** Resilience of Key Infrastructure to Extremes Ron Cox*, Network Convenor, ACCARNSI*
2.45	*AFTERNOON TEA*
3.15	**GUEST PRESENTATION**: Understanding eco-hydrologic linkages to improve long-term wetland management Will Glamore*, Senior Research Fellow, UNSW Water Research Laboratory, NSW*
4.00	TOUR OF NSW PUBLIC WORKS' MANLY HYDRAULICS LABORATORY
4.45	DAY 2 CLOSE - BUS BACK TO Q STATION, MANLY

Day 3: Wednesday 13 March 2013
Sharing Responsibility for Implementing the National Strategy for Disaster Resilience (NSDR) Workshop at UNSW, Kensington

8.00	*TEA AND COFFEE ON ARRIVAL/REGISTRATION*
9.00	**Workshop Welcome:** John Handmer, Richard Thornton, Ron Cox, Christopher Lee
9.40	PANEL 1 - Research Perspectives Chaired by Chris Lee, NSW Office of Environment & Heritage
10.30	*MORNING TEA*
11.00	PANEL 2 - Enabling Community Resilience Chaired by Blythe McLennan, RMIT
12.30	*LUNCH*
1.30	PANEL 3 - Changing Government Practice Chaired by Ron Cox, ACCARNSI
3.00	*AFTERNOON TEA*
3.30	Open Discussion - Questions from the Floor Chaired by John Handmer, ARN for Emergency Management
4.30	Reflections and Wrap Up lead by John Handmer
5.00	**ECR Forum Close:** ACCARNSI Network Convenor Associate Professor Ron Cox
5.10	Transport to Sydney Domestic Airport

Sharing responsibility for implementing the NSDR

AN INTERACTIVE WORKSHOP

Wednesday 13th March 2013

Tyree Room
The John Niland Scientia Building
UNSW Kensington Campus, Sydney
(*Building G19 on the attached map*)

Overview

This one-day workshop will use an interactive format to explore the meaning of 'shared responsibility' for the implementation of the NSDR.

Three panels of speakers representing a wide range of perspectives from "governments, businesses, not-for-profit, communities and individuals" as well as from research will address one or more of the following questions:

1. What would 'disaster resilience' look like and will we know it when we see it?
2. What has been learned about sharing responsibility for disaster resilience from experiences so far?
3. What aspects of current practices and relationships most need to change in order that responsibilities for disaster resilience can be shared effectively and fairly?

This event builds on the work of the Bushfire CRC research project 'Sharing responsibility' undertaken by the Centre for Risk and Community Safety at RMIT University and is a follow-up to a successful workshop conducted as part of this project in Melbourne in 2012. See http://www.bushfirecrc.com/publications/citation/bf-3336

RMIT University bushfire CRC

UNSW AUSTRALIA

NSW GOVERNMENT Office of Environment & Heritage

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network SETTLEMENTS AND INFRASTRUCTURE

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network EMERGENCY MANAGEMENT

climate friendly event
climatefriendly.com/disclosure

Carbon credits have been purchased to offset the greenhouse gas emissions of this event.

Workshop Program

Panelists will speak for 7-10 minutes each, allowing time for group discussion.

You can also send questions/topics you would like to have included in the open discussion at any time via SMS to: 0406-059-510

8.00am-9:00am
Tea/coffee and registration

9am-9.40am
Welcome

- **John Handmer** – Director, Centre for Risk & Community Safety, RMIT University/ Convenor - NCCARF Emergency Management network
- **Richard Thornton** – Deputy CEO & Research Director, Bushfire CRC
- **Ron Cox** – School of Civil & Environmental Engineering, UNSW/ Convenor - ACCARNSI
- **Christopher Lee** – Manager Impacts & Adaptation, Office of Environment & Heritage NSW

9.40am-10:30am
Panel 1 – Research perspectives
(*Chair: Christopher Lee, OEH*)

- **Blythe McLennan** – Research Fellow, Centre for Risk & Community Safety, RMIT University
- **Peter Rogers** – Co-director, Climate Futures, Macquarie University
- **Dale Dominey-Howes & Emma Calgaro** –Co-director APTRC-NHRL / Research Fellow, School of Biological, Earth & Environmental Sciences, UNSW

10:30am-11:00am
Morning tea

11.00am-12.30pm
Panel 2 – Enabling community resilience
(*Chair: Blythe McLennan, RMIT University*)

- **Julie Molloy** – Director of Social Engagement Initiatives, Volunteering Queensland
- **Alison Turner** – Community Relations Manager, ParaQuad
- **John Richardson** – National Coordinator-Strategic Development, Emergency Services, Australian Red Cross
- **Lesley Wood** & **Jan Gluski** – Mandemar brigade / Mandemar district community
- **Erin Jackson** – President, University of Canterbury Students Association, NZ
- **David Lemcke** – Senior Planner, Environment & Natural Resources, Wyong Shire Council

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12.30pm-1.30pm
Lunch

1.30pm-1.40pm
'Mapping shared responsibility' Delphi
(Blythe McLennan)

Invitation to contribute to a visual 'mapping tool'

1.40pm-3.00pm
Panel 3 – Changing government practice
(*Chair: Ron Cox, UNSW/ACCARNSI*)

- **Wendy Graham** – Director of Resilience & Planning, MPES NSW
- **Tanyia Tuckey** – Manager, Community Engagement, NSW RFS
- **Chris Collett** – Assistant Secretary, National Disaster Recovery Programs Branch, Commonwealth Attorney-General's Department
- **Ian Armstrong (*to be confirmed*)** – Project officer, Climate Change Adaptation, Sydney Coastal Councils Group
- **Steve Opper** – Director of Community Safety, NSW SES

3.00pm-3.30pm
Afternoon tea

3.30pm-4.30pm
Open discussion
(*Chair: John Handmer, RMIT University/NCCARF-EM*)

Questions/comments/statements from the floor

4.30pm-5.00pm
Reflections and wrap up
(*Chair: John Handmer, RMIT University/NCCARF-EM*)

Final reflections on the day

5pm-7pm
Informal discussion over drinks
Function room, Civil Engineering building
(*H20 on attached map*)

7.30pm-9.30pm
Dinner at the Doncaster Hotel
268 Anzac Parade Kensington
(*Booking numbers to be collected during the day*)

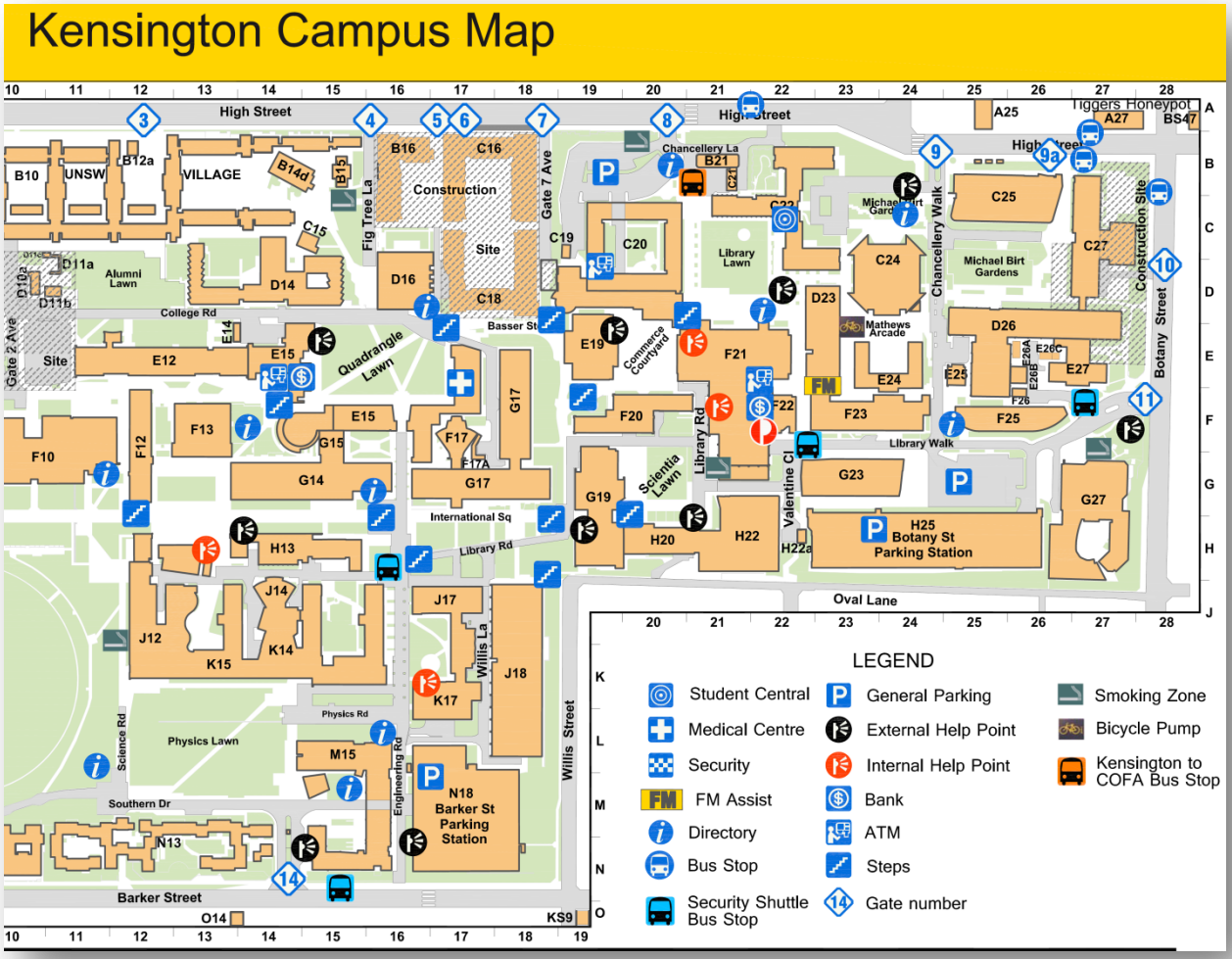
Getting here

Venue location

The workshop venue is the Tyree room in the John Niland Scientia Building (building G19).

There will be signage in the building to direct you to the room.

The informal drinks venue is in the Civil Engineering building next door (building H20).



Parking

Please note there is limited parking available on campus so you may wish to arrange another form of transport to the workshop.

If you are driving, all day casual parking is generally available on the top floors of the Barker Street (Gate 14) and Botany Street (Gate 11) car parks. However, sometimes this parking may not be available due to various other demands.

ACCARNSI ECR9 Participants' List

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MANAGING ESTUARIES UNDER CLIMATE CHANGE: AN ADAPTIVE DECISION MAKING FRAMEWORK

Erica Davey, William Peirson, Alan Jones, Maria Beger, Keith Bishop, Samantha Capon, Bob Creese, Brendan Edgar, Peter Fairweather, Leigh Grey, Wade Hadwen, Tim Smith and Rodger Tomlinson

Abstract:
Australian estuaries should be able to meet the needs and aspirations of society and ecological integrity in the face of future change, while continuing to support integrated human and ecological values. Our work presents a new approach to the challenging task of making decisions regarding estuaries with respect to climate change adaptation through the introduction of estuarine focused adaptation strategies.

The range of communities likely to be present in estuaries, and their associated values has been collated, as well as ecological and socio-economic goals for these communities. This will better enable those making management decisions for estuaries to consider the full range of estuarine communities. Adaptation strategies, and examples, are presented to provide a framework approach for decision making. Case studies of Australian estuaries are used to illustrate past estuarine management successes and failures, and provide examples of estuarine goals and associated strategies

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STORING ENERGY: AN APPRAISAL OF PUMPED HYDROELECTRIC POTENTIAL IN NSW

Matt Phillips, William Peirson and Ron Cox

Abstract:
With a national energy market turning to intermittent renewable sources, the challenge of reliably meeting variable demand intensifies. Despite its potential, large scale energy storage in the form of pumped hydro-electricity is limited to only two developments in NSW. This study aims to address the potential of pumped hydroelectric storage as a suitable form of energy storage in NSW. The purposes of pumped storage and various key concepts are outlined. Possible options for more widespread development including surface, coastal and underground storages are briefly drawn upon and discussed with illustrated example locations in NSW. It is recommended that further development be considered as suitable storage infrastructure, supporting a future energy market and renewable energy development.

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DESIGN FLOOD ESTIMATION IN VIETNAM UNDER FUTURE CLIMATE REGIMES

Phuong Cu Thi

Abstract:
Design flood estimation under current climatic conditions remains a problem for many catchment managers. This problem will be more complex in the future when unknown future climatic conditions exist. Nonetheless, estimation of current and future flood risks is required for assessment of a range of climate change adaptation proposals. The issues associated with estimation of future flood flows in a Vietnamese catchment will be presented in this proposed paper.
While Ball et al. (2011) discusses a range of flood characteristics that may be of interest in a design flood estimation project, the peak flow of the flood hydrograph is the most common characteristic requiring prediction. For the purposes of this project, therefore, prediction of design flood flow quantiles will be discussed.

Techniques available to estimate design flood quantiles include At-site Flood Frequency Analysis techniques, Regional Flood Frequency Estimation techniques, and Catchment Modelling Systems. Of these three techniques, Catchment Modelling Systems will be used for the desired prediction. The use of these systems for prediction of future flood quantiles will be the focus of the proposed paper.

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DEVELOPING SYSTEMIC UNDERSTANDING OF COMMUNITY AND ADAPTATION OPTIONS WITHIN THE TONLÉ SAP REGION, CAMBODIA

Amelia Travers

Abstract:
Tonlé Sap is a complex environmental, social and economic system highly vulnerable to climate change and global change impacts. The lake is essential to Cambodian food supply through large fish catches and extensive floodplain agriculture and is listed as a biosphere reserve. Water-based housing communities are widely distributed throughout the lake and river system. Both the communities and infrastructure are vulnerable to global change impacts. This paper presents a systems analysis of the changing characteristics of the environment and associated water-based communities on Tonlé Sap. The vulnerability of these communities to global changes, including climate change, is discussed within a systems thinking framework to demonstrate the interconnected nature of the problem.

Systems analysis tools allow a unique and holistic perspective on the varied anthropogenic and natural impacts on the environment and communities of Tonlé Sap. This analysis has demonstrated some unintended consequences of low carbon emission developments in the Mekong Basin and also allows those in developed countries to consider how they may learn from developing country mental models. Social capital and the resilience of at risk communities are also discussed. Policy and adaptation options must consider how these socioeconomic factors will influence the nature of development and adaptation projects.

Murray HERRON
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PORTLAND VICTORIA 2012 – 2050: IS THE SETTLEMENT SUSTAINABLE?

Murray Herron, David Jones and John Rollo

Abstract:
Over the past few decades, coastal cities around the world have grown at an incredible rate. With this growth have come major challenges relating to land use planning, social relationships, economic development, bio diversity and the ecological footprint.

Regional and rural coastal cities have not been immune to these problems. How has Portland, Victoria, faced the issues of: increasing population and population density; open space requirements; residential density issues; public transport coverage; employment and employment density; a shifting economic climate; environment and climate change; water quality issues and building energy consumption with subsequent C02 emission.

Through a series of simulations the nine issues Portland will be examined from 2012 through to 2050.

The goal is to highlight the current and simulated future impacts of the selected issues and propose solutions that could mitigate those impacts.

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GREEN INFRASTRUCTURE AND ITS ROLE IN MITIGATING MELBOURNE'S URBAN HEAT ISLAND

Richard Harris

Abstract:
As part of the Victorian Centre for Climate Change Adaptation Research (VCCCAR) program we aimed to monitor and research the cooling affects that can be gained by the installation of green infrastructure (Street trees, green walls and living roofs) into the urban environment as a way of reducing the urban heat island. Airborne thermal imaging was used to get an accurate recording of surface temperatures of the City of Melbourne and the City of Port Phillip during a time of extreme heat. This was aided by terrestrial thermal imaging, climate stations and air temperature transects. The results show that green infrastructure produced a positive influence on the cooling of urban canyons during heat waves.

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PUBLIC AWARENESS OF AND ATTITUDES TOWARDS THE USE OF ALTERNATIVE WATER SOURCES FOR RESIDENTIAL PURPOSES: THE POTENTIAL FOR USE OF TREATED WASTEWATER, TO MINIMISE DISCHARGE TO THE ENVIRONMENT AND REDUCE DEMAND ON EXISTING POTABLE WATER SUPPLIES IN SOUTH AUSTRALIA

Pearl Tassell

Abstract:
Australia's public perception of treated wastewater for direct and indirect potable use has been an inhibitor to the implementation of reuse schemes. Literature has focused on public acceptance of treated wastewater for non-potable reuse within the home and findings show a common trend: acceptability decreases with level of personal contact to treated wastewater.

High demand on naturally available water supplies and large volumes of treated wastewater discharged into the environment renders current water management and systems unsustainable. The use of recycled water can reduce the environmental impact associated with discharges of treated wastewater and combinations of water sources including harvested stormwater, rainwater, groundwater, desalinated water, grey water from the home, and treated wastewater may reduce demand on potable water supplies.

The aim of this project is to find out which alternative water sources, and potential mixtures of these sources, are considered acceptable for various uses around the home. An outcome of this project is to better understand the relationship between levels of awareness of current municipal water supply and wastewater systems and attitudes towards alternative water sources for a number of household uses.

These results may be applied to proposed and future water reuse schemes, supplementing the current potable water supply with recycled wastewater and other sources. The use of these findings may increase resilience to climate change in providing flexibility in sources for water supply for residential use ensuring a more sustainable supply of water.

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GREEN HUBS: ENTICING AND HARNESSING READINESS FOR CHANGE ACROSS INSTITUTIONS, FROM COMMUNITY TO HOME AND WORK

Gabriele Fitzgerald

Abstract:
Effectively managing change is one of the critical challenges to adapt to social, economic and institutional dimensions of Climate Change. In this context, the relationship between readiness for change, and people's and organisation's opportunities and guidance to embrace the implementation of pro-environmental practices is crucial for successful adaptation to the effects of Climate Change.

The Conservation Council of South Australia (CCSA) developed a successful climate change community engagement program through social entrepreneurship called Green Hubs. This program harnessed the readiness for change of small commercial (eg. Natural Resource Centres) or community organisations (eg. Football, Bowling, Community Clubs). It aimed to alter people's perceptions and practices in resource and waste management practices towards pro-environmental choices not only in participating organisation but also in individual members' lives across all domains.

Findings presented are based on focus group discussions, surveys and phone interviews that were obtained during June 2012, two years after the launch of the program. These findings form part of a formal evaluation process of this community engagement program. All five so-called Green Hubs had completed every step of the greening program. Results showed intended and unintended, tangible and intangible pro-environmental outcomes. These ranged from quantifiable Co2 reductions and savings in water usage in the community hubs, their recognition as community leaders and the winning of grants through cross referencing their greening practices, to the increase in membership. Moreover, the induction of individual members of those Green Hubs towards pro-environmental practices at home and across other life domains such as work or community were also reported.

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IMPACT OF CLIMATE CHANGE ON DISADVANTAGED GROUPS: ISSUES AND INTERVENTION

Arusyak Sevoyan and Graeme Hugo

Abstract:
The literature on the impact of climate change suggests that the negative effects of climate change are going to be disproportionately experienced by socially and economically most disadvantaged groups. However, there is little empirical evidence looking at these associations. To fill this gap in the literature the current study looks at vulnerability and adaptive capacity of disadvantaged groups to the impact of climate change in South Australia, using data from 1800 CATI interviews and over 60 face-to-face in-depth interviews conducted with disadvantaged groups. Employing the framework of social exclusion in the multivariate statistical analysis, the project adds to our understanding of the relationships between economic and social exclusion, climate attitudes and self-assessed vulnerability and adaptive capacity of disadvantaged groups. The results show that the level of social exclusion can mostly explain increased perception of vulnerability and lower adaptive capacity of some disadvantaged groups. However, some groups display increased vulnerability that cannot be explained through social exclusion or climate awareness. There is also some evidence that having multiple disadvantages may increase the perceptions of vulnerability and difficulty of adaptation that cannot be explained by the level of social exclusion. The results of statistical analysis are complemented with life-stories of disadvantaged households and discussed from policy perspective.

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BRIDGING THE GAP BETWEEN CLIMATE SCIENCE AND DECISION MAKING TO INCREASE ADAPTIVE CAPACITY

Emma Austin

Abstract:
There is a fundamental gap between what climate science can currently provide and what information is needed and useful to end users. This disconnect acts as a barrier to effective climate change adaptation and inhibits decision makers in their adaptation planning. Research to date has identified several causes of the gap: 1) uncertainty in scientific information; 2) ineffective communication and translation of climate information; 3) lack of agreement on key terminology; 4) challenges associated with interdisciplinary research; and 5) the influence of non- climatic factors such as social, financial and political. In addition, the available information is often not in the format or does not have the correct level of detail required by end users. Findings from surveys and workshops conducted as part of this research support the literature that states that end users must also consider climate information to be salient, credible and legitimate. The aim of this postgraduate research is to increase the adaptive capacity of decision makers by developing a method of assessment that will allow them to quantify how useful a given piece of climate information is to their decision making. Assessing climate information prior to engaging in the decision making process will contribute towards conserving resources and will ultimately lead to more successful climate change adaptation.

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PSYCHOLOGICAL ADAPTATION: THE INFLUENCE OF PERCEPTIONS OF RISK AND ADAPTIVE CAPACITY WITHIN A HIGH RISK COMMUNITY

Amanda Tunbridge and Claudia Baldwin

Abstract:
Climate change adaptation research is mainly concerned with biophysical impacts focusing on assessing system vulnerability to climate change and adaptation options, such as avoid, retreat, accommodate or protect and defend strategies for the built environment. Although these options can be assessed through economic cost-benefit analysis and through technological, financial, social and institutional constraints, the cognitive constraints of these options are largely under-researched.

Uncertainties relating to the scale and scope of impacts and a lack of prior experience associated with projected changes in climate may contribute to psychological distress. The perception of risk and the perceived adaptive capacity of an individual, incorporated within a social construction of risk, can influence behavioral responses and provide a powerful motivator to respond. However, little is understood about the psychological factors that contribute to adaptive capacity.

This research will use an innovative visualisation technology (GroupMap) in a participatory group setting within a canal estate community, to document residents' perceptions of risk to climate change and their perceived adaptive capacities. This research aims to progress understanding of the psychological dimensions of adaptation through a case study using a socio-cognitive model of adaptation and adaptive capacity, focusing on building a social construction of risk and development of attainable adaptation options for the community.

Tom FITZGERALD
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DEFINING ACCEPTABLE RISK IN A CHANGING COASTAL ZONE

Tom Fitzgerald

Abstract:
In times where normal conditions are a changing notion, coastal communities must adjust. At the exposed fringes of the Australian continent the level of the sea is rising - resulting in king tides pushing further inland backing up stormwater drains, submerging jetties and causing erosion at the back of the beach. Tropical cyclones may even be pushing further south due to warmer waters. Risks are increasing.

We now understand the climate to be increasingly dynamic as it gains more energy. This changing climate will remain the case until a new 'normal' is established and the earth's warming potential is realised. Climate extremes are likely to be experienced in new ways and in new places than previously – potentially becoming more damaging or catastrophic.

For decision-makers this means that basing decisions for the outlook of the future on the experiences of the past is unlikely to lead to good coastal management decisions. So how are good coastal management decisions made? Are there some key values or principles common to such decisions?

Risk based approaches to decision-making are designed to deal with uncertainty, and are presently being advocated by government agencies and professional institutions here in Australia (NCCOE, 2012). But the real decision-makers in a democracy are the community, and it is they that decide what risk to take. Is a 1:100 year storm or flood level still a relevant benchmark? Is it more important to preserve the public beach or private property? What is an acceptable risk at the coast, and to whom?

This paper will assess technical coastal management guidelines in Australia and interrogate them for how they assess, define and communicate risk. The extent of collaboration or consultation mandated with stakeholders will be identified and representative case studies chosen to illustrate successes and failures.

NCCOE 2012. Climate Change Adaptation Guidelines in Coastal Management and Planning. *In:* COX, R., LORD, D., MILLER, B., NIELSEN, P., TOWNSEND, M. & WEBB, T. (eds.) *Engineers Australia National Committee on Coastal and Ocean Engineering.* Crow's Nest: Engineers Media

Alianne RANCE
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IMPLEMENTING TOOLS TO INCREASE ADAPTIVE CAPACITY IN THE COMMUNITY AND NATURAL RESOURCE MANAGEMENT SECTORS

Alianne Rance

Abstract:
In Australia, much of public sector climate change adaptation efforts have focused on developing adaptation strategies and plans in governmental organisations and their agencies, in particular at the local government level. Despite this seemingly favourable policy context, most government-funded agencies and service providers working directly on community welfare issues have not been able to engage as systematically in climate change adaptation. If, to what extent, and how government-funded community service organisations and primary health care agencies are adapting to climate change, and what enables or hinders their adaptation, are not well understood.

This paper presents preliminary findings from a research project currently underway in the state of Victoria, Australia, which explores, among other inquiries, the needs, organisational capacities and institutional contexts for adaptation among community service organisations and primary care partnerships. The results are based on a sector-wide context and needs analysis conducted in late 2012 that used soft systems methodologies to examine social and institutional learning processes for adaptation. A mix of qualitative research methods was used to produce rich 'stories' about how climate variability and change affect government-funded organisations and the services they provide, and to better understand which factors influence their ability to respond to climatic events and prepare themselves for a future in a rapidly changing climatic, socio-economic and institutional contexts. The paper raises critical issues about specific challenges that 'frontline' community welfare organisations face in the context of climate change adaptation.

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STUDENTS, SHAKES AND SILT – THE STUDENT VOLUNTEER ARMY, SOCIAL MEDIA AND ITS IMPACT ON LOCAL AND CENTRAL GOVERNMENT

Gina Scandrett

Abstract:
The Student Volunteer Army was a spontaneous volunteer group, born in the aftermath of the first Christchurch Earthquake in September 2010. Redeployed repeatedly in the subsequent aftershocks, this is an example of one of the first groups to be born in the age of Social Media. The impact this group has had on the rebuild of Christchurch has been immense, including financial, governance, psychological and physical implications. This presentation will cover the beginning of the Student Volunteer Army, what some of its key achievement were and some of the major lessons learnt. It will then move on to look at the ongoing impact of the Canterbury Earthquakes throughout New Zealand, specifically in the field of Emergency Management and Local Government.

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STUDENTS AND AFTERSHOCKS - THE ONGOING IMPACTS OF THE CANTERBURY EARTHQUAKES ON LOCAL INFRASTRUCTURE AND 'BUSINESS AS NORMAL'

Erin Jackson

Abstract:
Two years on from the February Earthquake, there are an incredible mix of perspectives to be gained from Christchurch and its surrounding areas. There are both old and new challenges that are facing the city, especially as it moves from "demolition" phase to "rebuild and recovery" in 2013. Forming a large component of this is the University of Canterbury, and its extraordinary student-body; a group that contributed richly following the major events. While questions surrounding remediation and insurance feature prominently in conversation, there are other big questions that need to be addressed urgently. These include the ongoing and future impacts to infrastructure, to communities and how we rebuild the city better than it was before – none of which come with simple answers!

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COMPLEX UNBOUNDED PROBLEMS AND EMERGING THREATS IN THE 21ST CENTURY

Peter Weiske

Abstract:
This abstract and research primer focuses upon the history, present shape and future possibilities of 'Complex Unbounded Problems' (CUPs) or major disruptive events of natural, political, economic, technological or military provenance. This is a nascent but rapidly advancing area of activity in both research and policy, but is scattered across disciplines, professional domains, and jurisdictions.

CUP research takes into account the emergent characteristics of threat elements which exceed routine surveillance and strategic/tactical response capabilities.

As a new element of the over arching theory of Exceedance and Disruption – the Science of Surprise – the CUP inquiry draws together a number of threat/hazard management analogues.

Recent year long fieldwork conducted at the University of Oxford; the Stimson Centre for Global Security (Washington D.C.); the University of California, Berkeley, The INSS – Tel Aviv, Joint Operations Command – IDF/US Marine Corps and US National Guard; University of the Aegean and other leading agencies has supported the investigation currently underway from a CUP position.