climateadaptation2013

knowledge + partnerships

25-27 June 2013

Hilton Hotel, Sydney

Program

NCCARF
National
Climate Change Adaptation
Research Facility

We gratefully acknowledge the considerable time and effort invested by many individuals and organisations in planning for and running this Conference.

Special thanks go to:

The scientific program committee

- Sarah Boulter
- Chris Lee
- Jean Palutikof
- David Rissik
- Your Registration Desk (YRD)

The media + communications team:

- Michelle Baker
- Brooke Billett
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- Rachel Merrick
- Cameron Moor
- Ann Penny

Conference host

The National Climate Change Adaptation Research Facility hosted by Griffith University is an initiative of, and funded by, the Australian Government, with additional funding from Griffith University, the Queensland Government, Macquarie University, the Queensland University of Technology, James Cook University, The University of Newcastle, Murdoch University, University of Southern Queensland, and University of the Sunshine Coast.

The role of the National Climate Change Adaptation Research Facility is to lead the research community in a national interdisciplinary effort to generate the information needed by decision makers in government and in vulnerable sectors and communities to manage the risks of climate change impacts.

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Contents

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James Cook University

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James Cook University
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University of the Sunshine Coast
Murdoch University

Welcome to the 2013 national adaptation conference

Climate Adaptation knowledge + partnerships

We are delighted to welcome approximately 600 participants to this event.

This 2013 Conference will showcase the growing body of climate change adaptation knowledge in Australia and internationally, how this knowledge is being used by communities, governments and industry to adapt to the impacts of climate change, the contribution of adaptation science to planning and policy making across Australia, and how robust adaptation decisions can be made in the face of uncertainty.

Climate already has a significant impact on our lives and livelihoods, particularly through extreme events such as storms, cyclones, floods and droughts. Climate change, brought about by increasing greenhouse gas emissions, will result in even greater impacts through warmer temperatures, rising sea levels and more intense floods, droughts, and bushfires. While change is inevitable, there is little to be gained by getting caught up in doom and gloom scenarios of the future. Instead, we must proactively plan for and adapt to change, in order to minimize the negative impacts and take advantages of any opportunities that arise. This is a challenge for decision-making at all levels.

Recognition of this challenge led to the formation of the National Climate Change Adaptation Research Facility and the CSIRO Climate Adaptation Flagship approximately 4 years ago. Since then, these initiatives have worked to progress climate adaptation research and knowledge transfer in Australia in partnership with the communities, governments and industries that have the responsibility to adapt Australia successfully to climate change. Building on the success of the NCCARF/CSIRO 2010 International Climate Change Adaptation Conference, the 2012 National Adaptation Conference provides an ideal platform to highlight Australia's growing and significant contribution towards global understanding of climate change impacts and opportunities and options to adapt to these impacts. With an exciting program of over 270 presenters, focused plenary and panel sessions, together with side meetings, and social functions, we are sure that the Conference will provide a golden opportunity for participants to discuss the latest developments in adaptation research, and to share information, practical experiences and contacts.

Professor Jean Palutikof
Director, NCCARF

Conference host
About NCCARF

NCCARF
National
Climate Change Adaptation
Research Facility

All publications can be accessed at:
www.nccarf.edu.au

About The National Climate Change Adaptation Research Facility

The National Climate Change Adaptation Research Facility (NCCARF) was established in 2008 to lead the Australian research community in a national inter-disciplinary effort to generate the information needed by decision-makers in government, and in vulnerable sectors and communities, to manage the risks of climate change impacts.

NCCARF has established a national research agenda in nine key sectors together with an overarching program of synthesis and integrative research. NCCARF has funded projects at over 30 universities, 61 commonwealth, state and local government bodies and 25 private institutions to deliver over 140 projects. This investment has totaled $28 million. NCCARF has established and coordinates eight National Adaptation Research Networks, hosted by Australian Universities, with over 5000 members across Australia.

NCCARF has made a substantial effort to engage with practitioners to understand their research needs, build capacity, promote research partnerships and improve their access to information to support climate adaptation. The establishment of a Business Portal, a Local Government Climate Adaptation Portal, and the Forum for NCCARF Interaction with State and Territory governments, are examples of these activities.

NCCARF has been a strong driver of international efforts to share information on adaptation and played the lead role in hosting and organizing the 2010 International Climate Change Adaptation Conference, the first in what has now become a regular series of international adaptation conferences.

Based at Griffith University's Gold Coast campus, NCCARF is a partnership between the Australian Government Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education, Griffith University, the Queensland Government, James Cook University, Macquarie University, Murdoch University, Queensland University of Technology, The University of Newcastle, University of Southern Queensland, and the University of the Sunshine Coast.

Australian Government
Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education

Griffith University
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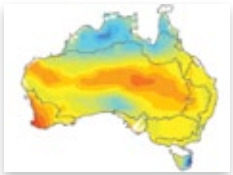
CSIRO Climate Adaptation Flagship

The CSIRO Climate Adaptation Flagship is a multidisciplinary research partnership with the objective to equip policy makers, industries and communities with practical and effective adaptation options to climate change and variability and in doing so create, in the national interest, $3 billion per annum in net benefits by 2030.

Our research improves understanding of both the climate system and our human responses to change for a range of adaptation focal areas including:

Pathways to Adaptation



Sustainable Cities and Coasts

Managing Species and Natural Ecosystems

Adaptive Primary Industries, Enterprises and Communities

Scientific understanding of climate change and variability, of its impacts and of adaptation responses, can support Australia to formulate and manage an effective response.

Conference sponsors

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Our vision

is to support the community to protect, strengthen and enjoy a healthy, productive environment and economy.

Our focus

is to ensure that the people of NSW have a healthy environment and are supported to access, protect and enjoy their natural and cultural heritage.

www.environment.nsw.gov.au

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Photos clockwise from top: Stuart Cohen/OEH, City of Sydney, D. Finnegan/OEH, James Horan Destination NSW, Christopher J Woods/OEH.

Conference
supporters

Nature Climate Change
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Exhibitors

Booth 1 **Great Barrier Reef Marine Park Authority and University of Tasmania (Shared booth)**
Booth 2 **VCCCAR**
Booth 3 **National Climate Change Adaptation Research Facility**
Booth 4 **CSIRO**
Booth 5 **Marine Adaptation Network**
Booth 6 **James Cook University**

General
conference information

Registration desk

The registration desk is located in the Level 3 Foyer, Hilton Hotel, and will be attended during the following times:

Monday 24 June:	4.00pm – 6.00pm
Tuesday 25 June:	7.30am – 5.35pm
Wednesday 26 June:	8.00am – 5.35pm
Thursday 27 June:	8.00am – 3.00pm

Name badges

Delegates will be required to wear name badges at all times during the conference. This will allow access to all plenary, panel and parallel sessions as well as the welcome reception and poster sessions. Tickets have been issued in your registration pack for the conference dinner.

Meal breaks

Morning and afternoon tea, and lunch will be served on Level 3 in the Exhibition area.
We have arranged for special meals to be prepared for those delegates who have pre-registered their special dietary requirements. Special meals will be available from the designated buffet stations during meal breaks. Please see a member of the banquet staff for assistance.

All social activities are included in the full registration fee

Welcome reception Monday 24th June 5.00pm – 7.00pm. Zeta Bar, Hilton Hotel.
The welcome reception provides a great opportunity to register for the conference and network with colleagues.

Poster mixer Tuesday 25th June 5.30pm – 7.00pm. Level 3 in the Exhibition area.
The session is a chance to meet poster presenters and discuss their research over a drink.

Poster and pre-dinner bar Wednesday 26th June 6.15pm – 7.15pm. Level 3 in the Exhibition area.
Discuss posters with their authors and gather for drinks before the conference dinner.

Conference dinner Wednesday 26th June 7.15pm – 10.30pm. Grand Ballroom, Hilton Hotel.
Enjoy an interesting program and dinner conversation with other delegates.
You must have pre-registered for the dinner in order to attend.

Poster breakfast Thursday 27th June 8.00am – 9.00am. Level 3 in the Exhibition area.
A light stand-up breakfast (tea, coffee and pastries) will be available.

Internet

Limited conference WiFi is available. For an access code, please ask at the registration desk.
As WiFi data is limited, please disconnect when not in use.

Meeting room

A small meeting room will be available for delegates wishing to book a room for a private meeting at the conference. Please see staff at the registration desk for availability of the room.

Think Space

This space was created for the conference students to meet with one another and engage with conference delegates. Think Space is located on Level 4.

Join the conversation

Stay in contact with the conference happenings and discussions.
Event App: **www.eventmobi.com/adapt2013**
Twitter: **#adapt2013**

Event App

Get the most out of the conference with the official App.
The program, speakers, abstracts, delegate profiles, polls plus your own personalised schedule in the palm of your hand - leave the program booklet behind!
Most importantly, it's a step towards more sustainable conference events.

Compatible with:

- laptop / computer
- iPad
- Mobile phone on internet network
- Smartphone (iPhone, Android)

Features:

- Browse program and speakers, and filter by category
- Build your own custom schedule "My Program"
- Create a profile to connect with other delegates and facilitate networking
- Take notes within a session page, and send to your email account
- Notices/alerts, such as changes to the program
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- Works offline; updates become available when network is connected
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Access the app online at: **www.eventmobi.com/adapt2013**
Bookmark the link; smartphone users will receive a prompt to add the app to their homescreen.
For assistance, please contact our App Support Officer at the Registration Desk.

Conference Abstracts

All the presenters' abstracts can be found in the full online program or by downloading the full program booklet at **www.nccarf.edu.au/conference2013**. They can also be found in the conference app **www.eventmobi.com/adapt2013**

Poster Prizes

We will be awarding four prizes at the conference.

Speedtalks and poster sessions provide an opportunity for researchers to present key findings and policy relevant information from their work. They present a challenge in conveying complex information in a succinct and easily understandable way. In an increasingly time limited world, the ability to present information in this way is highly valued and is an important skill to display. Awarding speedtalk and poster prizes rewards efforts made in communicating effectively and shows the value we hold for people involved in these sessions.

Speedtalks and posters will be judged by an expert panel of researchers, science communicators and policy makers and the winners announced at the closing plenary session of the conference. They will be judged on clarity, applicability, design and communication.

A prize will be awarded to the winner in each of the following categories:

- Best poster
- Best student poster
- Best speedtalk
- Best student speedtalk

Side meetings
and special events

All side meetings and special events take place at the conference venue: Hilton Hotel, Sydney

Monday 24th June

Postgraduate Student Workshop

Adaptation research provides a number of unique challenges to researchers. For post-graduate students at the beginning of their career, these challenges can seem daunting. Research in any field is challenging but one filled with uncertainty has additional pressures. This pre-conference workshop will be a fun, interactive day in which around 55 post-graduate students will have the opportunity to present their work, learn from others, meet some of the conference international plenary speakers and do some deep thinking about adaptation. The day will include learning sessions with leaders in their area, networking sessions, and facilitated panel discussions. This workshop, chaired by Mark Stafford Smith, Climate Adaptation Flagship, CSIRO, will give students a head start and help them get the most out of the Climate Adaptation Conference.

Time: 10.30am – 4.30pm

Anyone can register for this event online at **www.nccarf.edu.au/conference2013/side-events/**

Protecting Health – in a changing climate

We can see climate change has already started. Heatwaves. Floods. Storms. Fires & Droughts. These are all very much part of Australia's history, but no longer are they rare events, they are coming in salvos. Their health impacts are complex and lingering. Preparedness is the key to health protection. So we must assume that these extreme events will continue to increase in frequency and severity and prepare. This workshop will recap on recent learnings, current health sector capacity, and explore our ability to respond and recover from future, more extreme events.

This interactive event will include expert panellists, and opportunities share your expertise and learn from others. We will examine Federal, State and Local Government responsibilities to and capabilities, roles of the acute, and community health sectors, public health and researchers in boosting community resilience. The aim of the workshop is canvass the climate threats, review our response strengths and weaknesses in order to map out the next steps.

Time: 1.00pm – 4.30pm. Open to all delegates

Anyone can register for this event online at **www.nccarf.edu.au/conference2013/side-events/**

Book launch

"Climate Adaptation Futures" is based on key contributions from the First International Conference on Climate Change Adaptation, held on the Gold Coast, Australia, in June 2010. It includes contributions from many of the leading thinkers and practitioners in adaptation today. The book will be launched at the Welcome Reception and copies can be purchased at a special delegate discount rate by collecting a flyer at the reception.

Time: 5.30pm. Welcome Reception.

Wednesday 26th June

Biodiversity Report Card launch

We invite people to attend the launch of the first Terrestrial Report Card, which has been produced by the NCCARF Terrestrial Biodiversity Network and supported by core NCCARF. The Terrestrial Report Card aims to summarise current information on known and expected impacts of climate change on terrestrial and freshwater biodiversity in Australia. The information presented in the Report Card is aimed at a wide audience, and we hope it will be easily understood by all interested parties, from managers, policy makers and scientists, to the general public. The Report Card also recommends adaptation options, and highlights current knowledge gaps in the field of climate change adaptation research.

Up-to-date references used in the Report Card are available as an online resource at:

https://terrestrialclimatechange.org.au/references

By attending this event you can obtain the printed version of this report card or you can view this document online at: **https://terrestrialclimatechange.org.au**

Time: 12.45pm – 1.00pm. Open to all delegates

2013 Climate Adaptation Champion Awards

The annual Climate Adaptation Champion Awards highlight the achievements of people taking concrete steps to change behaviour, techniques, businesses practices and policies to adapt to climate variability and change.

The awards will be announced at the conference dinner, and are a chance to share the stories of Australian people, businesses and organisations who are champions of practical and innovative ways to adapt to climate change. NCCARF Climate Adaptation Champions will be chosen in 4 categories: Individual, Community, Business and Government. They champion climate adaptation in one or more fields:

1. **Adaptation for prosperity –** In a shop or on the farm, from your location to your services, what do you do differently in business to account for a changing climate?
2. **Communicating for climate adaptation –** What have you done to connect people with the knowledge they need to understand adaptation and find solutions for climate challenges?
3. **Assisting the natural environment –** How do you make habitats more climate resilient or care for wildlife that will be affected by climate change?
4. **Climate adapted city life –** What are you doing in the city to help prepare for climate impacts such as more extremely hot days or stresses on the water supply?

Time: 8.00pm. Conference Dinner. Open to all delegates

Thursday 27th June

Business Breakfast – Climate Adaptation: Building the Business Case

Climate change is decades away – so why worry now? But climate change presents businesses with a broad array of risks and opportunities – some impacts are already being felt now.

As the increase of extreme events manifests the world is witnessing how changes in climate (and associated responses) in one location can send ripples through businesses throughout the world. Other impacts won't be felt for decades but demand planning and investment decisions now.

In this breakfast briefing for business our speakers will explore smart business responses to a changing climate focusing on:

- investment – emerging questions and responses from lenders
- effective approaches applied by infrastructure intensive organisations to increase resilience to climatic hazards
- who inherits the risk in delivery models such as public-private-partnerships?
- integrating climate risk into design and maintenance regimes

Time: 7.00am – 8.45am.

Tickets for this event available through **www.nccarf.edu.au/conference2013/side-events/**

Tickets are $40 for delgates; $50 for non-delegates.

NRM planning meeting

The Australian government through its NRM Climate Change Impacts and Adaptation Research Grants Program is looking to improve the capacity of regional NRM organisations to plan for climate change. This investment aims to improve the quality and accessibility of regionally relevant information on climate change impacts and potential adaptation responses. It will provide regional NRM organisations with access to expert advice on how to apply climate change information in their planning.

The program commenced in early 2013. This lunchtime meeting is an opportunity to hear from some of the research teams about the approach they are taking and early findings from engagement with NRM organisations.

Time: 12.40pm – 1.30pm. Open to all delegates

Convenor: Alison McMorrow

Pre-Conference Events

Monday 24th June

10.00am – 10.30am	Morning Tea		
10.30am – 12.00pm			**Postgraduate student workshop** **Level 4, Function Rooms 1-3** Welcome and workshop opening – Jean Palutikof • Integrated research implications, lessons learnt from NCCARF, next generation of adaptation research • Key developments in climate change adaptation research in Australia and internationally – Mark Stafford-Smith • Journey through an adaptation career – David Dodman • Poster activity and networking session
12.00pm – 1.00pm	Lunch **Exhibition Space**		
1.00pm – 2.30pm	Marine pre-conference meeting (Closed meeting)	Health Network workshop	Postgraduate student workshop (cont) • Short presentations from students voted to have the "best" posters by their peers • Round table discussion and feedback from presentations • Learning session 1
2.30pm – 3.00pm	Afternoon Tea **Exhibition Space**		
3.00pm – 4.30pm	Marine pre-conference meeting (cont)	Health Network workshop (cont)	Postgraduate student workshop (cont) • Learning session 1 • Climate adaptation challenges
4.30pm – 5.00pm	Climate Adaptation 2013 Conference – Registration desk open		**Level 3 Foyer, Hilton Hotel**
5.00pm – 7:00pm	Climate Adaptation 2013 Welcome Reception **Zeta Bar, Hilton Hotel** **Welcome** **Jean Palutikof** (NCCARF) **Ian Carruthers** (Chair NCCARF Board) Book launch: Climate Adaptation Futures		

Conference Program

Day 1 – Tuesday 25th June Morning

8.00am – 8.45am	Arrival tea, coffee and croissants **Exhibition Space**
8.45am – 10.00am	**Opening Plenary** **Room:** Grand Ballroom **Chair: Sarah Boulter** (NCCARF) **Welcome to country** **Lord Mayor Clover Moore** (Sydney City Council) – Official Opening and Welcome **Hon. Greg Combet AM MP** (Minister Department of Climate Change and Energy Efficiency) – (video) **Jean Palutikof** (NCCARF) – NCCARF's Achievements **Voice of Youth**
10.00am – 10.30am	Morning Tea **Exhibition Space**
10.30am – 12.00pm	**Plenary 2 – Information for Adaptation** **Room:** Grand Ballroom **Chair: Ian Carruthers** (NCCARF) **Geoff Love** (World Meteorological Organisation) – *Taking climate research to operations: Responding to the meningitis challenge in Africa* **Tom Wilbanks** (Oak Ridge National Laboratory) – *Commitments to share knowledge: Toward adaptation partnerships that cross boundaries* **Karl Braganza** (Australian Bureau of Meteorology) – *Certainty and uncertainty in climate change science*
12.00pm – 1.00pm	Lunch **Exhibition Space**

Day 1 – Tuesday 25th June Afternoon

1.00pm – 2.30pm	**Panel Session 1** **Room:** Level 3 Grand Ballroom A **The Parliament of Climate Change Adaptation : science, policy, people** **(Chair: Kate Auty)** Dave Griggs, Ann Henderson-Sellers, John Connor, Alex McMillan, Ben Waters, Veena Sahajwalla	**Panel Session 2** **Room:** Level 3 Grand Ballroom B **From vulnerability to adaptation** **(Chair: Brent Jacobs)** Katie Vines, Biance Lewis, Rohan Hamden, Natasha Hall, Verity Sanders, *Sponsor: NSW Office of Environment and Heritage*	**Panel Session 3** **Room:** Level 4 Function Room 4 **Ecosystems – the slippery slope to slime** **(Chair: Craig James)** Lesley Hughes, Stephen Williams, Max Finlayson, Eve McDonald-Madden	**Panel Session 4** **Room:** Level 4 Function Room 5 **International Perspectives on adaptation action** **(Chair: Jean Palutikof)** Roger Street, Jonathon Overpeck, Jon Barnett		
2.30pm – 3.00pm	Afternoon Tea **Exhibition Space**					
3.00pm – 4.30pm	**Parallel Session 1** **Communities** **Chair:** A Penny **Room:** Level 3 Grand Ballroom A	**Parallel Session 2** **Cities** **Chair:** R Cox **Room:** Level 4 Function Room 1	**Parallel Session 3** **Coasts** **Chair:** D Rissik **Room:** Level 4 Function Room 2	**Parallel Session 4** **Behaviour and beliefs** **Chair:** J Reser **Room:** Level 3 Grand Ballroom B	**Parallel Session 5** **Hydrology, Geomorphology and Water Resources** **Chair:** J Chambers **Room:** Level 4 Function Room 3	**Parallel Session 6** **Climate adaptation and emergency management** **Chair:** J Handmer **Room:** Level 4 Function Room 4	**Parallel Session 7** **Decision making under uncertainty** **Chair:** A Kiem **Room:** Level 4 Function Room 5 **Sponsor:** University of Newcastle's Centre for Water, Climate and Land-use Management (CWCALM)
	Zones of friction and traction: conceptualising the adaptability of Australian households. **Gibson**	Automating adaptation – Using big data and big computation to find the biggest risks and the best pathways. **Mallon**	The risk typology of sea level rise: understanding the problem of houses falling into the sea. **Lorenz**	The Australian public's understanding of climate adaptation: Familiarity, conceptualisations, and reported adaptation actions. **Leviston**	Sydney climate impact profile: Impacts of a changing climate on hydrology and water balance. **Littleboy**	Re-conceptualising community resilience in Australian disaster risk management. **Reis**	Bridging the gap between end user needs and science capability: decision making under uncertainty. **Verdon-Kidd**

3.00pm – 4.30pm continued	Prioritising children and young people's social and emotional wellbeing during and after climate-related extreme events. **White**	Adaptive Syngeries: An institutional analysis of urban resiliency and governance. **Stock**	Coastal urban climate futures in South East Australia: from Wollongong to Lakes Entrance. **Norman**	Are the general public mental models consistent? A numerical assessment. **Richert**	TMImap: an online database for historical impact of climate change on soil moisture and built environment. **Leao**	Secondary, compound and multiple hazards: How a changing climate necessitates an all-hazard, all-agency approach. **Foster**	The need to replace scientific uncertainties with social acceptance of changing risks. **Manning**
	Australia's country towns under climate change to 2050: analysis, case studies and action. **Beer**	Planning for sustainable urban water systems in adapting to a changing climate - a case study in Can Tho City, Vietnam. **Nguyen**	Assessing present and future coastal erosion and inundation impacts for the Sydney region. **Kinsela**	Not just talking to the "Greenies": effects of self-concordance on individual adaptation. **Unsworth**	Predicting rainfall erosivity and hillslope erosion for climate impact assessment in the Sydney region. **Yang**	Network governance and climate change adaptation: collaborative responses to the Queensland floods. **Mann**	Rationalist policy-making for climate change adaptation: a cautionary tale from disaster risk management in Australia. **Tangney**
	Risk priorities and perceptions in two Australian coastal communities: uncovering diversity to inform risk management. **Elrick-Barr**	Transitioning from vulnerability to resilience: integrated adaptation approaches to transforming Melbourne's landscape. **Lynch**	Sea level rise and contaminated sites - more challenges and hard decisions lie ahead. **van der Beeke**	Climate change scepticism and voting behaviour: what causes what? **McCrea**	A world with less water - Adapting to a changing climate in the Riverina. **Sainsbury**	Recovering from natural hazards under a changing climate: lessons from cyclone Yasi. **Serrao-Neumann**	Known unknowns, unknown unknowns, and the design and timing of adaptation responses and interventions. **Harris**
	The social impacts of adaptation to sea-level rise in Lakes Entrance, Victoria. **Graham**	Towards "green" streets - using the typical suburban street to mitigate climate change; a case study from Western Sydney. **Gallagher**	Adapting Between the Flags: enhancing the capacity of surf life saving Australia to cope with climate change. **Sherker**	Have we got farmers' attitudes to climate change wrong? Experiences from Victoria and WA. **Noonan**	Robust optimal design of urban water resource systems in the face of uncertain climate change. **Kuczera**	Impact of the 2010-11 floods and the factors that inhibit and enable household adaptation strategies. **Bird**	The challenges of climate change adaptation for judges: developing new methodologies for judicial reasoning in climate change litigation. **Rogers**
	Displaced twice: What has changed for refugee men after the 2011 Queensland floods? **Correa-Velez**	Poverty, inequality and climate change: adapting critical social infrastructure to the impacts. **Hamilton**	The human face of climate change: Adaptation in a vulnerable coastal community context. **Schneider**	Future fit? A comparative assessment of farm resilience in eastern New Zealand dairying. **Cradock-Henry**	The paradox of climate change and adaptive water management. **Hauck**	Natural disasters, insurance and climate change. **McAneney**	Defining acceptable risk in a changing coastal zone. **Fitzgerald**
							Lessons learnt in translating climate data for use by impact scientists and policy makers. **Mitchell**
4.30pm – 4.40pm	Short break						

4.40pm – 5.30pm	**Speedtalk Session 1** **Communities** **Chair:** E Waters **Room:** Level 3 Grand Ballroom A	**Speedtalk Session 2** **Cities and coastal settlements** **Chair:** A Beer **Room:** Level 4 Function Room 1	**Speedtalk Session 3** **Ecosystems** **Chair:** F Stadler **Room:** Level 4 Function Room 2	**Speedtalk Session 4** **Health and psychological aspects adaptation** **Chair:** M Waschka **Room:** Level 3 Grand Ballroom B	**Speedtalk Session 5** **Science, hydrology, geomorphology and water resources** **Chair:** R Kay **Room:** Level 4 Function Room 3	**Speedtalk Session 6** **Emergency management** **Chair:** J Whittaker **Room:** Level 4 Function Room 4	**Speedtalk Session 7** **Communication** **Chair:** C Lee **Room:** Level 4 Function Room 5
	Walking on country with spirits: Enhancing adaptive capacity through Aboriginal research tourism. **Wallace**	Climate impacts– analysing infrastructure interconnectivity and flow-on effects for Australian cities. **Whittaker**	Using climate and biodiversity indicators to identify macroscale refugia for terrestrial biodiversity across Australia. **Van Der Wal**	Psychological theories of environmentally responsible behaviour. **Simpkins**	The scientific and economic origins of the gradualist adaptation narrative and how to move beyond it. **Jones**	Rapid assessment model for reconstruction following extreme weather events in Victorian parks. **Mumford**	Getting smarter: a technological approach to sharing adaptation knowledge. **Capon**
	Indigenous intercultural governance of adaptation. **Dwyer**	Service life of housing structures in a changing climate. **Nguyen**	Climate change pressures on native vegetation in the Sydney Basin. **Logan**	Changing behaviour in a changing climate: Can psychology help save the Great Barrier Reef? **Goldberg**	Applying Bayesian inference to analyse extreme events with limited historical observations. **Keighly**	Understanding the adaptive capacity of Small-to-Medium Enterprises (SMEs) to climate change and variability. **Murta**	Bridging the gap between end-user needs and climate science capability: do we need a 'knowledge broker' and if so what should it look like? **Kiem**
	Living with nature – Ceremony is adaptation. **Roos**	Climate change vulnerability assessment of selected council buildings. **Keele**	State-transition analysis of flood dependent vegetation communities. **Bino**	Perceived coastal distress in tsunami affected Andaman Islands of India and psychological/ behavioural resilience to climate change. **Mudaliar**	Integrating landslide risk assessment into city spatial planning in improvement of climate change resilience, case study Tarakan City, East Kalimantan Province, Indonesia. **Setiawan**	Reconceptualising hospital facility resilience to extreme weather events using a panarchy model. **Mirti-Chand**	'Sufficient science and deficient publics'?: South Australian publics' understanding of climate change risk and adaptation - implications for communication and engagement initiatives. **Hanson-Easey**
	Climate adaptation practices: Achieving spatial climate and environmental justice in Australian communities. **Hillier**	Considerations of climate risk in new coastal developments. **Rance**	Buffering our aquatic habitats from climate change: using riparian vegetation to reduce impacts on stream biodiversity and ecosystem function. **Thompson**	Climate change anxiety in rural Tasmania. **Materia**	Statistical modeling of daily temperature extremes for climate change impact studies at the urban catchment scales around south western Quebec. **Mahtab**	Disaster response and adaptive capacity in the Pacific. **Gero**	Effectively communicating climate science to executive and political decision makers and achieving better informed decisions. **Losee**

4.40pm – 5.30pm continued	Farmers' awareness and response to climate variability and change in North-West Cambodia. **Touch**	Developing resilient green roofs for Adelaide. **Razzaghmanesh**	Double Jeopardy: will climate change and disease affect the distribution of *Philoria loveridgei*? **Lopez**	How will the health of remote Australian communities be affected by climate change? **Race**	Modelling sub-daily rainfalls for flood estimation. **Cu Thi**	Patterns of climate change and coping strategies of small farmers in mountainous area of Kaghan Valley, Northwest Pakistan. **Safdar**	"Climate in the Boardroom": Reporting on the NCCARF funded synthesis research project. **Johnston**
	Community conceptions of vulnerability – from discourse to policy. **Collins**	The impacts of climate change on infrastructure and ecosystems. **McKinnon**	Conserving freshwater biodiversity. Joining downscaled climate projections, hydrology, ecosystem values, and management frameworks: successes and obstacles. **Barmuta**	Food safety practices and knowledge during heat waves: A survey of Salmonella and Campylobacter cases. **Milazzo**	Response of soil organic carbon and other soil properties to predicted climate change over the Sydney region. **Gray**	Impact of the 2011 flood event on a Brisbane industrial area. **Baldwin**	Reactions to different precision formats in climate change communication. **Chai**
	Community-based climate change adaptation in action: EWB Australia and Nepal Water for Health. **Binks**	Simulation on wind environment at pedestrian level in a street canyon at Docklands. **Han**	Effects of climate change on river macroinvertebrate. **Bush**	A health and social services perspective on climate change related violence. **Walker**	Application of SWAT model for climate change impact analysis on Yass River flow: a sub-catchment of Murrumbidgee River. **Saha**	Anticipating and adapting emergency management to changes in the Victorian landscape. **Foster**	Using the Köppen climate classification scheme to examine potential climate change in South East Australia. **Morrissey**
	Integrated assessment and decision support tool of community-based vulnerability and adaptation to storm surges in three coastal areas in Bangladesh. **Younus**	Sensitivity of estuaries to climate related changes in catchment hydrology. **Dela-Cruz**	Climate adaptation in the Abrolhos Islands fishing community: a cascade of environment, management, economic and social changes. **Shaw**			Framing resilience: practitioners' view of its meaning and usefulness in disaster risk management practice. **Aldunce**	Cloud Nasara* Pacific Climate Animation Project: communicating climate science in the Pacific region. **Rischbieth**
	Climate adaptation and sustainable livelihoods: An analysis of selected subsistence communities of West Timor, Indonesia. **Tjoe**	Would somebody please listen – Applying insights from behavioural economics and social psychology to coastal adaptation. **Mutafoglu**					
5.30pm – 7.00pm	Poster presentations and mixer **Exhibition Space**						

Day 2 – Wednesday 26th June morning

8.00am	Registration desk opens			
8.30am – 10.00am	**Plenary session 3 – Challenges and barriers** **Room:** Grand Ballroom **Chair: James Duggie** (Department of Environment and Conservation, WA) **Michael Nolan** (AECOM) and **Peter Brown** (San Francisco Municipal Transportation Agency) – *Lessons Learnt from San Francisco – implementing adaptation in the bay for critical infrastructure* **Stephen Jeffery** (Suncorp Insurance) – *Calculated Risk: Insurance as an adaptive force* **Major General Richard Wilson** (Queensland Reconstruction Authority) – *Rebuilding More Resilient Communities and Infrastructure*			
10.00am – 10.30am	Morning Tea **Exhibition Space**			
10.30am – 12.00pm	**Panel Session 5** **Room:** Level 3 Grand Ballroom A **Towards a culture of adaptation: building practical capacity and scaling up good adaptation practice** **(Chair: Bruce Thom)** Elissa Waters, Kushla Munro, Rohan Hamden, Steve Wilson	**Panel Session 6** **Room:** Level 3 Grand Ballroom B **Marine biodiversity and environmental change: pathways for adaptation** **(Chair: Marc Hockings)** Michael Lockwood, Julie Davidson, Allan Jordan, Lorne Kriwoken *Sponsor: University of Tasmania*	**Panel Session 7** **Room:** Level 4 Function Room 4 **Can pragmatic policy-making cope with transformation?** **(Chair: Neil Lazarow)** Mike Dunlop, Dorean Erhart, David Schlosberg, Bruce Taylor, Mark Stafford-Smith, Karen Hussey	**Panel Session 8** **Room:** Level 4 Function Room 5 **Resourcing adaptation actions: emerging lessons internationally and implications for Australia** **(Chair: Rob Kay)** Maria Tiimon Chi-fang, Habiba Gitay, Simon Bradshaw, David Dodman
12.00pm – 1.00pm	Lunch **Exhibition Space**			
12.15pm – 1.00pm	Launch of the Biodiversity Report Card **Level 3, Grand Ballroom B**			

Day 2 – Wednesday 26th June afternoon

1.00pm – 2.30pm	**Parallel Session 8** **Adaptation and Indigenous Communities** **Chair:** A Penny **Room:** Level 3 Grand Ballroom A	**Parallel Session 9** **Innovation in the built form** **Chair:** R Hamden **Room:** Level 4 Function Room 1 **Sponsor:** Government of South Australia	**Parallel Session 10** **Marine and coastal governance** **Chair:** D Rissik **Room:** Level 4 Function Room 2 **Sponsor:** NCCARF Marine Adaptation Network	**Parallel Session 11** **The role of tools and knowledge in adaptation** **Chair:** C Lee **Room:** Level 3 Grand Ballroom B	**Parallel Session 12** **Climate ready natural resource management** **Chair:** L Rickards **Room:** Level 4 Function Room 3	**Parallel Session 13** **Feeling the heat: Planning for extreme heat** **Chair:** TBC **Room:** Level 4 Function Room 4	**Parallel Session 14** **Linking Science and action** **Chair:** P Smith **Room:** Level 4 Function Room 5 **Sponsor:** NSW Office of Environment and Heritage
	Indigenous leadership for climate change. **Pfitzner**	The urban heat island and temperature-dependence of office building electricity consumption in the Adelaide CBD. **Guan**	Integrating climate change adaptation and coastal management in Australia: Moving from government to adaptive governance. **Bergonia**	Adaptation support strategies for Australia: addressing the gap. **Webb**	Climate change projections to support natural resource management planning. **Clarke**	Current and future heatwave vulnerability in Australian capital cities. **Loughnan**	Eastern Seaboard Climate Hazard Tool - MATCHES. **Coutts-Smith**
	Indigenous voices in climate change adaptation: Building the capacity of the Yorta Yorta community to respond to climate change. **Griggs**	Climate change impact on comfort provision in australian housing. **Saman**	Coastal adaptation to climate change: factors affecting governance, knowledge, the consituency and implementation. **Stocker**	Rural livelihood adaptation in eastern Indonesia: bridging scales and knowledge types through multi-level participatory scenario planning and learning. **Goddard**	Adapted future landscapes - from aspiration to implementation. **Meyer**	Heatwaves in Australia 1788-2010: who, really, is most at risk? **Coates**	Toward future projections of East Coast Lows. **Evans**
	From the Tiwi Islands to Arnhem Land: Climate change risk assessments and adaptation planning in the tropical north. **Prudent-Richard**	Living architecture techniques to reduce building energy consumption and create a better urban micro climate. **Hopkins**	Revisiting resilience and climate change adaptation in the Great Barrier Reef. **Fidelman**	Terra Nova - discovering, sharing and reusing climate change adaptation research data & information. **Mackey**	Fiddling while Rome burns: current approaches to landscape design for biodiversity are not climate ready. **Doerr**	Framework for adapting Australian households to heat waves. **Belusko**	East Coast storm climatology over the past millennium. **Goodwin**

1.00pm – 2.30pm continued	Future change in ancient worlds: The importance of land and sea as cultural identity in Indigenous Australia. **Mason**	Low carbon living communities. **Donaldson**	Community preferences for roles and responsibilities for adaptation to sea level rise. **Waters**	Supporting local climate change adaptation: a participatory assessment tool for secondary cities in Vietnam and Bangladesh. **McEvoy**	Broadacre farm performance in a warming, drying climate. **Kingwell**	Heat Ready? Caring for aged care residents in three Australian states. **Wilson**	Coastal response to extreme East Coast storms over the past 500 years. **Goodwin**
	Climate change adaptation opportunities for peri-urban indigenous communities. **Low Choy**	Discussion	A climate change focused socio-geomorphological typology of Australian estuaries to underpin effective management. **Doblin**	Perceptions of usefulness: supply and demand of future climate change information for adaptation decision-making. A case study of climate scientists. **Dunn**	EverFarm®: Perenniality as an adaptation for dryland farming systems in southern Australia. **Farquharson**	Green Infrastructure and the Urban Heat Island: Is it adaptation, and does it matter if it isn't? **Trundle**	The influence of East Coast Lows on the water security of coastal New South Wales. **Kiem**
	The language of climate change adaptation: Building a framework for adaptation planning in Indigenous communities of Northern Australia. **Leonard**		Discussion	Capacity building adaptation tools: the Climate Adaptation Knowledge Exchange and the Adaptation Marketplace. **Hitt**	Perceptions of climate change adaptation among catchment management authorities: findings from an empirical study in Victoria. **Wallis**	Improved climate-readiness of intensive livestock management through use of a Heat Load Index as an indicator of heat stress. **Wiebe**	Development of a generic framework to determine the economic impact on NSW locations from natural disaster events. **Roche**
2.30pm – 3.00pm	Afternoon Tea **Exhibition Space**						
3.00pm – 4.30pm	**Parallel Session 15** **Case studies of adaptation** **Chair:** R Kay **Room:** Level 3 Grand Ballroom A	**Parallel Session 16** **Infrastructure** **Chair:** J Palutikof **Room:** Level 4 Function Room 1	**Parallel Session 17** **Marine and fisheries: conservation and adaptation** **Chair:** N Holbrook **Room:** Level 4 Function Room 2	**Parallel Session 18** **The role of tools and knowledge in adaptation** **Chair:** C Lee **Room:** Level 3 Grand Ballroom B	**Parallel Session 19** **Climate ready natural resource management** **Chair:** S Barlow **Room:** Level 4 Function Room 3	**Parallel Session 20** **Feeling the Heat: Planning for extreme heat** **Chair:** D Black **Room:** Level 4 Function Room 4	**Parallel Session 21** **Policy and regulation** **Chair:** J Duggie **Room:** Level 4 Function Room 5
	Climate change and health in the South Pacific: Assessing vulnerability and planning health adaptations in Pacific Small Island developing states. **McIver**	The vulnerability of electricity infrastructure due to climate change. **Froome**	eReefs: Responding to a changing climate in the Great Barrier Reef. **Stuart**	Assisting local governments to decide on adaptation actions using the CATLoG Tool (Climate Adaptation decision support Tool for Local Governments). **Henderson-Sellers**	Working out what to put where in the landscape in a climate ready future. **Siebentritt**	Rising heat: actual heat exposures where we live, work and play. **Hanna**	A typology of barriers to adaptation. **Waters**

3.00pm – 4.30pm continued	Health care capacity for disaster response under a changing climate in the Pacific. **Fletcher**	Climate adaptation engineering and risk-based design and management of built infrastructure. **Stewart**	Developing and evaluating an engagement framework: a case study with recreational spearfishers. **Gledhill**	Development of a guide for Councils to identify climate change adaptation actions. **Balston**	Preparing for invasion: a decision support tool to manage future weeds. **Englert Duursma**	Households' perception of climate change (CC) and human health risks: A community perspective. **Haque**	How will the health system adapt to climate change? Strengths, gaps and barriers in the Australian system. **Burton**
	Quantifying user needs for future climate information in the wine-grape sector. **Dunn**	Climate resilient seaports. **Mullett**	Understanding coral range expansions to enhance management strategies. **Mizerek**	Exploring adaptation policy options: contributions of graduate student courses to local adaptation efforts. **Dolan**	Climate change adaptation-mitigation GHG tradeoffs in livestock industry. **Ghahramani**	Older Chinese's perceptions, behaviors and attitudes towards heatwave and health: A comparison between urban and rural areas. **Zhang**	Legal frameworks for biodiversity conservation in a changing climate: can we do better? **McCormack**
	Climate risk and adaptation assessment in city, case study Palembang City, Indonesia. **Ilmiaty**	Local government planning for the future: Adaptable buildings for flooding and sea level rise impacts **Davies**	Assembly processes at biogeographic transition zones in tropical-to-temperate eastern Australia. **Sommer**	Community-based flood adaptation strategies under climate change in Nepal. **Devkota**	Future Farm Landscapes – a new approach for engaging farmers in planning for climate change. **McFarland**	An adaptive thermal comfort study in Sydney homes with air conditioning. **de Dear**	Global lessons for adapting our coastal communities to protect against storm surge inundation. **Harman**
	Migration decision-making process in response to climate change - A case study in Shangnan County of China. **Lei**	To what extent do case studies add robustness and improve consistency of climate risk assessments? **Atkinson**	From fish to dish – future opportunities for Australian fisheries and aquaculture. **Hobday**	Learning to adapt to climate change in the community welfare sector: preliminary findings from an empirical study in Victoria. **Fuenfgeld**	Opposing trends affecting climate change adaptation in agriculture in New South Wales. **Reid**	Identifying existing sustainable weather and seasonal adaptation strategies in Australia's tropical north. **de Vet**	Property, Power, and Process. The role of property value in climate adaptation. **O'Donnell**
	Climate change indicators for interdisciplinary reporting. **Rawlings**	Climate change adaptation in cities: a synthesis-analysis for Sydney. **Schuster**	Social vulnerability of marine resource users to extreme weather events. **Marshall**	Hypothetical case study to explore decision making under uncertainty for the water resource management sector. **Kiem**	Framing and re-framing drought within agriculture. **Rickards**	From climate change research to policy and practice. **Hansen**	Adaptation Research Synthesis - Lessons for State Government policy anddecision makers. **Nolan**
4.30pm – 4.40pm	Short break						

4.40pm – 5.30pm	**Speedtalk Session 8** **Case Studies** **Chair:** M Washcka **Room:** Level 3 Grand Ballroom A	**Speedtalk Session 9** **Business** **Chair:** S Boulter **Room:** Level 4 Function Room 1	**Speedtalk Session 10** **The role of tools and knowledge in adaptation** **Chair:** A Penny **Room:** Level 4 Function Room 2	**Speedtalk Session 11** **Natural resource management, agriculture and food security** **Chair:** P Hayman **Room:** Level 4 Function Room 3	**Speedtalk Session 12** **Emergency management and heat** **Chair:** D Bird **Room:** Level 4 Function Room 4	**Speedtalk Session 13** **Policy and governance** **Chair:** D McEvoy **Room:** Level 4 Function Room 5
	Adaptation to energy-efficient practices: effects of the greening of community organisations on Australian citizens before and after the carbon pricing scheme. **Fitzgerald**	Engaging the private sector in adaptation. **Prudent-Richard**	Adaptation and innovation - reframing adaptation implementation. **Young**	Exploring the nexus between climate adaptation and mitigation in primary industries. **Ashworth**	Indigenous experiences of Cyclone Tracy. **Haynes**	Is grassroots movement influential enough towards development of climate supportive adaptation and mitigation policy in Australia? **Azam**
	Yorke and Mid North Regional Alliance planning for coordinated climate change action. **Hall**	Adaptation and risk culture in private vs listed companies. **Johnston**	Staying afloat with CRATER: a decision making tool for mine management under extreme climatic events. **Hodgkinson**	Energy tree crops as transformative adaptation to climate change in dryland agriculture of southern Australia. **Farquharson**	Small towns don't get climate change: attitudes to climate change and hazard resilience. **King**	Incorporating climate change impacts and adaptation in environmental impact assessment: Opportunities and challenges. **Prudent-Richard**
	Tackling transferability: Lessons from applying climate change assessment frameworks in the Upper Murrumbidgee and Golburn-Broken catchments. **ElSawah**	A mining company's journey to adaptation: The FMG Extreme Weather Event Risk Assessment project. **Loechel**	Climate Smart Seaports: online decision support tool for climate resilient seaports. **Mullett**	Wheat stubble, soil carbon and atmospheric CO_2: To incorporate or not to incorporate, that is the question. **Liu**	Stakeholder participation key for building resilience: positive and dangerous implications of divergent frames. **Aldunce**	Pathways for adaptive and integrated disaster resilience. **Djalante**
	Coping strategies of rural populations: How best to approach climate risk management in the Sahel zone? **Galiné**	Likely versus actual flooding; evidence from the 2011 flood on the Brisbane property market. **Doupe**	Adaptation planning with various levels of government in Victoria: knowledge, tools and principles. **Larsen**	Climate change and fisheries in Ghana: Trends and adaptive strategies by small-scale fishers. **Freduah**	Incorporating climate change adaptation into South Australian Emergency Risk Management programs. **Balston**	The Adaptation Plan of King Canute: Engaging communities on sea level rise. **Waters**

4.40pm – 5.30pm continued	Future of climate change adaptation in the coastal region of Bangladesh: Current strategies and governance challenges. **Azam**	Incentivising corporate action on climate change - time for tax breaks, direct support and shared approaches? **Livingstone**	Insurance industry tools and knowledge development for a more resilient built environment. **Davies**	Understanding the responses of taro and cassava to climate change - implications for Pacific food security. **Crimp**	High resolution fire weather projections for the Sydney Climate Impact Profile. **Clarke**	Cross-border governance to support climate change adaptation in Australia – prospects and pitfalls. **Steele**
	Stepping out of the way - Driving effective reform by empowering local leaders. **Burton**		Open software for restricted data: a climate/suicide health impact assessment example. **Hanigan**	Grassroots practices, urban food and climate adaption. **Bond**	Plans for an Australian Climate Extremes Service (ACES). **Walland**	Development of a framework for Local Government adaptation strategies. **Zaman**
			Effective adaptation to climate change for coastal property development in Victoria. **Rance**		Optimal educational building retrofit strategy for thermal comfort and energy reduction. **Ledo**	Is our local government ready to adapt climate change? **Ahsan**
			Reconceptualising "adaptation pathways" for informing responses to complex adaptation problems. **Wise**		Collective behavioral change: The fourth pillar of climate change mitigation. **Khalilpour**	The emergence of local climate change policy: international diffusion or local development? **Setiadi**
					Hot weather and the health of working people – what protects them now? **McInnes**	How shared values and beliefs shape climate change responses: cultural biases, policy preferences, and behaviour. **Price**
6.15pm – 7.15pm	Poster Presentations and pre-dinner bar **Exhibition Space**					
7.15pm – 10.30pm	**Conference Dinner** Announcement of Climate Adaptation Champions **Grand Ballroom**					

Day 3 – Thursday 27th June Morning

7.00am – 8.30am	Breakfast Briefing: The Business Case for Adaptation **Level 4 Function Room 1**						
8.00am – 9.00am	Breakfast poster session **Exhibition Space**						
9.00am – 10.30am	**Plenary 4 Where do people fit in to adaptation?** **Room:** Grand Ballroom **Chair: Mark Stafford Smith** **David Dodman** (International Institute for Environment and Development) – *Resilient People and Resilient Cities: bringing household coping and urban adaptation together* **Stewart Cohen** (University of British Columbia) – *Where do people fit into adaptation?* **Melissa Nursey-Bray** (University of Adelaide) – *Country – Climate – Change: The Arabana* **Habiba Gitay** (World Bank) – *Adaptation from the perspective of multilateral development banks and private sector investment*						
10.30am – 11.00am	Morning Tea **Exhibition Space**						
11.00am – 12.30pm	**Parallel Session 22** **Climate change adaptation - Good Practice** **Chair:** N Reis **Room:** Level 3 Grand Ballroom A **Sponsor:** NCCARF Adaptation Good Practice Workshop	**Parallel Session 23** **The business and economics of adaptation** **Chair:** M Gibbs **Room:** Level 4 Function Room 1	**Parallel Session 24** **Adaptation in action for the Great Barrier Reef** **Chair:** C Schauble **Room:** Level 4 Function Room 2 **Sponsor:** Great Barrier Reef Marine Park Authority	**Parallel Session 25** **Communication** **Chair:** M Waschka **Room:** Level 3 Grand Ballroom B	**Parallel Session 26** **Ecosystems** **Chair:** V Doer **Room:** Level 4 Function Room 3	**Parallel Session 27** **Human health** **Chair:** L Hanna **Room:** Level 4 Function Room 4	**Parallel Session 28** **Governance** **Chair:** J Duggie **Room:** Level 4 Function Room 5
	Leading change on climate change - A decade of work. **McCorkell**	Price regulation and climate risk – a case study of the energy distribution sector. **Whittaker**	Expecting adaptation: the who, when, where and what of managing the Great Barrier Reef in a climate stressed world. **Schauble**	Modelling the future, remembering the future, visiting the future and playing with the future; four complementary ways to communicate climate and adaptation options. **Hayman**	Managing change: biodiversity conservation in a climate change world. **Dunlop**	The activation of policy and institutional responses to heat waves: a socio-cultural analysis. **Miller**	Australia has three and a half levels of government! **Hunt**
	A coastal hazard adaptation study for Townsville: Pilot study. **Harper**	Coming ready or not: Managing climate risks to Australia's infrastructure. **Watts & Whittaker**	Climate Change, World Heritage and Adaptive Management: incorporating climate change into the Strategic Assessment of the Great Barrier Reef. **McCook**	Climate change on film: pass the popcorn, choc top and catastrophe. **Thomsen**	Optimal habitat protection and restoration for climate change adaptation of Australia's threatened species. **Kujala**	Low income households and adaptation to extreme heat. **Beaty**	Public or private responsibility for adaptation? Legal and regulatory considerations. **Rochford**

11.00am – 12.30pm continued	Taking the next steps towards building a city resilient to climate change. **McLachlan**	Corporate climate change legal risk and opportunity management – the road to corporate resilience. **Baker-Jones**	Adaptive management planning for turtles on Raine Island changed the way we think. **Hicks**	Natural disasters in the Australian press: implications for climate change policy. **Middle**	Adapting to climate change: a risk assessment and decision framework for managing groundwater dependent ecosystems with declining water levels. **Chambers**	Baseline survey on risk reduction and adaptive measures in the context of climate change impact on health sector in Bangladesh. **Kabir**	(In)Consideration of climate change and human health in local government planting and weed management policy. **Jaggard**
	Finding the adaptation path. **Armstrong**	Valuing adaptation under rapid change: anticipatory adjustments, maladaptation and transformation - project wrap. **Jones**	Why understanding people helps improve adaptive capacity over time: A long term social and economic monitoring program in the Great Barrier Reef region. **Marshall**	Adapting communication conventions: communicating climate change adaptation to Aboriginal peoples. **Palmer**	Expert elicitation as a tool for identifying climate impacts, monitoring targets, and adaptation options. **Wilcox**	A SWISH way to assess the health impacts of climate change. **Bennett**	Institutional challenges for implementing an ecosystem-based approach for climate change adaptation in the Murray-Darling Basin. **Lukasiewicz**
	A strategic State-wide adaptation strategy that identified and delivered a decision support tool for Local Governments to assess climate change impacts on infrastructure. **Gray**	An inconvenient curve – Moving beyond the mean in adaptation economics. **Keating**	A resilience decision framework for the Great Barrier Reef World Heritage Area. **Beeden**	Youth-centred participatory video as a tool for climate change adaptation and disaster risk reduction. **Haynes**	Identifying climate change refugia for freshwater biodiversity across Australia. **VanDerWal**	A health and social services perspective on climate change and disability. **Walker**	Australian case studies of investment in adaptation: shifting from decision support to co-evolving multi-scale social systems. **Gorddard**
		The contributions of microfinance organisations to reducing vulnerability to climate change. **Nuruzzaman**	Changing science needs for different management paradigms on a protection - restoration spectrum. **Pears**	Adaptation research communication to influence real world decisions. **Coulter**	Prioritization tools for evaluating adaptation options for seabirds and marine mammals. **Hobday**	Impact of climate variability on Plasmodium vivax and *Plasmodium falciparum* malaria in the high risk area of Yunnan Province, China. **Yu**	A Comparative Study on the Decision Making Process of the Coastal Climate Adaptation of Bangladesh. **Sultana**
12.30pm – 1.30pm	Lunch **Exhibition Space**						
12.40pm – 1.30pm	NRM Planning meeting **Level 3, Grand Ballroom B**						

Day 3 – Thursday 27th June Afternoon

1.30pm – 3.00pm	**Parallel Session 29** **Case studies – regional** **Chair:** R Hamden **Room:** Level 3 Grand Ballroom A	**Parallel Session 30** **The business and economics of adaptation** **Chair:** I Carruthers **Room:** Level 4 Function Room 1	**Parallel Session 31** **Conservation planning for change in the Great Barrier Reef** **Chair:** B Pressey **Room:** Level 4 Function Room 2 **Sponsor:** Great Barrier Reef Marine Park Authority	**Parallel Session 32** **Communication** **Chair:** L Coulter **Room:** Level 3 Grand Ballroom B	**Parallel Session 33** **Ecosystems** **Chair:** S Capon **Room:** Level 4 Function Room 3	**Parallel Session 34** **Planning and monitoring** **Chair:** J Palutikof **Room:** Level 4 Function Room 4	**Parallel Session 35** **Policy and regulation** **Chair:** M Stafford Smith **Room:** Level 4 Function Room 5
	Alternative futures for climate change adaptation of coastal settlements and communities. **Morley**	Adaptor of last resort?: An economic perspective on the Government's role in adaptation. **Dobes**	Governance dimensions of key Great Barrier Reef issues under climate change – A Whitsunday case study. **Hockings**	Building adaptation capacity through narratives. **Young**	Conservation planning for the 22nd Century. **Anderson**	Adaptation planning and action for nine sectors in Tasmania. **McDonald**	Principles for good adaptation governance: a more robust adaptation practice. **Webb**
	Strengthening community resilience to extreme weather events using trans-dimensional, multi-hazard Self Assessment. **Scott**	Costs and coasts: Economic, equitable and affordable adaptations to protect coastal settlements against storm surge. **Fletcher**	Water quality changes in the Great Barrier Reef given more intense storms and floods associated with climate change. **Brodie**	Improving communication about climate change adaptation between mining professionals. **Mason**	Maximising colonial waterbirds breeding events, using identified ecological thresholds and environmental flow management. **Bino**	No adaptation without legislation: natural hazard constraints to land use planning. **King**	Barriers to sea level rise adaptation: Asset anchoring. **Gibbs**
	Climate change adaptation and the Royal Australian Navy. **Brown**	Will primary producers transform their industry in response to climate change? **Hayman**	Spatial management for climate-related patchy disturbances in the Great Barrier Reef. **Pressey**	Why should we take notice of you? Climate change science in complex community decision making. **McLean**	Climate change and Australian birds - adaptation for the next half century. **VanDerWal**	A typology of spatial planning instruments for climate change adaptation. **Macintosh**	An overview of Western Australian climate change adaptation initiatives and some insights from experience. **Duggie**
	Working at the pointy end: Local Government and climate change. **Martin**	Assessing climate change vulnerability and resilience in a commercial property portfolio. **Johnson**	Prioritization of management actions for conservation of sea turtles in north Queensland under climate change. **Fuentes**	Seasonal forecasting in the Pacific: combining traditional knowledge with statistical and dynamical methods to aid adaptation. **Chambers, Waiwai**	Predicting water quality and ecological responses to a changing climate. **Dyer**	Rockhampton 2050: defining current and future climate hazard for planning consideration. **Moore**	Scaling-up, scaling-down, and scaling-out: Local planning strategies for sea-level rise in NSW, Australia. **Taylor**

1.30pm – 3.00pm continued	One regional collaborative governance structure is unlocking doors and leading the way to transformational change. **Poole**	The productivity trajectories and components of broadacre farms adapting to a warming, drying climate. **Islam**	Cumulative impacts from local, regional and global-scale stressors on Great Barrier Reef marine ecosystems. **Anthony**	Out of the frying pan into the fire - doing climate change adaptation with an authoritarian and neo-patrimonial government. **Frewer**	Building the climate resilience (and resistance) of arid zone aquatic ecosystems and freshwater biodiversity. **Davis**	Trade-offs in adaptation planning. **Foerster**	State Government agencies supporting community based adaptation planning in South Australia. **Klos**
	Indigenous population movement in south east Australia during a 20th century drought event. **Rose**	Using climatic variability and regional influences to improve risk assessment – a mine and quarry application. **Losee**	Cumulative impacts of human activities on the Great Barrier Reef coast. **Greche**	Living with floods: key lessons from Australian flood reviews, the Netherlands, China and the USA. **Hussey**	Strategic adaptive management in the Macquarie Marshes - incorporating climate adaptation. **Kingsford**	Exploring current analogues of future climate to evaluate the likely response of sensitive montane birds of the Australian Wet Tropics to a warming world. **Williams**	Enhancing adaptive capacity in South East Queensland. **Smith**
3.00pm – 3.30pm	Afternoon tea **Exhibition Space**						
3.30pm – 5.00pm	**Closing Plenary 5 Where the rubber hits the road** **Room:** Grand Ballroom **Chair: David Rissik** (NCCARF) **Kate Nelson** (East Gippsland Shire) – *Important things we've learnt so far - an East Gippsland Shire Council perspective on Climate Adaptation* **Chris Lee** (NSW Office of Environment and Heritage) – *Building Adaptive Capacity in Government and Local Communities* **Ian Noble** (Global Adaptation Institute) – *The Green Climate Fund: Is that an Elephant in the Room or a Rubber Ducky?* **Discussion** **Voice of Youth** **Conference Wrap-up** **Jean Palutikof** (NCCARF)						

Plenary
Speakers

Tuesday 25th June

Plenary session 1 – NCCARF's achievements

Lord Mayor Clover Moore, Sydney City Council

Welcome from Sydney City Council

Lord Mayor Clover Moore is currently serving her third term as the Lord Mayor of Sydney. Currently, Clover chairs the Central Sydney Planning Committee and Sydney Festival. She also represents Sydney at the C40 Cities Climate Leadership Group, a network of cities established to address global warming.

Sustainable Sydney 2030 is an initiative developed under Clover's leadership to improve the City's environmental, economic, social and cultural sustainability. The 2030 plan particularly focuses on reducing emissions, using alternative energy and diversifying transport for the city. The City also strives under this directive to deliver award-winning facilities, promote design excellence and sustainability, and initiate progressive solutions to complex city social problems.

Clover served as a member of NSW Parliament from March 1988 until September 2012. Initially she served as the member for Bligh and more recently as the member for Sydney. Between 1992 and 1995, she held the balance of power in parliament with fellow independents John Hatton and Peter McDonald. This led to the development of a reform charter that included 4 year fixed terms for MPs, stronger freedom of information provisions, whistleblower legislation, an independent Legal Services Commissioner and the Royal Commission that forced major reform of the NSW Police Service.

The City of Sydney is a diverse region and as an elected representative, Clover advocates equality and progress. Protecting the natural and urban environment are also major priorities, as well as promoting animal welfare.

Hon. Greg Combet AM MP, Minister Department of Climate Change and Energy Efficiency: Minister for Industry and Innovation

Greg Combet comes from a wine making family, growing up at Penfold's Minchinbury cellars in the western suburbs of Sydney. He studied mining engineering at the University of New South Wales, working in the coal industry and later in community organisations. After working in the field of occupational health and safety, he went on to become a union official, at the same time graduating with a Bachelor's degree in Economics from the University of Sydney. He also has a Graduate Diploma in Labour Relations and the Law. He was awarded a Member of the Order of Australia in 2006.

Following the Labor Party's Federal Election win in November 2007, Greg was appointed Parliamentary Secretary for Defence Procurement in the Rudd Labor Government.

In February 2009 he was appointed the Parliamentary Secretary for Climate Change and in June 2009 was appointed Minister for Defence Personnel, Materiel and Science and the Minister Assisting the Minister for Climate Change.

After the 2010 Federal Election, the Gillard Labor Government was formed on 7th September. Greg was promoted to Cabinet in the role of Minister for Climate Change and Energy Efficiency. The Prime Minster made changes to the Ministry on 25th March 2013 announcing that Greg was the Minister for Climate Change, Industry and Innovation.
Greg is a keen student of Australian labour history, a long time fancier of Gouldian finches and has a natural interest in the méthode Champenoise as it is applied to the production of sparkling Shiraz.

Jean Palutikof, National Climate Change Adaptation Research Facility

NCCARF achievements

NCCARF has operated since 2008 to build knowledge and national capacity around adaptation to climate change. Through an investment of $38 million, NCCARF has commissioned a research portfolio of 148 projects to address key challenges in adaptation. Its nine Adaptation Research Networks have built a community of more than 4000 researchers and practitioners in adaptation. These networks have organised early career workshops, given grants for adaptation research projects, and published factsheets, discussion papers and research summaries. NCCARF has worked extensively to ensure the policy relevance of its activities. It has published twelve Policy Guidance Briefs that provide high-level policy advice designed for use by policy makers at Commonwealth and State level. It has distilled the outputs from its research projects into eight reports, one for each state and territory, designed to outline the key climate change impacts for each jurisdiction, and the options available to address the adaptation challenge.

Jean Palutikof is Director of the National Climate Change Adaptation Research Facility at Griffith University. She took up the role in October 2008, having previously managed the production of the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report for Working Group II (Impacts, Adaptation and Vulnerability), while based at the UK Met Office. Prior to joining the Met Office, she was a Professor in the School of Environmental Sciences, and Director of the Climatic Research Unit, at the University of East Anglia, UK, where she worked from 1979 to 2004, and a Lecturer at the Department of Geography, University of Nairobi, Kenya, from 1974 to 1979.

Her research interests focus on climate change impacts, and the application of climatic data to economic and planning issues. She specialises in the study of changes in extreme events and their impacts, especially windstorm. She was a Lead Author for Working Group II of the IPCC Second and Third Assessment Reports. She has authored more than 200 papers, articles and reports on the topic of climate change and climate variability. Her proudest moment to date was attending the ceremony in 2007 at which the IPCC was awarded the Nobel Peace Prize.

Plenary session 2 – Information for adaptation

Geoff Love, World Meteorological Organisation

Taking climate research to operations: Responding to the meningitis challenge in Africa

From time-to-time meningococcal meningitis occurs at epidemic levels across sub-Sahalian Africa, devastating families and communities. Using seven years of health statistics and meteorological data (January 1, 2007 through to December 31, 2010) the relationships between periods of drought, dust storms and the incidence of meningitis in Burkina Faso, Chad, Mali and Niger are explored. From these data it is clear that the incidence of dust storms in the dry season is a necessary, but not sufficient condition for an epidemic. Other factors such as the level of infections in the exposed communities, their living standards and the degree of crowding in housing, and whether there has been significant displacement of populations are all known to be factors that increase the likelihood of meningitis occurrence. From the available data it seems clear that the onset of rain ends the epidemic.

The challenges of building an ongoing, operational climate service that would support those with the resources and ability to put in place reactive vaccination programs and a timely response to a developing epidemic are briefly addressed. It is clear that partnerships, or multi-lateral cooperative arrangements at national, regional and global levels are required, to enable the continuous exchange of health, meteorological and security data and processed information that are required to support the service. An outline of the effort underway, as a part of the Global Framework for Climate Services, to put in place such arrangements is given.

Geoff Love is currently the World Meteorological Organization's Director, Weather and Disaster Risk Reduction Services, based in Geneva, Switzerland. While in Geneva Dr Love was active in the development of the Global Framework for Climate Services. Prior to moving to Geneva Dr Love was the Chief Executive Officer of the Bureau of Meteorology (Director of Meteorology: 2003-2008). He has worked with the Intergovernmental Panel on Climate Change as its Secretary (2001-2003) and as a Bureau Member of the IPCC through the preparation of the Fourth Assessment Report (2003-2008). From 1975 to 2001 Dr Love was employed by the Bureau of Meteorology in a variety of roles including as a research scientist, forecaster and administrator. Dr Love has also been active in the technical programmes of the World Meteorological Organization for over 20 years, serving as the chair of various working groups and as vice president and president of its Commission for Basic Systems. Dr Love has a BSc (Hons) and MSc degrees from La Trobe University, a PhD from Colorado State University, USA (in Atmospheric Sciences), and an MBA from Deakin University.

Tom Wilbanks, Oak Ridge National Laboratory

Commitments to Share Knowledge: Toward Adaptation Partnerships that Cross Boundaries

The topic of the conference recognizes that converting adaptation knowledge into adaptation actions requires partnerships that cross boundaries between scales, institutions, and communities of interest. This presentation will summarize findings about how to develop effective, self-sustaining partnerships across boundaries between communities, based mainly on US studies and experiences over several decades (even if we have not always applied them well!), and it will offer suggestions of approaches that might be incorporated in Australia's adaptation strategies.

Tom Wilbanks is a Corporate Research Fellow at the Oak Ridge National Laboratory. He has been active for more than three decades in international and national energy, environmental, and sustainability research and policy analysis, including the international Millennium Ecosystem Assessment, the work of the Intergovernmental Panel on Climate Change (IPCC), for which he shared a part of the Nobel Peace Prize in 2007, and the three US national climate change assessments. In IPCC's Fifth Assessment Report, he is Coordinating Lead Author for the Working Group II chapter on "Climate-resilient Pathways: Adaptation, Mitigation, and Sustainable Development." He has led several reports on climate change impacts, vulnerabilities, and adaptation possibilities for the US National Academy of Sciences, the US Global Change Research Program, and the Department of Energy, emphasizing issues for human settlements and the energy sector, including serving as chair of the NAS/NRC Committee on Human Dimensions of Global Change from 2004 to 2010 and as a member of the NAS/NRC Committee on America's Climate Choices and as chair of the adaptation panel for that study, published in May 2010 as Adapting to the Impacts of Climate Change.

Karl Braganza, Australian Bureau of Meteorology

Certainty and uncertainty in climate change science

Certainty, uncertainty, knowledge and ignorance are key concepts in science. Correctly partitioning what is known from what is not known, with accompanying confidence estimates, is a key component of effectively communicating science for policy.

While the IPCC Fifth Assessment Report goes to some length to provide consistent and understandable confidence estimates for key scientific statements, a divide remains in the comprehension of certainty and uncertainty between scientists and science stakeholders. Arguably, conveying the elements of climate science that are most certain has been hampered by the traditional scientific focus on uncertainty and by the conceptual framework around acceptance of the science more broadly.

In many societal settings, such as law, uncertainty can mean the difference between one paradigm and another, since uncertainty is translated as doubt in regard to an entire conclusion or truth. In science, uncertainty describes where truth is to be expected. More typically even, scientific uncertainty describes an envelope in which the truth is known to, and must, exist. That envelope can be large or small, but is never singular. This is perhaps a subtle, but profoundly different, meaning of uncertainty.

This presentation will cover scientific certainty and uncertainty in observed and projected climate change within the context of communicating science.

Karl Braganza is the manager of the Climate Monitoring Section at the Bureau of Meteorology's Climate and Water Division. This Section is responsible for collecting and analysing climate data for Australia and the region. It provides sector-relevant climate information related to drought, bushfires, extreme events and climate change. Karl has a doctorate in applied mathematics from Monash University, where his research centred on understanding climate variability and change using climate modelling, instrumental observations and palaeo-climate evidence.

Plenary session 3 – Challenges and barriers

Stephen Jeffery, Suncorp Personal Insurance

Calculated Risk: Insurance as an adaptive force

With floods, bushfires, cyclones and earthquakes the summer of 2010-11 seemed more like a surreal Hollywood blockbuster than the Australia and New Zealand we know and love. In Queensland alone, 2010–11 saw Suncorp accept 40,000 catastrophe claims at a cost of just over $1 billion, demonstrating the magnitude of natural disaster risk right in our own backyard. With significantly increasing disaster risks throughout Australia, the question becomes, why aren't we doing more to prevent a natural hazard from becoming a natural disaster? Having returned to the same flood damaged homes 3 times in as many years, Suncorp has decided to take strong stance on disaster mitigation and continues to press the need to invest in disaster mitigation, reduce risks and unlock cheaper insurance premiums.

Stephen Jeffery is an Executive Manager with the Suncorp Group of insurance companies and has more 15 years of industry experience. Starting his career as an actuarial trainee in 1997 Stephen has progressively built an in-depth knowledge of the insurance world through his positions both here in Australia and overseas. In his current position, Stephen is responsible for the Suncorp Group's home insurance portfolio across brands such as AAMI, APIA, GIO, Vero and Suncorp Insurance, and brings a passion for converting numbers into real world action. On weekends you'll find Stephen exploring the mountain bike trails of South East Queensland with his wife and two children.

Michael Nolan, AECOM
and **Peter Brown,** San Francisco Municipal Transportation Agency

Lessons Learnt from San Francisco - implementing adaptation in the bay for critical infrastructure

The climate resilience of cities and their infrastructure is a global challenge. San Francisco and the Bay Area are steadily adapting to the impacts of climate change with over 90 projects completed or underway. The adaptation approaches are being applied at multiple levels from the whole of bay approach to site-specific master plans or developments. The various strategies are interlinked across agencies and implementation is progressing. The presentation will share the lessons learnt from several of the key adaptation projects in the San Francisco Bay area including: SF Public Utilities Commission - Sewer system improvement program; The Adapting to Rising Tides Assessment; San Francisco Municipal Transportation Agency Adaptation Plan – Alameda County vulnerability of transportation assets assessment; Ocean Beach Master Plan; Treasure Island Development Plan; the Pier 70 Waterfront Development; and the United Nations International Strategy for Disaster Reduction - Making Cities Resilient Campaign initiative for resilient investment in San Francisco. The presentation will emphasize the relevant lessons to policy officers, land-use planners, risk managers, asset managers and engineers for water, transport, power and coastal infrastructure. These lessons are valuable for the Australian cities and infrastructure adaptation challenge.

Michael Nolan has led over 100 climate change risk and adaptation projects around the world for global corporations and governments at all levels. He has almost 20 years experience in sustainability and climate change. Michael has represented the Australian Green Infrastructure Council in developing an Australian Standard for Climate Change Adaptation for Settlements and Infrastructure. Michael also led the development of economic analysis for climate adaptation for coastal regions, the water, power and transport sectors in Australia and Asia. He is currently supporting USAID in delivery of its Climate Adaptation Knowledge Management Task Order.

Peter Brown trained as a Geographer and Urban Planner and now manages the San Francisco Municipal Transportation Agency's Climate Mitigation and Adaptation Program as well as the environmental compliance program for the agency. He is also a faculty member in the Environmental Science Department at the University of San Francisco teaching urban climate adaptation and sustainable transportation courses. Peter has done biological conservation work in Costa Rica and helped write the first national environmental policy plan for the nation of El Salvador. He has 15 years of sustainable urban policy and infrastructure experience in cities throughout California. Peter is an avid cyclist and believes that San Francisco can be among the leading world cities in urban adaptation strategies.

Major General Richard Wilson, Queensland Reconstruction Authority

Re-building more resilient communities and infrastructure

In 2011 Queensland was hit hard by unprecedented flooding and tropical cyclones, including the Category 5 Severe Tropical Cyclone Yasi. The enormous consequential damage from these events, right across the state, has been compounded and complicated by further natural disasters in 2012 and 2013. The Chairman of the Queensland Reconstruction Authority (QRA), the organisation set up to drive and coordinate reconstruction, provides details of progress to date and highlights lessons learned as Queenslanders continue their work re-building more resilient communities and infrastructure, better prepared for future natural disasters.

Major General Richard Wilson was an infantryman with extensive practical command experience at all levels from platoon to division. He has served as the Chair of the Queensland Reconstruction Authority since September 2011 and retired from the Army in January 2012. During his 39 years in the military, Major General Wilson held a wide range of staff appointments, mainly in the areas of operations, plans, strategy and intelligence. He also served on exchange with the US Army (1991-1992) and has operational service which includes assignment with the United Nations Transitional Administration in East Timor (July 2001-March 2002). A graduate of the Royal Military College, Duntroon (1977), the Australian Army Command and Staff College (1990) and the United States Army War College (2001), Major General Wilson is a Member of the Australian Institute of Company Directors and has educational qualifications that include a Bachelor of Arts with First Class Honours from the University of New South Wales (1977), a Master of Letters from the University of New England (1983), and a Doctor of Philosophy from the University of New South Wales (1986).

Wednesday 26th June

Plenary session 4 – Where do people fit in to adaptation?

David Dodman, International Institute for Environment and Development

Resilient People and Resilient Cities: bringing household coping and urban adaptation together

How do the actions taken by individuals and households contribute to making cities more resilient? How do the actions taken by city governments help to make individuals and households more resilient? This presentation will examine these questions, and will look at the ways in which people fit into adaptation in urban areas in low- and middle-income countries. Drawing on examples from Asia and Africa (but with relevance for cities elsewhere in the world), it will particularly focus on the practices and experiences of low-income and marginalised groups.

The discussion will be framed by the concept of resilience. Although there are multiple meanings and definitions, this is increasingly recognised as a multidimensional concept that requires agents, institutions and systems to work together to counter shocks and stresses and to achieve broader benefits for urban development. While some responses to climate hazards at the household level might appear only to be 'coping' with threats, others can contribute to community and city-wide improvements that generate benefits for large numbers of people. Similarly, the actions taken by local and municipal governments can act to enhance the ability of individuals and households to adapt. The presentation will examine the potential of existing interventions to achieve transformative urban development, and will point to some of the actions that will be necessary to reduce risk in a variety of challenging urban settings.

David Dodman is a researcher in the Climate Change and Human Settlements Groups at the International Institute for Environment and Development (IIED). His is a geographer with a background in urban environmental management, climate change, and urbanisation. His research interests are primarily adaptation to climate change in low-income urban centres. He recently co-edited Global Change and Caribbean Vulnerability: environment, economy and society at risk and Adapting Cities to Climate Change: understanding and addressing the development challenges.

Stewart Cohen, University of British Columbia

Where do people fit into adaptation?

Public opinion surveys indicate that people are generally aware of projected climate change and its implications for coastal zones, ecosystems and managed resource systems, including food, water and forests. But that doesn't mean that people can act on this knowledge.

Barriers to adaptation may be less about scientific uncertainty and costs of adaptation, and far more about lack of guidance and best practice standards. Increased availability of such guidance, accompanied by mandates from governing bodies of various fields of practice, would enable engineers, planners, resource managers, financial institutions and community organizations to be more proactive in planning for future changes in climate related risks and opportunities.

A key element in the enabling of adaptation is extension services, which offer assistance in knowledge transfer from research communities to practitioners and their clients. Climate services could become a form of extension service, working in tandem with established services in agriculture, forestry and other fields, to facilitate the translation of climate change information into risk assessments. This would provide the foundation for assessments of adaptation options, and for participatory approaches for incorporating adaptation into long term planning and decision making.

Stewart Cohen is senior researcher with the Adaptation and Impacts Research Section of Environment Canada, and an Adjunct Professor with the Department of Forest Resources Management, at the University of British Columbia (UBC) in Vancouver. His research interests are in climate change impacts and adaptation through shared learning between researchers and practitioners, a process sometimes referred to as Participatory Integrated Assessment. Dr. Cohen has been a member of various author teams for national climate change reports in Canada and the United States, and since 1992, has contributed to publications of the Intergovernmental Panel on Climate Change (IPCC), which was awarded the 2007 Nobel Peace Prize. He is a member of the author team for the ongoing IPCC 5th Assessment Report, due to be completed in 2014.

Melissa Nursey-Bray, University of Adelaide

Country – Climate – Change: The Arabana

Indigenous peoples worldwide are going to be affected by climate change, compounding existing inequities and socio-economic vulnerabilities. Adapting to those changes is going to be a major challenge. This presentation reflects on how to respond to these challenges in Australia, by reporting on the outcomes of a NCCARF funded research collaboration between the Arabana people and the University of Adelaide, South Australia. The project focussed on finding out what the predicted climate change impacts are for Arabana people, what adaptive capacity exists to respond to those changes, how the Arabana have experienced and adapted to climate and other environmental change, and how adaptation can occur in response to those changes. Arabana people now have, and intend to implement, a community based adaptation strategy. In working together, we found that scale, time and history are all important drivers in contemporary adaptation. Moreover, embedding social justice and differentiating between vulnerability of people and country is crucial. Adaptation that enhances Indigenous agency, facilitates partnerships and builds connection to country and people in different place and scales is one way forward.

Dr Melissa Nursey-Bray is a Senior Lecturer in Geography, Environment and Population (GEP), University of Adelaide. She is Deputy Director of the Centre for Coastal Research and theme leader for adaptive governance as part of the Asia-Pacific Governance Research Centre. She is also co-theme leader for communities, as part of the National Climate Change Adaptation Research Network for Marine Biodiversity, Chair of the REDMAP Community Advisory Committee, a past Churchill Fellow (2001) and Tyndall Fellow (2009). Melissa has also won a national teaching award for making an outstanding contribution to student learning in the area of critical thinking and environmental sustainability and has just launched a 100% online Graduate Certificate in Climate Change Adaptation.

Melissa's research interest is the examination of how communities or communities of interest become involved in decision making and in this context she has worked primarily in the area of Indigenous resource management, protected area management, and more recently in climate change adaptation. Melissa has over 45 publications in these areas of interest. Her work with Indigenous peoples has included training Indigenous rangers on country, and development of award winning community based management plans. While working at UTAS, Melissa was active in building research in and tools for climate change adaptation for fisheries, the port sectors and local governments. Her current research includes being a researcher within the CSIRO Research Cluster, work with UTAS and the National Fisheries Research Institutes in Cochin, India, on climate change, fisheries and food security and investigation of the role conflict and communities of practice play in adaptation.

Today, she will be talking about Indigenous peoples, adaptation and climate change, and particularly reporting on the results of an NCCARF funded research project which focussed on the development of a community based climate change adaptation framework.

Habiba Gitay, World Bank

Ingredients of effective climate resilient development

In recent years, adaptation to climate change has become an accepted part of development. However, putting it into practice requires translating conceptual knowledge into actions and fully integrating climate risk management into ongoing development agenda, and at scale. Conceptual work tells us that climate resilient development has to be a process involving multiple stakeholders from the outset and using best available climate, impacts and vulnerabilities information for decision making. There is often emphasis on involving champions and using a learning-by-doing approach. So what happens in reality? Early results show that the conceptual framework is useful, but translating the various components into actions on the ground is a challenge, a challenge similar to that of doing effective development. To bring climate issues into the development agenda requires engaging with the full development planning process and bringing in disaster risk management units into the conversation at the outset. It inevitably involves multiple development sectors and a wide range of government and non-government stakeholders. The champions emerge during the process rather than being identifiable at the outset; they are the people in key positions who become convinced for the need for climate resilient development and act as the major "gate openers".

As champions, they need solid analytical evidence to work through the decision-making process in their respective organizations. Access to international sources of funding from the outset is critical and provides a focus on actions that will make a difference. These funds have to be substantive to incentivize the changes in institutional arrangements, securing national in-kind and/or actual budgets needed for multiple sectors and stakeholders working towards a common and sustainable goal of improving resilience of the people, especially the poorest and often the most marginalized. It is a learning-by-doing process for all concerned and it requires sharing knowledge within a country and internationally. These are early results from only a handful of countries, but they provide the ingredients for the challenge of doing effective climate resilient development.

Habiba Gitay is a Senior Environmental Specialist in the Climate Policy and Finance Department of the World Bank. She joined the World Bank in 2007 where she has developed programs for capacity building, seeking innovative ideas for climate resilient development. She also provides technical leadership for integrating climate change into development strategies and plans; country-led work within the Pilot Program for Climate Resilience in Zambia, Samoa and the Pacific region. Prior to joining the World Bank, she was at the Australian National University and an independent consultant for 5 years, working widely with many international organisations on adaptation to climate change, capacity development and science-policy interface. Habiba has been a Coordinating Lead Author for chapters related to ecosystem impacts of climate change and adaptation options in five IPCC reports; lead author and capacity development lead in Millennium Ecosystem Assessment; Vice-Chair of the Scientific and Technical Advisory Panel (STAP) of the Global Environment Facility (GEF). She has a PhD in Ecology from University of Wales.

Thursday 27th June

Plenary session 5 – Where the rubber hits the road

Kate Nelson, East Gippsland Shire

Important things we've learnt so far - an East Gippsland Shire Council perspective on Climate Adaptation

Coastal communities in the Gippsland Lakes region of East Gippsland Shire have been the focus of significant attention and study given their vulnerability to the combined impacts of catchment flooding and coastal climate change. East Gippsland Shire has been working in partnership with a range of agencies to understand and pilot appropriate ways to assist and support our communities to adapt into the future. Although we have only been working on this challenge for a couple of years, we have learnt a few things that may be important to others embarking on processes to work at a community level to undertake adaptation planning.

Kate Nelson has worked in Local Government for over 20 years and is currently the Director Planning and Community at East Gippsland Shire. Kate holds qualifications in Planning, Rural Resource Management, Business Management and Public Policy development. Her professional role is now focused on strategic community development with responsibilities for strategic planning, community and social planning, environmental sustainability (including understanding the impacts to the community resulting from climate change), community programs including libraries, disability access, transport, aged, youth and early years services. Kate also has responsibility for Emergency Management, which is viewed as a key community planning and development function at the Shire.

Christopher Lee, NSW Office of Environment and Heritage

Building Adaptive Capacity in Government and Local Communities

In determining an approach to adaptation policy, NSW has focused on three strategic areas.

1) The development and communication of fine-scale, baseline information on climate change in NSW, as climate change projections are not useful for decision-makers unless they reflect the regional diversity and variation in the NSW climate;

2) Regional vulnerability assessment focused on regional coordination and social resilience, in recognition that the majority of adaptation measures will be implemented at the regional and local level; and

3) Building adaptive capacity, so government (local and state), businesses and the wider community understand the importance of adapting to climate change and can use this information to inform their decisions and manage climate risks.

This presentation will highlight key examples and successes in NSW. It will emphasise the importance of strategic partnerships with the research community and all tiers of government, the collaborative nature of capacity building and the key role leadership can play. It will also pose key questions and outline future directions for Australian adaptation policy and programs.

Christopher Lee has a Bachelor of Arts (Hons) from the University of NSW, specialising in development economics and a Masters in Environmental Management from Macquarie University. He has a broad background having worked at the Reserve Bank, universities in Australia and Singapore, and his own publishing company. Since 2005 he has worked for the NSW Office of Environment and Heritage in its many forms, firstly as an economist in Economic Services and more recently in climate change policy. Chris is currently the Manager of Impacts and leads NSW policy and program development in Climate Change Adaptation. Chris has been working on climate change policy for the past four years. He has led the development of methodologies and implementation of Integrated Regional Vulnerability Assessments in regional NSW, and the ongoing development of an Adaptation Strategy for metropolitan Sydney. He has had a leadership role in the development regional climate projections for NSW and driving end user engagement to deliver locally relevant information. He currently sits as an independent member on the NCCARF Board.

Ian Noble, Global Adaptation Institute

The Green Climate Fund: Is that an Elephant in the Room or a Rubber Ducky?

The Green Climate Fund was established at the UNFCCC meetings in Cancun in December 2010 and core steps have been taken over the past two years to see it operating possibly by next year. The intent is to establish a fund that will promote a 'paradigm shift' towards low emission and climate resilient development pathways in developing countries. The vision for the Fund is ambitious; 'paradigm shifts'; 'transformational change', and $100 billion per year in funding by 2020 that is new and additional to that through existing development sources. Its impact on the adaptation community should be enormous. Yet I hear very little discussion about it. Has no one noticed the elephant in the room, or will the GCF prove to be just a rubber ducky floating in a backwater?

Why are so few of us engaging in this critical design period of the GCF? Do we believe that it is doomed to fail? The funding goal is optimistic but even if only marginally successful adaptation funding could increase by an order of magnitude. The GCF will need to work not with projects of a few million dollars as have dominated the adaptation effort to date, but with programs of hundreds of millions. Possibly most of the money will flow to mitigation efforts: a tragic outcome for both mitigation and adaptation. Maybe it will become inoperable due to the polarized debate between some developing and developed countries. Maybe it will deliver the funds, but we in the adaptation community will not be able to respond effectively.

Ian Noble is Chief Scientist at the Global Adaptation Institute. He recently retired as Lead Climate Change Specialist at the World Bank. Before joining the Bank in 2002 he was Professor of Global Change Research at the Australian National University. An ecologist by training, he held senior roles in the IPCC process and in international cooperative research on climate change as part of the International Geosphere Biosphere Program (IGBP) including chairing the Global Change and Terrestrial Ecosystems (GCTE). In Australia he participated in the public and policy debate over responses to climate change and served as a Commissioner in an inquiry into the future of the Australian forests and forest industries.

Panel
Sessions

Panel Session 1: The parliament of climate change adaptation: science, policy, people

A cross sectoral, multi disciplinary discussion about immediate adaptation actions and Flash Policy.

Chair: Prof Kate Auty (Victoria's Commissioner for Environmental Sustainability)
Panel members:
Dave Griggs (Monash Sustainability Institute and ClimateWorks Australia)
Ann Henderson-Sellers (Macquarie University)
John Connor (The Climate Institute)
Alex McMillan (Economics and Policy PwC Australia)
Ben Waters (Sustainable Business Australia; ecomagination GE Australia and New Zealand)

Panel Session 2: From vulnerability to adaptation

This session will outline the different approaches used and lessons learnt from the experiences in the SA and NSW of working to assist communities to understand their vulnerability and develop actions to address it. It will outline each States' methodology and experience and highlight the practical differences in implementing the processes within their differing contexts.

Chair: Brent Jacobs (Institute for Sustainable Futures University of Technology Sydney)
Panel members:
Katie Vines (NSW Office of Environment and Heritage)
Biance Lewis (NSW Office of Environment and Heritage)
Rohan Hamden (Sustainability and Industry Partnerships, SA Department of Environment, Water and Natural Resources)
Natasha Hall (Yorke and Mid North Regional Alliance)
Verity Sanders (City Of Port Adelaide Enfield)

Panel Session 3: Ecosystems – the slippery slope to slime

Whatever we do for our ecosystems we know that climate change means a fundamental shift in what our ecosystems look like. Arguably it is where aggressive mitigation might be the best adaptation option. In the absence of this, what do we do? If we keep doing what we do now (build resilience, biosecurity, reduce fragmentation) is it enough? Should we be pragmatic and start preparing for trade-offs – determine sacrificial species or ecosystems that we can't save? Is it simply an economic exercise of optimising our investment to get the best diversity bang for our buck? Or are we simply on the slippery-slope to slime with weeds and algae the future of biodiversity.

Chair: Craig James (CSIRO)
Panel members:
Lesley Hughes (Maquarie University)
Steve Williams (James Cook University)
Max Finlayson (Charles Sturt University)
Eve McDonald-Madden (University of Queensland)

Panel Session 4: International perspectives on adaptation action

Effectively managing the collection, distribution and on-ground expenditure of adaptation resources is one a key challenge. Only in the last few years has an international framework for adaptation resourcing been developed. Some important lessons are emerging from the region on how various financing mechanisms are applied through, for example, UN-led systems and aid donors. National governments in the region have responded differently to the challenge, some have created new financing systems, while other are seeking to streamline existing approaches to 'mainstream' the flow of adaptation resources through their national systems to the local and community level. However, the question remains as to what the best options are to effectively resource adaptation activities and how best to design the systems to channel resources to the needs of vulnerable households and communities in developing countries, particularly given capacity constraints. The participants in this session will describe the formal and informal systems for allocating adaptation resources, and will draw lessons from other innovative approaches to generating funds that are used to meet local priorities for development. This discussion is also not confined to overseas, given that Australian communities and local level governance face many of the same adaptation challenges, albeit with a greater opportunity to raise local resources for adaptation.

Chair: Jean Palutikof (NCCARF)
Panel members:
Roger Street (University of Oxford)
Jonathan Overpeck (University of Arizona)
Jon Barnett (University of Melbourne)

Panel Session 5: Towards a culture of adaptation: building practical capacity and scaling up good adaptation practice

Australian Government investment in evidence-based decision making and good governance for climate change adaptation (through organisations like NCCARF, and through programs such as the Coastal Adaptation Decision Pathways (CAPs) projects) has helped to establish strong adaptation leadership and national research capacity.

- How can we build on and extend this leadership and capacity to ensure nation-wide adaptation and response to climate risk?
- What are the public expectations regarding who is responsible for action?
- How can we extend a culture of climate adaptation practice?
- What kind of formal and informal governance arrangements are most effective?
- What can be learnt from innovative examples of climate change adaptation?

Chair: Bruce Thom (University of Sydney)
Panel Members:
Elissa Waters (University of Melbourne)
Kushla Munro (Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education)
Rohan Hamden (Government of South Australia)
Steve Wilson (Hunter & Central Coast Regional Environmental Management Strategy (HCCREMS))

Panel Session 6: Marine biodiversity and environmental change: pathways for adaptation

Sponsor: University of Tasmania

This session addresses challenges for marine biodiversity governance and management in the face of climate change. We report on plausible futures for marine regions in Queensland, NSW and Tasmania. We suggest adaptation pathways for terrestrial and marine governance reform. An open discussion will then be held on how terrestrial and marine governance arrangements could be reconfigured to achieve better marine biodiversity outcomes.

Chair: Marcus Haward (University of Tasmania)
Panel Members:
Michael Lockwood (University of Tasmania)
Julie Davidson (University of Tasmania)
Alan Jordan (University of Tasmania)
Lorne Kriwoken (University of Tasmania)

Panel Session 7: Can pragmatic policy-making cope with transformation?

Large-scale public institutions have been described as 'iron cages' (Weber, 1958), lacking ability to reflect, integrate and improve; and bound to a process of policy evolution through incrementalism and ad hocery. These organisational settings may be unable to achieve the 'major, non-marginal change' (Stern, 2007) that many would argue is required for climate adaptation.

Building on reflections since Panel Session 1 'The Parliament of Climate Change Adaptation: science, policy, people', this panel will consider whether an approach to policy making that relies on the ability of actors to improve knowledge and problem solving capacity over time through enquiry, reflection, deliberation and experimentation can overcome the multiple and often contested evidence bases that seek to influence adaptation planning and policy. Panelists will also explore and compare lessons, evidence bases and approaches from other domains.

Chair: Neil Lazarow (CSIRO)
Panel Members:
Mike Dunlop (CSIRO)
Dorean Erhart (Local Government Association of Queensland)
David Schlosberg (University of Sydney)
Bruce Taylor (CSIRO)
Mark Stafford-Smith (CSIRO)
Karen Hussey (Australian National University)
Delegate (Institute of Public Administration Australia)

Panel Session 8: Resourcing adaptation actions: Emerging lessons internationally and implications for Australia

Effectively managing the collection, distribution and on-ground expenditure of adaptation resources is a key challenge. Only in the last few years has an international framework for adaptation resourcing been developed. Some important lessons are emerging from the region on how various financing mechanisms are applied through, for example, UN-led systems and aid donors. National governments in the region have responded differently to the challenge, some have created new financing systems, while other are seeking to streamline existing approaches to 'mainstream' the flow of adaptation resources through their national systems to the local and community level. However, the question remains as to what the best options are to effectively resource adaptation activities and how best to design the systems to channel resources to the needs of vulnerable households and communities in developing countries, particularly given capacity constraints. The participants in this session will describe the formal and informal systems for allocating adaptation resources, and will draw lessons from other innovative approaches to generating funds that are used to meet local priorities for development. This discussion is also not confined to overseas, given that Australian communities and local level governance face many of the same adaptation challenges, albeit with a greater opportunity to raise local resources for adaptation.

Chair: Robert Kay (Adaptive Futures)
Panel Members:
Maria Tiimon Chi-fang (Edmund Rice Centre Pacific Calling Initiative)
Habiba Gitay (World Bank).
Simon Bradshaw (OXFAM).
David Dodman (International Institute for Environment and Development (IIED)).

Guide to **Parallel** *Sessions*

For the convenience of conference participants, we have organised the parallel and speedtalk sessions into areas of common interest, or 'threads'. In deciding which session to attend, it may help you to follow a thread. But this is only provided as a guide – there is no requirement to stay with a single thread throughout the conference.

Conference threads	Session	When and where
Policy & governance		
Decision making under uncertainty	7	Tues 3.00–4.30pm, Level 4 Function Room 5
Linking science and action	14	Wed 1.00–2.30pm, Level 4 Function Room 5
Policy and regulation	21 35	Wed 3.00–4.30pm, Level 4 Function Room 5 Thurs 1.30–3.00pm, Level 4 Function Room 5
Governance	28	Thurs 11.00–12.30pm, Level 4 Function Room 5
Emergency management & health		
Behaviour and beliefs	4	Tues 3.00–4.30pm, Level 3 Grand Ballroom B
Climate adaptation and emergency management	6	Tues 3.00–4.30pm, Level 4 Function Room 4
Feeling the heat: planning for extreme heat	13 20	Wed 1.00–2.30pm, Level 4 Function Room 4 Wed 3.00–4.30pm, Level 4 Function Room 4
Human health	27	Thurs 11.00–12.30pm, Level 4 Function Room 4
Planning and monitoring	34	Thurs 1.30–3.00pm, Level 4 Function Room 4
Knowledge & communication		
The role of tools and knowledge in adaptation	11 18	Wed 1.00–2.30pm, Level 3 Grand Ballroom B Wed 3.00–4.30pm, Level 3 Grand Ballroom B
Communication	25 32	Thurs 11.00–12.30pm, Level 3 Grand Ballroom B Thurs 1.30–3.00pm, Level 3 Grand Ballroom B
Communities & case studies		
Communities	1	Tues 3.00–4.30pm, Level 3 Grand Ballroom A
Adaptation and Indigenous communities	8	Wed 1.00–2.30pm, Level 3 Grand Ballroom A
Case studies of adaptation	15	Wed 3.00–4.30pm, Level 3 Grand Ballroom A
Climate change adaptation good practice	22	Thurs 11.00–12.30pm, Level 3 Grand Ballroom A
Case studies - Regional	29	Thurs 1.30–3.00pm, Level 3 Grand Ballroom A
Natural resource management		
Hydrology, geomorphology and water resources	5	Tues 3.00–4.30pm, Level 4 Function Room 3
Climate ready natural resource management	12 19	Wed 1.00–2.30pm, Level 4 Function Room 3 Wed 3.00–4.30pm, Level 4 Function Room 3
Ecosystems		
Coasts	3	Tues 3.00–4.30pm, Level 4 Function Room 2
Marine and coastal governance	10	Wed 1.00–2.30pm, Level 4 Function Room 2
Marine and fisheries: conservation and adaptation	17	Wed 3.00–4.30pm, Level 4 Function Room 2
Adaptation in action for the Great Barrier Reef	24	Thurs 11.00–12.30pm, Level 4 Function Room 2
Ecosystems	26 33	Thurs 11.00–12.30pm, Level 4 Function Room 3 Thurs 1.30–3.00pm, Level 4 Function Room 3
Conservation planning for change in the Great Barrier Reef	31	Thurs 1.30–3.00pm, Level 4 Function Room 2
Cities, infrastructure & business		
Cities	2	Tues 3.00–4.30pm, Level 4 Function Room 1
Innovation in the built form	9	Wed 1.00–2.30pm, Level 4 Function Room 1
Infrastructure	16	Wed 3.00–4.30pm, Level 4 Function Room 1
The business and economics of adaptation	23 30	Thurs 11.00–12.30pm, Level 4 Function Room 1 Thurs 1.30–3.00pm, Level 4 Function Room 1

Guide to **Speedtalk** *Sessions*

For the convenience of conference participants, we have organised the parallel and speedtalk sessions into areas of common interest, or 'threads'. In deciding which session to attend, it may help you to follow a thread. But this is only provided as a guide – there is no requirement to stay with a single thread throughout the conference.

Conference threads	Sessions	When and where
Policy & governance		
Policy and governance	13	Wed 4.35–5.35pm, Level 4 Function Room 5
Emergency management & health		
Health and psychological aspects of adaptation	4	Tues 4.35–5.35pm, Level 3 Grand Ballroom B
Emergency management	6	Tues 4.35–5.35pm, Level 4 Function Room 4
Emergency management and heat	12	Wed 4.35–5.35pm, Level 4 Function Room 4
Knowledge & communication		
Communication	7	Tues 4.35–5.35pm, Level 4 Function Room 5
The role of tools and knowledge in adaptation	10	Wed 4.35–5.35pm, Level 3 Grand Ballroom B
Communities & case studies		
Communities	1	Tues 4.35–5.35pm, Level 3 Grand Ballroom A
Case studies	8	Wed 4.35–5.35pm, Level 3 Grand Ballroom A
Natural resource management		
Science, hydrology and water resources	5	Tues 4.35–5.35pm, Level 4 Function Room 3
Natural resource management, agriculture and food security	11	Wed 4.35–5.35pm, Level 4 Function Room 3
Ecosystems		
Ecosystems	3	Tues 4.35–5.35pm, Level 4 Function Room 2
Cities, infrastructure & business		
Cities and coastal environments	2	Tues 4.35–5.35pm, Level 4 Function Room 1
Business	9	Wed 4.35–5.35pm, Level 4 Function Room 1

Poster *Presentations*

Poster #	Title (by conference thread)	
	Policy & governance	
100	Is grassroots movement influential enough towards development of climate supportive adaptation and mitigation policy in Australia?	M Azam
101	Incorporating climate change impacts and adaptation in environmental impact assessment: Opportunities and challenges	G Prudent-Richard
102	The emergence of local climate change policy: international diffusion or local development?	R Setiadi
103	How shared values and beliefs shape climate change responses: cultural biases, policy preferences, and behaviour	J Price
104	Is our local government ready to adapt climate change?	R Ahsan
105	Pathways for adaptive and integrated disaster resilience	R Djalante
106	Cross-border governance to support climate change adaptation in Australia – prospects and pitfalls	W Steele
107	The adaptation plan of King Canute: Engaging communities on sea level rise	S Waters
108	Development of a framework for Local Government adaptation strategies	A Zaman
109	Defining acceptable risk in a changing coastal zone	T FitzGerald
110	Lessons learnt in translating climate data for use by impact scientists and policy makers	P Mitchell
	Emergency management & health	
200	Hot weather and the health of working people - what protects them now?	J McInnes
201	Rapid assessment model for reconstruction following extreme weather events in Victorian parks	J Mumford
202	How will the health of remote Australian communities be affected by climate change?	J Addison
203	Climate change anxiety in rural Tasmania	C Materia
204	Food safety practices and knowledge during heat waves: A survey of Salmonella and Campylobacter cases	A Milazzo
205	A comparative study of sustainable development initiatives in two public health enterprises	J Singleton
206	A health and social services perspective on climate change related violence	R Walker
207	The association between temperature and work-related injuries in South Australia, 2001-2010	J Xiang
208	Collective behavioral change: The fourth pillar of climate change mitigation	R Khalilpour
209	Optimal educational building retrofit strategy for thermal comfort and energy reduction.	L Ledo
210	Plans for an Australian Climate Extremes Service (ACES)	D Walland
211	Framing resilience: practitioners' view of its meaning and usefulness in disaster risk management practice	P Aldunce
212	Stakeholder participation key for building resilience: positive and dangerous implications of divergent frames	P Aldunce
213	Impact of the 2011 flood event on a Brisbane industrial area	C Baldwin
214	Incorporating climate change adaptation into South Australian Emergency Risk Management programs	J Balston
215	Community engagement in DRR and CCA: the need to transform our discourse	K Bosomworth

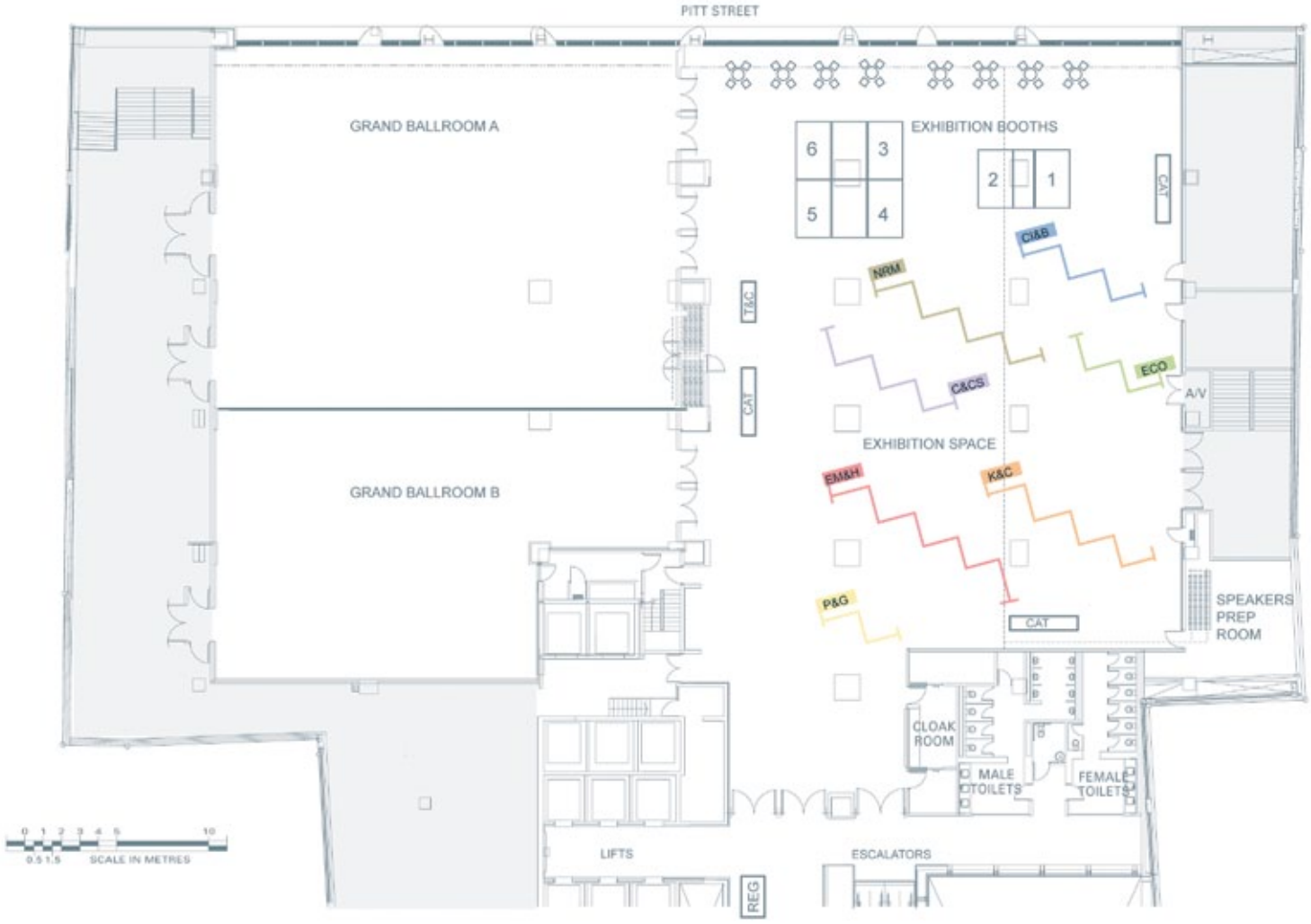
218	Anticipating and adapting emergency management to changes in the Victorian landscape	H Foster
219	Coping strategies of rural populations: How best to approach climate risk management in the Sahel zone?	Y Galiné
220	Disaster response and adaptive capacity in the Pacific	A Gero
221	Indigenous experiences of Cyclone Tracy	K Haynes
222	Small towns don't get Climate Change: attitudes to climate change and hazard resilience	D King
223	Reconceptualising hospital facility resilience to extreme weather events using a panarchy model	A Mirti-Chand
224	Understanding the adaptive capacity of Small-to-Medium Enterprises (SMEs) to climate change and variability	J Murta
225	Patterns of climate change and coping strategies of small farmers in mountainous area of Kaghan Valley, Northwest Pakistan	U Safdar
	Knowledge & communication	
300	Effective adaptation to climate change for coastal property development in Victoria	A Rance
301	Changing behaviour in a changing climate: Can psychology help save the Great Barrier Reef?	J Goldberg
302	Cloud Nasara- Pacific Climate Animation Project: communicating climate science in the Pacific region	U Majewski
303	Perceived coastal distress in tsunami affected Andaman Islands of India and psychological/behavioural resilience to climate change	R Mudaliar
304	Personal encounters with climate change: Their status, significance, and adaptation implications	J Reser
305	Psychological theories of environmentally responsible behaviour	D Simpkins
306	The scientific and economic origins of the gradualist adaptation narrative and how to move beyond it	R Jones
307	Applying Bayesian inference to analyse extreme events with limited historical observations	S Mathew
308	Getting smarter: a technological approach to sharing adaptation knowledge	S Capon
309	Reactions to different precision formats in climate change communication	H Chai
310	'Sufficient science and deficient publics'? : South Australian publics' understanding of climate change risk and adaptation - implications for communication and engagement initiatives	S Hanson-Easey
311	Trusted information sharing networks for adaptation	G Johnston
312	"Climate in the Boardroom": Reporting on the NCCARF funded synthesis research project	G Johnston
313	Bridging the gap between end-user needs and climate science capability: do we need a 'knowledge broker' and if so what should it look like?	A Kiem
314	Effectively communicating climate science to executive and political decision makers and achieving better informed decisions	S Losee
315	Using the Köppen climate classification scheme to examine potential climate change in South East Australia	T Morrissey
316	Climate change and its impacts on planning and adaptation strategies (case study from Punjab and Sindh: Provinces in Pakistan)	A Sadiq
317	"Switch off", part-time environmentalism or effective engagement? The limited impact of the deficit model on people's responses to climate change	R Sapiains
318	Communicating social change towards sustainability: The narrative power of values, social identity and the human act	C Thornton
319	Insurance industry tools and knowledge development for a more resilient built environment	T Davies

320	Reconceptualising "adaptation pathways" for informing responses to complex adaptation problems	R Wise
321	Open software for restricted data: a climate/suicide health impact assessment example	I Hanigan
322	Information systems and knowledge management: tools for adaptation	H Hasan
323	Staying afloat with CRATER: a decision making tool for mine management under extreme climatic events	J Hodgkinson
324	Adaptation planning with various levels of government in Victoria: knowledge, tools and principles	C Larsen
325	Climate change and population vulnernability in Tuvalu	R Missingham
326	Climate Smart Seaports: online decision support tool for climate resilient seaports	J Mullett
327	Adaptation and innovation – reframing adaptation implementation	C Young
	Communities & case studies	
400	Future of climate change adaptation in the coastal region of Bangladesh: Current strategies and governance challenges	M Azam
401	Stepping out of the way - Driving effective reform by empowering local leaders	L Burton
402	Multi Criteria Analysis of adaptive options in the south west costal region of Bangladesh	K Faruque
403	Adaptation to energy-efficient practices: effects of the greening of community organisations on Australian citizens before and after the carbon pricing scheme	G Fitzgerald
404	Yorke and Mid North Regional Alliance planning for coordinated climate change action	N Hall
405	Vulnerability and adaptive capacity of Mediterranean viticultural systems facing climate change (1956-2060): a comparative case study from France (Roussillon) and Australia (McLaren Vale)	A Lereboullet
406	Climate adaptation and sustainable livelihoods: An analysis of selected subsistence communities of West Timor, Indonesia	Y Tjoe
407	Community-based climate change adaptation in action: EWB Australia and Nepal Water for Health	A Binks
408	Community conceptions of vulnerability – from discourse to policy	L Collins
409	Piloting participatory media: A tool of empowerment for climatic-vulnerable communities	U Harris
410	Climate adaptation practices: Achieving spatial climate and environmental justice in Australian communities	J Hillier
411	Ethno-religious diversity and climate change adaptation in Australia	S Toole
412	Living with nature – Ceremony is adaptation	P Roos
413	Climate change adaptation with people participation: A case study of village Panchayat in India	G Sahibi
414	Indigenous intercultural governance of adaptation	L Strelein
415	Farmers' awareness and response to climate variability and change in North-West Cambodia	V Touch
416	Walking on country with spirits: Enhancing adaptive capacity through Aboriginal research tourism	M Wallace

	Natural resource management	
500	Energy tree crops as transformative adaptation to climate change in dryland agriculture of southern Australia	A Abadi
501	The interaction of temperature and light on vegetative and reproductive growth of Vitis vinifera cv. Shiraz	S Abeysinghe
502	Exploring the nexus between climate adaptation and mitigation in primary industries	P Ashworth
503	Climate change and fisheries in Ghana: Trends and adaptive strategies by small-scale fishers	G Freduah
504	Wheat stubble, soil carbon and atmospheric CO2: To incorporate or not to incorporate, that is the question	D Liu
505	Yield, carbon density and climate change impact on Bagras (Eucalyptus deglupta Blume) in smallholder tree-based agroforestry systems in Northern Mindanao, Philippines	R Palma
506	The cost of keeping your options open	M Mills
507	Tackling transferability: Lessons from applying climate change assessment frameworks in the Upper Murrumbidgee and Golburn-Broken catchments	S ElSawah
508	An assessment of the vulnerability of the coastal regions of Bangladesh to the changing climate	S Mahtab
509	Climate change and adaptation: Building resilience in the urban water sector – a case study of Indian city	S Mandal
510	Application of SWAT model for climate change impact analysis on Yass River flow: a sub-catchment of Murrumbidgee River	P Saha
511	Will climate change impacts be any worse than river regulation?	A Watson
512	Linkages between environment and food security in northern Ghana drylands	O Ampadu-Kwakwah
513	Grassroots practices, urban food and climate adaption	M Bond
514	Understanding the responses of taro and cassava to climate change – implications for Pacific food security	S Crimp
515	Supporting decision-making in the sugar cane industry with integrated seasonal climate forecasting	R Stone
516	Modelling sub-daily rainfalls for flood estimation	P Cu Thi
517	Response of soil organic carbon and other soil properties to predicted climate change over the Sydney - Central NSW Region	J Gray
518	Statistical modeling of daily temperature extremes for climate change impact studies at the urban catchment scales around south western Quebec	S Mahtab
519	Links between climate variability, vegetation cover and dust storm frequency in Australia	C Pudmenzky
520	Integrating landslide risk assessment into city spatial planning in improvement of climate change resilience, case study Tarakan City, East Kalimantan Province, Indonesia	B Setiawan
521	Modelling sub-daily rainfalls for flood estimation	P Thi Cu
	Ecosystems	
600	Conserving freshwater biodiversity. Joining downscaled climate projections, hydrology, ecosystem values, and management frameworks: successes and obstacles	L Barmuta
601	State-transition analysis of flood dependent vegetation communities	G Bino
602	Effects of climate change on river macroinvertebrates	A Bush
603	Double Jeopardy: will climate change and disease affect the distribution of Philoria loveridgei?	M Familiar Lopez

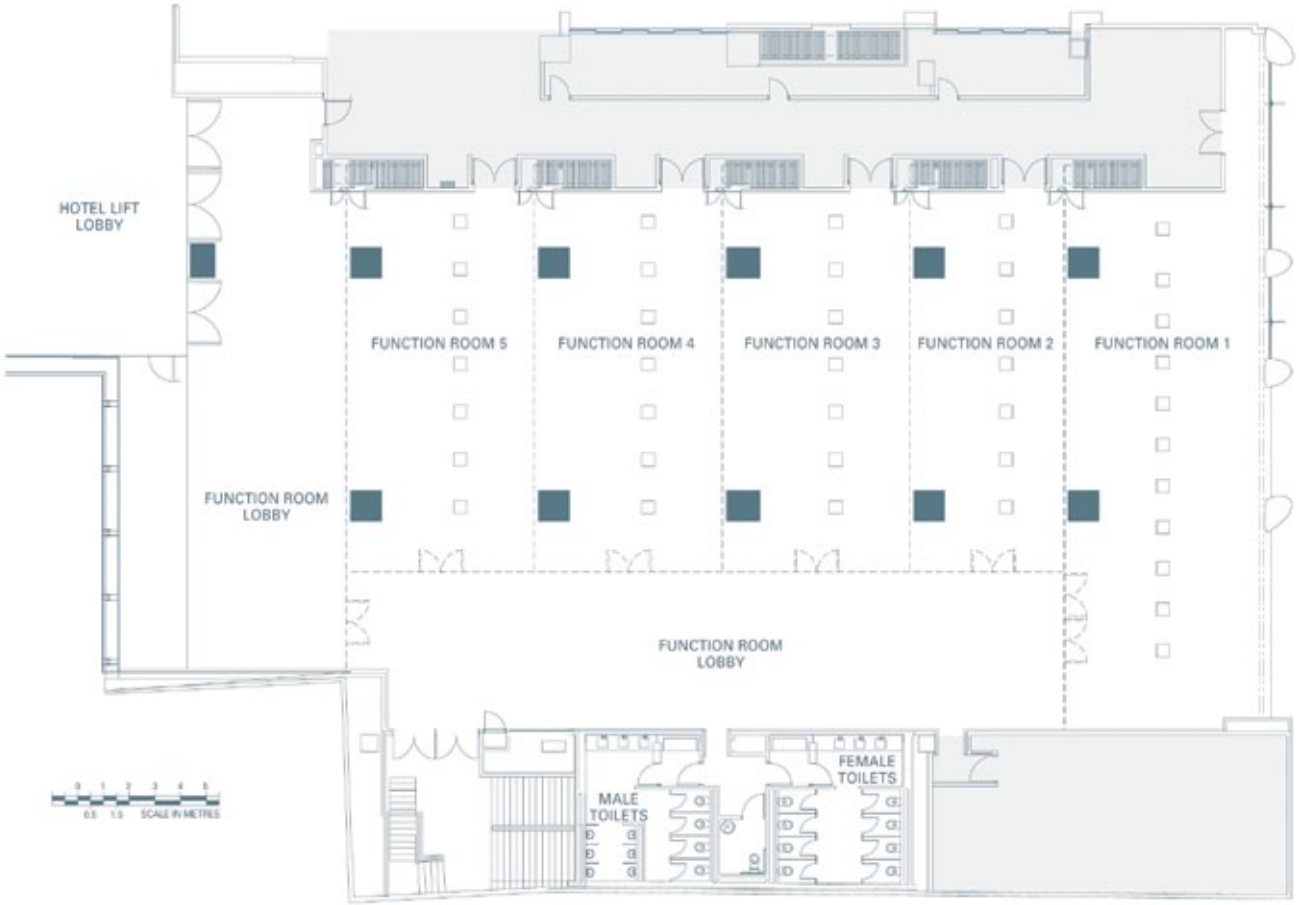
604	Climate change pressures on native vegetation in the Sydney Basin	V Logan
605	Marine population genetics: identifying marine regions of high diversity and low connectivity through meta-analysis	L Pope
606	Using climate and biodiversity indicators to identify macroscale refugia for terrestrial biodiversity across Australia	A Reside
607	The Oasis model, as a sustainable response to global changes, combating desertification and climate change adaptation in Morocco	A Said
608	Integration of species distribution models and metapopulation models to investigate the potential impacts of climate change on the endangered rainforest shrub Triunia robusta (Proteaceae), endemic to the south-east Queensland, Australia	Y Shimizu
609	Buffering our aquatic habitats from climate change: using riparian vegetation to reduce impacts on stream biodiversity and ecosystem function	R Thompson
610	Ecosystem valuation of peri-urban city 'Onkaparianga' in South Australia: an analysis based on valuation scenarios of millennium ecosystem assessment (MEA)	M Younus
611	Unintended consequences of management decisions on the environmental footprint of seafood and implications for climate change adaptation	A Farmery
612	Climate adaptation in the Abrolhos Islands fishing community: a cascade of environment, management, economic and social changes	J Shaw
	Cities, infrastructure & business	
700	Would somebody please listen – Applying insights from behavioural economics and social psychology to coastal adaptation	K Mutafoglu
701	Simulation on wind environment at pedestrian level in a street canyon at Docklands	J Han
702	Climate change vulnerability assessment of selected Council buildings	S Keele
703	Service life of housing structures in a changing climate	M Nguyen
704	Developing resilient green roofs for Adelaide	M Razzaghmanesh
705	Climate change adaptation in Sydney: A synthesis	S Schuster
706	There is more to it than public transport	R Sharples
707	Climate adaptation engineering for extreme events – a Climate Adaptation Flagship cluster	M Stewart
708	Climate impacts– analysing infrastructure interconnectivity and flow-on effects for Australian cities	S Whittaker
709	Sensitivity of estuaries to climate related changes in catchment hydrology	J Dela-Cruz
710	Climate-Smart' development: Does the vulnerability measurement of the coastal people matters?'	M Hossain
711	The impacts of climate change on infrastructure and ecosystems	L McKinnon
712	Likely versus actual flooding; evidence from the 2011 flood on the Brisbane property market	P Doupe
713	Adaptation and risk culture in private vs listed companies	G Johnston
714	Incentivising corporate action on climate change - time for tax breaks, direct support and shared approaches?	J Livingstone
715	A mining company's journey to adaptation: The FMG Extreme Weather Event Risk Assessment project	B Loechel
716	Engaging the private sector in adaptation	G Prudent-Richard
717	What about me? Reporting the results of the effect of emotion on individual climate change adaptation in a workplace setting	K Unsworth
718	Effective adaptation to climate change for coastal property development in Victoria	A Rance

Conference Venue *Level 3*



KEY	
REG	Registration desk
CAT	Catering
T&C	Tea and coffee
Exhibition booths:	
1	Great Barrier Reef Marine Park Authority & University of Tasmania
2	Victorian Centre for Climate Change Adaptation Research (VCCCAR)
3	National Climate Change Adaptation Research Facility (NCCARF)
4	CSIRO
5	NCCARF Adaptation Network Marine Biodiversity and Resources
6	James Cook University
Exhibition space:	
P&G	Policy & governance
EM&H	Emergency management & health
K&C	Knowledge & communication
C&CS	Communities & case studies
NRM	Natural resource management
ECO	Ecosystems
CI&B	Cities, infrastructure & business

Conference Venue *Level 4*



An assessment of the vulnerability of the coastal regions of Bangladesh to the changing climate

Poster

Session: Poster session

[1]Sania Mahtab

[1]McGill University, Montreal, Canada

Extreme climate events are an important concern for a resource constraint country like Bangladesh due to its impacts on society in the form of loss of economic goods, life and property. Reliable estimates of future extreme climate events relating to extreme precipitation and extremes of temperature are a valuable guide for policy makers in determining infrastructure requirements for the 21st century. Using a standard set of annual and seasonal climate extreme indices derived from daily temperature and precipitation data, rate of change of extreme indices and 30- year average values of the indices are analyzed for the baseline period (1961-1990). Extreme indices from PRECIS (Providing REgional Climates for Impacts Studies) output data were validated against those calculated from the observed data of Bangladesh Meteorological Department (BMD), to predict the values of extreme indices in the coming decades. The results show that PRECIS is able to simulate daily temperature related extreme indices with lower percentage bias as compared to the precipitation extreme indices. The temperature extremes are found to occur more at the coastal regions like Cox's Bazar and Teknaf than at the inland stations for both the BMD and PRECIS data. PRECIS predicted that towards the end of coming decades like 2021, 2031 and 2051 Sylhet and Srimangal will remain as the wettest regions of the country with a stark change to come in 2071 and 2091 when Teknaf, Cox's Bazar or Patuakhali will be receiving extreme precipitations.

Statistical modeling of daily temperature extremes for climate change impact studies at the urban catchment scales around south western Quebec

Speedtalk

Session: Speedtalk session 5

Time: 4.55-5.00

[1]Sania Mahtab

[1]McGill University, Montreal, Canada

Global climate change is no longer an illusion, it is a reality and it will pose a myriad of challenges for water resource managers in Canada and the world over likewise. To quantify the change at an urban catchment scale we need to model the parameter that is vital to almost all hydrological processes i.e. temperature. Although many studies suggest that critical temperature sequences are necessary for accuracy and conformity of the predictions, many urban hydrologists measure snowmelt runoff, evapotranspiration, heating/cooling demands etc. using temperature at the daily scale largely because very few meteorological stations around the world record temperatures at sub-daily scales since it is cost intensive. Hence a mathematical tool is crucial to establish the scale transferability of temperature characteristics from daily to sub-daily scales, so that regions where funding is a major constraint could still climate proof themselves as much as possible by knowing the critical cutoff values of significant hydrological processes when and as they occur.

Automating adaptation – Using big data and big computation to find the biggest risks and the best pathways

Oral

Session: Parallel session 2

Time: 3.00-3.15

[1]Karl Mallon

[1]Climate Risk Pty Ltd, Sydney, NSW, Australia

Imagine trying to test, one-by-one, 250,000 utility assets and buildings, spread from Perth to Queensland, for multiple climate change hazards and scenarios, every year for the next century with full probabilistic analysis. This cannot be done by hand but requires a completely new approach based on big data-sets and large-scale high-speed computation.

This paper first covers the axioms of required computational solutions to such problems and then provides examples of computational tools already created based on work with insurers, local governments, utilities thoughout Australia.

The paper will also outline internationally patented computational methods that have been developed in Australia capable of addressing large portfolio risk and adaptation analysis.

Climate change and adaptation: Building resilience in the urban water sector - a case study of Indian city

Poster

Session: Poster session

[1]Shailendra Mandal, [1]Manoj Kumar, [1]Vivekanand Singh

[1]National Institute of Technology Patna, Patna, Bihar, India

This paper looks at associated discourses and actions related to climate adaptation strategies about the water sector in urban areas. Unique to developing country cities is the predominance of informal actors in the water sector. The formal or government sector, which often exclusively manages water access and distribution in developed country cities, is only one among many players in the water sector. In these cities, thousands of people directly access the water source itself from self-supply through private boreholes. In this environment, with already existing pressures on water availability and use, the impacts of climate change on water will be strongly felt by all these water managers. Climate change is already having impacts on temperature and the hydrologic cycle, which complicates planning for water supply and demand and increases water insecurity. For those, particularly the urban poor, who barely meet their water-related needs, climate change is likely to increase high levels of water insecurity.The purpose of this research is to understand the complex dynamics of the water sector, to investigate the needs of urban water managers and ultimately to suggest strategies and tools that can help these managers to meet ever growing needs in the face of climate change and increasing water insecurity. This paper would also discuss about the approach and methodology used in the study, the resilience planning process, climate forecast in and around the city, specific vulnerabilities within the water supply system in city, the resilience interventions to address these vulnerabilities and tools to support overall resilience.

Network governance and climate change adaptation: collaborative responses to the Queensland floods

Oral

Session: Parallel session 6

Time: 3.30-3.45

[1]Susan Kinnear, [1]Kym Pattison, **[1]Julie Mann**, [2]Elizabeth Malone, [3]Victoria Ross, [4]Garry Robins, [1]David Swain

[1]CQ University, Bruce Highway, North Rockhampton, Queensland, Australia, [2]U.S. Pacific Northwest National Laboratory, Maryland, USA, [3]Griffith University, Brisbane, Australia, [4]University of Melbourne, Melbourne, Australia

This research involved case studies of organisations that participated in the response to the major flood disaster in Queensland in 2010/11. Social network analyses and qualitative investigations were conducted on data collected from 63 organisations across the communities of Rockhampton, Emerald and Brisbane. The network analyses examined collaboration and communication patterns; changes in the network structure from routine management to flood operations; similarities and differences between the geographic regions, and whether collaboration was correlated with trust. In both the Brisbane and Central Queensland (CQ) networks, slightly higher levels of collaboration amongst organisations were recorded during flood periods compared with routine operations; and organisations tended to provide, as well as receive, information and/or resources from their collaborators.

Overall, both networks appeared to feature high trust, with only a low level of difficult ties (problematic relationships) being reported. Cultural values analysis was also performed to identify the key values of different organisations. In Brisbane, a high value was placed on shared information systems and resources; shared communication and language; as well as on collaboration and flexibility. In CQ, there was a greater emphasis on local solutions, community wellbeing and longitudinal issues (such as post-disaster supply chains for recovery). The current structure of Local Disaster Management Groups appeared to be heavily influential on broader network participation. This study demonstrated that a network governance approach can provide new ways of understanding the core elements of adaptive capacity, in areas such as enablers and barriers to adaptation, and translating capacity into adaptation.

The need to replace scientific uncertainties with social acceptance of changing risks

Oral

Session: Parallel session 7

Time: 3.15-3.30

[1]Martin Manning

[1]NZ Climate Change Research Institute, Wellington, New Zealand

When atmospheric CO_2 was found increasing much faster than expected it was immediately considered a global experiment because science is focused on observations that reduce uncertainties. But limits to scientific understanding mean that uncertainties are increasing because our environment is becoming unprecedented, as seen by the unexpected Antarctic Ozone Hole and a widening range of future sea level rise estimates[1]. Moreover, some experiments should be avoided.

Development of better approaches to uncertainty in complex systems analysis has allowed fuzzy limits in knowledge to still provide a clear basis for expert judgement and decision making[2] But this leaves the challenge of communication across society in ways that acknowledge uncertainties, while ensuring these avoid becoming barriers to response[3] Even the precautionary principle requires development before becoming effective[4]. Consequently dealing with uncertainty now requires broader social engagement aimed at developing recognition of: changing risks; the need for consensus on response options; and a greater underlying resilience to change[5]

[1] Bamber, J. L. & Aspinall, W. P. An expert judgement assessment of future sea level rise .... Nature Climate Change, online January (2013). [2] Dubois, D. & Guyonnet, D. Risk-informed decision-making .... Intl J General Systems, 40, 145-167 (2011). [3] Berkhout, F. Adaptation to climate change by organizations. Wiley: Climate Change, 3, 91-106 (2012). [4] Sunstein, C.R., Laws of Fear: Beyond the Precautionary Principle, 234 pp., Cambridge University Press, Cambridge, U.K., 2005. [5] Norris, F. H., et al. Community Resilience as a Metaphor, Theory, Set of Capacities, ... American J Community Psychology, 41, 127-150 (2008).

Social vulnerability of marine resource users to extreme weather events

Oral

Session: Parallel session 17

Time: 4.15-4.30

[1]Nadine Marshall, [2]Renae Tobin, [3]Paul Marshall, [3]Margaret Gooch, [4]Alistair Hobday

[1]CSIRO, Townsville, QLD, Australia, [2]Centre for Sustainable Tropical Fisheries and Aquaculture, Townsville, QLD, Australia, [3]Great Barrier Reef Marine Park Authority, Townsville, QLD, Australia, [4]CSIRO, Hobart, TAS, Australia

Knowledge of vulnerability provides the foundation for developing actions that minimise impacts and supports system views that are particularly desirable. We modified a well-established model to assess and describe the vulnerability of the two major industries dependent on the Great Barrier Reef (GBR) to extreme weather events. The modification entailed distinguishing between the properties that determine exposure, sensitivity and adaptive capacity for both the ecological and the social components of a natural resource system. We surveyed 145 commercial fishers and 62 tourism operators following a severe tropical cyclone and a major flooding event that extensively affected the region in 2011. Exposure of these industries included direct risk to life and infrastructure and indirect risk from loss of important ecosystem services. Our study found that many commercial fishers and marine-based tourism operators were sensitive to changes in the GBR's condition and limited in their adaptive capacity. However, those with smaller businesses, higher levels of occupational identity, place attachment, formal networks, and strategic approaches also had higher levels of adaptive capacity. These results suggest that resource users with higher sensitivity to change are not necessarily the most vulnerable; sensitivity may be offset by adaptive capacity. That is, while exposure and sensitivity determine the potential impact of a climate-induced change, adaptive capacity may be a major influence on the impacts that eventuate. We empirically show that adaptive capacity is an obvious focus for climate adaptation planning.

Why understanding people helps improve adaptive capacity over time: A long term social and economic monitoring program in the Great Barrier Reef region

Oral

Session: Parallel session 24

Time: 11.45-12.00

[1]Renae Tobin, [2]Erin Bohensky, [2]Matthew Curnock, [1,3]Jeremy Goldberg, [4]Margaret Gooch, **Nadine [2]Marshall**, [2]Petina Pert

[1]Centre for Sustainable Tropical Fisheries and Aquaculture and the School of Earth and Environmental Sciences, James Cook University, Townsville, Australia, [2]Ecosystem Sciences, Commonwealth Scientific and Industrial Research Organisation, Townsville, Australia, [3]School of Business, James Cook University, Townsville, Australia, [4]Climate Change & Science, Great Barrier Reef Marine Park Authority, Townsville, Australia

Climate change affects the entire socio-ecological system. When there is a change in the ecosystem it flows through to the human system, and vice versa. For those charged with managing systems under increasing climate stress, it is therefore important to not just understand how ecosystems are affected by changes to their environment, but also how people are directly and indirectly affected, and how they react. To design 'people-relevant' adaptive management approaches, natural resource managers need to understand people's values, attitudes, the way they view and understand the environment, how they use or interact with the environment, and their inherent capacity to adapt to change.

Researchers from the CSIRO and James Cook University are working to develop a Social and Economic Long Term Monitoring Program (SELTMP) for the Great Barrier Reef (GBR) region, collating existing and collecting new information annually about people and industries connected to the GBR. Combining top-down (science-driven) and bottom-up (multiple stakeholder involvement) approaches, SELTMP aims to better understand the key social, cultural and economic factors across the region that impact on the well-being of the GBR ecosystem and the people connected to it. Understanding and monitoring the strength of connections to the GBR, level of resource dependency and the adaptive capacity of people within this system are critical elements of the Program. These elements will help inform the design of approaches that managers, communities and industries can use to build adaptive capacity and encourage positive interactions within the GBR socio-ecological system.

Working at the pointy end: Local Government and climate change

Oral

Session: Parallel session 29

Time: 2.15-2.30

[1]Narelle Martin

[1]Two Hemispheres Environmental Consulting Pty Ltd, Murmungee, Australia

Local Government has no choice but to deal with climate shocks. Local Government has been for years dealing with climate change impacts and trends. They may not recognise it, and are often busy reacting to events rather than being in position to be proactive.
In 2012 the Regional Climate Change Adaptation Strategy for North East Victoria: Water and Beyond was launched. This was an initiative of the North East Greenhouse Alliance (NEGHA). NEGHA is a consortium of six municipalities and partners in North East Victoria. The Strategy was developed over two years. It commenced after the region had experienced significant bushfires, and while the region was experiencing a serious drought. During the last year of the project the region experienced three floods in six months.
This paper describes the development of the Adaptation Strategy, its findings, and discusses some of the challenges and opportunities identified. There was extensive collaboration in the development of the Adaptation Strategy, with significant funding provided by the Australian Government. The development of the Adaptation Strategy has provided an opportunity for the participants to consider in a proactive way risks and opportunities. An emphasis of the Adaptation Strategy and the contributing reports and research has been to try and add value to the partners. As a result there are now a suite of tools, reports, case studies and resources available to assist NEGHA and its partners, and through them the wider community and businesses.

Improving communication about Climate Change Adaptation between mining professionals

Oral

Session: Parallel session 32

Time: 1.45-2.00

[1]Leah Mason

[1]University of Technology, Sydney, New South Wales, Australia

The mining industry has a diverse base of professional and non-professional personnel, with different interests and responsibilities for a range of mine site operations over the mine's life-cycle. Some of these professionals will never meet but their performance in their respective roles has the potential to make a big difference to the adaptation capacity of the mine. A partnership between NCCARF, the Australasian Institute of Mining and Metallurgy (AusIMM), and the Institute for Sustainable Futures (UTS) produced a guide for these professionals, using case studies of mining operations that have experienced and/or successfully adapted to flooding and storms, drought, high temperatures, bushfire. Following an overview of the guide, the paper describes the project's approach to navigating divided attitudes towards climate change adaptation within the industry, and using language that opens up lines of conversation between professionals of different ages and experience. Reviews of existing guidance for this industry, and consultation with mining professionals revealed a number of key concepts for achieving good outcomes for climate change adaptation in the mining and mineral processing industry. Terms that resonate with mining and mineral professionals were found to come from conventional risk assessment and risk management, such as preparedness and value-protection. Another concept that has proven to be engaging with this audience are landscape-scale assessments of infrastructure risk ('reading the landscape'). Further research, to identify language that can increase the transmission of important experiences, across sites and over time, will be important to further progress in this area.

Future change in ancient worlds: The importance of land and sea as cultural identity in Indigenous Australia

Oral

Session: Parallel session 8

Time: 1.45-2.00

[1,2]**Eddie Mason**, [3]Deanne Bird, [3]Katharine Haynes, [4]Jeanie Govan, Natalie Carey

[1]Senior Traditional Land Owner, Saltwater Burrarra People, Arnhem Land, NT, Australia, [2]Protect Arnhem Land, Maningrida, NT, Australia, [3]Risk Frontiers, Macquarie University, Melbourne, VIC, Australia, [4]The Northern Institute, Charles Darwin University, Darwin, NT, Australia

This project investigated barriers to and opportunities for embracing adaptation strategies within Indigenous communities in northern Australia in regards to slow onset environmental changes and extreme weather events. We utilised ethnographic participatory research to garner a multifaceted understanding of why Indigenous people may be vulnerable or resilient to weather events and climate change. Broader socioeconomic and political changes were also investigated as potential catalysts for influencing vulnerability. "If I lose my land or my salt water, I lose who I am. That songline, out in my ocean, you cut him out, I lose my identity and I am nothing". Presenters will discuss the fundamental relationship Indigenous people have with their ever changing environment and the issues that are inhibiting or enabling adaptation. The voices of research participants from Maningrida and Ngukurr, Northern Territory; Broome, Western Australia; and Wujal Wujal, Queensland provide further insight into the underlying vulnerabilities and adaptive capacities within Indigenous communities across northern Australia.

Climate change anxiety in rural Tasmania

Speedtalk

Session: Speedtalk session 4

Time: 4.55-5.00

[1]Christine Materia

[1]University of Tasmania, Hobart, Tasmania, Australia

Climate change has been identified as the biggest global health threat of the 21st century. Tasmania is experiencing significant changes in seasonal patterns of rainfall and temperature; and increasing intensities and frequencies of climate driven events. Academic literature supports the notion that humans derive physical and psychological benefit from spending time in nature. Research on the mental health impacts of climate change has tended to be disaster focused; examining the direct psychological impacts of extreme events. This paper reports preliminary finding from a doctoral study in Tasmania examining relationships between connectedness to nature, anxiety and psychological well-being in a changing climate. The study aims to develop a theoretical model for health practitioners, policy-makers and local government to better understand and respond to community level anxiety about climate change.

178 people self-nominated and completed Spielberger's State-Trait Anxiety Inventory (Form Y) to measure climate change state and trait anxiety. Data was analysed using SPSS. Preliminary findings indicate people aged 50 and over experience levels of anxiety in excess of levels reported for the normative sample.

OECD reports suggest unprecedented aging in the global population, including for Australia. Climate and health literature identifies older people as a particularly climate-vulnerable group. International attitudinal evidence suggests older people are less concerned about climate change. In light of this, the present study offers interesting insights into how older people experience climate change. The presentation offers important implications for understanding the health and well-being of older people linked to their anxieties and experience of climate change

Natural disasters, insurance and climate change

Oral

Session: Parallel session 6

Time: 4.15-4.30

[1]**John McAneney**, [1]Ryan Crompton, [2]Rade Musulin, [2]Delphine McAneney, [2]George Walker

[1]Risk Frontiers, Sydney, Australia, [2]Aon Benfield, Sydney, Australia

The rising cost of natural disasters can be firmly sheeted home to the fact that there are now more of us living in vulnerable places with more to lose. The current contribution of global climate change to this toll is trivial and in the case of US hurricanes likely to remain so for the order of a century or more. This has been unequivocally demonstrated across jurisdictions and for different perils. It is also unlikely that we have seen the worst that the current climate has to offer. So society faces (at least) two problems: on the one hand, we have the warming of the planet and long-term and largely unknown consequences that this may bring about but which are likely weighted towards negative outcomes. Secondly we have a natural disaster problem, which is current and in many cases a direct consequence of poor land use planning by individuals and government. The two problems are currently unrelated except in the minds of politicians and many media commentators. If we genuinely wish to reduce disaster losses or even arrest their increase, land-use planning has to become more risk-informed. Insurance can play an indirect role in encouraging change by pricing risk correctly and sending clear signals to homeowners and governments to stimulate risk-reducing behaviours. The success of the regulated use of the building code in tropical cyclone-prone regions in Australia and the performance of modern seismic building codes in Christchurch shows what can be achieved when there is a demonstrated need and political will.

Climate Change, World Heritage and Adaptive Management: incorporating climate change into the Strategic Assessment of the Great Barrier Reef

Oral

Session: Parallel session 24

Time: 11.15-11.30

[1]Laurence McCook, [1]Roger Beeden, [1]Julia Chandler, [1]Jen Dryden, [1]Josh Gibson, [1]Margaret Gooch, [1]Hayley Gorsuch, [1]Jess Hoey, [1]Fergus Molloy, [1]Rachel Pears, [1]Chloe Schauble, [1]Hilary Skeat, [1]Karen Vohland

[1]GBRMPA, Townsville, Australia

Climate change was identified as the most serious threat to the Great Barrier Reef in the 2009 Great Barrier Reef Outlook Report, which stated that the Reef was "at a cross-roads". Since then there has been emerging evidence of long-term declines in coral and seagrass habitats, major expansion of coastal development, ports and shipping activities, much of it associated with coal exports, and global carbon levels have continued to increase largely unchecked.

The Great Barrier Reef Marine Park Authority (GBRMPA) and Queensland Government are undertaking a Strategic Assessment of the Great Barrier Reef World Heritage Area. Together with the 5 yearly Outlook Report cycle, this provides a critical opportunity for review and analysis of the status and trend of the biodiversity, heritage and community values of the Reef, and the cumulative impacts on those values, with a view to ensuring they are maintained in a future profoundly affected by climate change. Despite some impressive successes in management, the clear picture is of an ecosystem in decline, especially in the southern, inshore regions. Importantly, Reef stakeholders from a wide range of backgrounds and sectors strongly, indeed passionately, support the urgent need for a major increase in management action across the full range of pressures on the Reef, explicitly including the need for global action and leadership on reducing climate change. The GBRMPA's Climate Change Adaptation Strategy and Action Plan provides the basis for incorporating climate into reef management, but the context for that work is itself changing with these adaptive management processes.

Leading change on climate change - A decade of work

Oral

Session: Parallel session 22

Time: 11.00-11.15

[1]Gabrielle McCorkell

[1]Mornington Peninsula Shire, Victoria, Australia

The Mornington Peninsula Shire has been preparing for the potential impacts of climate change for a decade. Its commitment has been driven by the Sustainable Peninsula Initiative, developed in conjunction with the Mornington Peninsula community in 2001. The Initiative provides a framework that ensures it incorporates sustainability principles into its operations.
"Leading Change on Climate Change" is one of five key goals in the Shire's Community Plan. To achieve this goal, over a dozen strategies have been identified and articulated within its Strategic Plan; that flow into Business' Unit Plans.
The Shire has also integrated climate change risks into its Corporate Risk Register and the overall management of the Shire's approach to Climate Change is overseen by a cross functional internal Advisory Committee.
Recent outcomes include:

- a 60% reduction in potable water use to ensure better preparation for more severe droughts;
- a budget of $30 million to develop and implement an Integrated Drainage Strategy focused on managing increased rain intensity and sea level rise;
- requirements for planning applications; coastal developments and Coastal Management Plans to identify and respond to sea level rise risks;
- an increase of $1.5 million in annual fire prevention works;
- implementation of a Heatwave Strategy and action plans for vulnerable residents;
- ESD requirements incorporated into new Council buildings, refurbishments and purchases;
- innovative community engagement programs engaging over 15,000 residents; and
- ongoing amendment of the Planning Scheme to identify areas subject to climate change risks as data becomes available.

Legal frameworks for biodiversity conservation in a changing climate: can we do better?

Oral

Session: Parallel session 21

Time: 3.30-3.45

[1]**Phillipa McCormack**, [1]Jan McDonald

[1]University of Tasmania, Hobart, Tasmania, Australia

Australia is one of the most biodiverse countries in the world but, with high rates of extinction and ecological degradation, it has a poor record for biodiversity conservation. Many species and ecological communities are currently listed as endangered, threatened or vulnerable. Climate change will increase the pressure of existing stressors and pose an additional threat to these species and communities (Steffen et al, 2009). Climate change will also affect the resilience of populations currently considered healthy (Dunlop et al, 2012). Although the climate change implications for Australia's biodiversity are well recognised, effective adaptation responses are only now emerging. Very little work has examined the role of conservation and natural resources law and policy in promoting or hindering adaptation. This paper seeks to fill this gap. It argues that current frameworks may require new mechanisms but, most importantly, we may need to re-think the fundamental goals of conservation law and policy.

The paper considers a range of adaptation strategies for conservation (including increasing the number, size, diversity, and connectivity of protected areas, engaging in assisted migration and captive breeding programs, and reducing existing stressors and threats) and how well current legal frameworks facilitate or impede their implementation. These options face technical, financial, political, ethical and legal barriers, but failure will have consequences across many sectors (Dunlop et al, 2012).

As conservation priorities shift towards transformation and adaptive management, so too must the supporting legal framework. At the very least, legal and institutional arrangements should not create unnecessary additional barriers for adaptation.

Climate change scepticism and voting behaviour: what causes what?

Oral

Session: Parallel session 4

Time: 3.45-4.00

[1]**Rod McCrea**, [2]Zoe Leviston, [2]Iain Walker

[1]CSIRO Ecosystems Sciences, Brisbane, Australia, [2]CSIRO Ecosystems Sciences, Perth, Australia

Policies for action on climate change need support from the electorate. Such support necessitates that scepticism about anthropogenic climate change be low. Rational models of behaviour suggest that scepticism about climate change impacts on voting behaviour and election outcomes. However, other psychological theories suggest the reverse: that voting behaviour causes climate change scepticism. There is a growing body of research investigating the often strong associations between climate change scepticism and political preferences, but this research has been limited to correlational analyses. This paper uses longitudinal panel data from an Australian survey of attitudes to climate change and cross-lagged modelling to make stronger causal inferences about the direction of impacts between scepticism and voting, while controlling for potential confounds. We found that voting influenced subsequent climate change scepticism, at both the individual and electorate levels, to a greater extent than scepticism influenced voting. This study covered a post-election context, the 2010 Australian federal election. Similar research is now needed in pre-election contexts. Nonetheless, these findings show that voting behaviour influences levels of climate change scepticism consistent with their party preference. An implication is that governments gain an advantage when implementing their climate change policies shortly after winning elections. Another is that partisan politics on climate change increase fluctuations in climate change scepticism. Alternatively, bipartisan politics decreases such fluctuations.

Adaptation planning and action for nine sectors in Tasmania

Oral

Session: Parallel session 34

Time: 1.30-1.45

[1]Jan McDonald, [2]John Harkin, [1]Andrew Harwood, [3]Alistair Hobday, [1]Anna Lyth, [1]Holge Meinke

[1]University of Tasmania, Hobart, Australia, [2]Tasmanian Office of Climate Change, Hobart, Australia, [3]CSIRO Climate Adaptation Flagship, Hobart, Australia

Research efforts around Australia have focused on improving adaptation in a range of sectors. While this research effort is relatively new, largely occurring since the establishment of the CSIRO Climate Adaptation Flagship and NCCARF in 2008, there is anecdotal evidence of changing sectoral practices in response to perceived or actual climate impacts. In this NCCARF-funded project, we reviewed adaptation research and action in Tasmania- a state facing unique challenges under climate change. It is likely to become a climate refuge for Australia as the southernmost refuge for a range of terrestrial and marine species, and a potential residential destination for mainland émigrés and industries displaced by climate change related impacts. It also has a unique socio-economic profile with a limited mix of industry, a low-density dispersed population, and some distinct regional differences. Thus, many impacts will be particularly felt by socially, physically and economically vulnerable communities with limited capacity or resources to adapt. Literature reviews, stakeholder interviews, and workshops revealed that Tasmania is a leader in adaptation research in some sectors, including marine and primary industries, due in part to strong research networks. In other sectors, such as health, there has been little directed research to date. Closely connected science-management-end user communities have progressed towards adaptation action, while more poorly connected sectors are still at the planning stage. By examining cross-sectoral linkages at state, national and international levels we also explored how Tasmania can provide and receive information to help with future adaptation planning, and reduce the risk of maladaptation.

Supporting local climate change adaptation: a participatory assessment tool for secondary cities in Vietnam and Bangladesh

Oral

Session: Parallel session 11

Time: 1.45-2.00

[1]Darryn McEvoy, [1]Iftekhar Ahmed, [1]Alexei Trundle

[1]RMIT University, Melbourne, Australia

Vietnam and Bangladesh are countries already vulnerable to weather-related extreme events. Climate change, and changes to climate variability, will increase the risks for both countries in the future. This presentation will reflect on the lessons learned from participatory action research that was carried out jointly in the Vietnamese city of Hue and the Bangladeshi city of Satkhira to assess climate-related risks, identify adaptation options, and to strengthen local adaptive capacity. The focus on secondary cities was intentional from the outset as they face unique challenges - a combination of rapid growth and development, climate impacts, and in many cases less institutional capacity to respond than primary cities. Whilst numerous assessment toolkits already exist, these have typically been developed for rural or natural resource contexts. The objective of the recently completed research project was therefore to develop a flexible suite of assessment methodologies targeted specifically to the urban environment; as well as being suitable for use by local practitioners at the city and neighbourhood scales. The presentation will not only highlight some of the main findings from each of the case studies but will also critique the assessment to distil some key recommendations for future climate assessment activity in secondary cities across the Asia Pacific region.

Future Farm Landscapes - a new approach for engaging farmers in planning for climate change

Oral

Session: Parallel session 19

Time: 3.45-4.00

[1]Ian McFarland, [1,2]Mark Stanley

[1]Rural Solutions SA, South Australia, Australia, [2]Regional Connections, South Australia, Australia

Farmers are faced with seasonal variability twelve months of the year, year in year out. It comes as no surprise that many farmers are somewhat sceptical about climate change and the so called carbon economy. Through the Future Farm Landscapes project a group of ten farm businesses on Eyre Peninsula, South Australia, have been looking at how they can use the experts and current best knowledge to plan the future for their farming businesses.

'Next generation' farm plans and action plans have been developed by each farm business. The plans incorporate assessments of production/risk, the value of biodiversity, a farm carbon audit and management strategies for the short to long term. The farmers have had the opportunity to hear the latest information and actively discuss climate change, soil carbon and biology, biodiversity values and carbon farming.

This paper will provide detail on the process used, outcomes from the planning process, farmer feedback and further recommendations for farmer engagement in climate change.

Hot weather and the health of working people - what protects them now?

Speedtalk

Session: Speedtalk session 12

Time: 5.20-5.25

[1]Judith McInnes

[1]Monash University, Melbourne, Victoria, Australia

Workers who undertake physical labour, who work outdoors or in hot humid environments, who wear protective clothing, or who cannot regulate their pace of work may be vulnerable to harmful effects of hot weather including heat-related illness and an increased risk of injury.
The impact of hot weather on worker health is likely to increase in the future. Climate model projections indicate that hot days and heatwaves are very likely to become more frequent and severe. Policies to reduce the risk of harm to workers from hot weather are therefore essential.
Through a systematic review of grey and peer-reviewed literature this study will investigate policies, regulations, standards and guidelines that are currently in place to minimise harm to workers from exposure to heat in Australia and internationally. I will also review the evidence base for existing policies and identify current gaps in policies and regulations.
Sources of information will include publications of relevant organisations, electronic databases, and electronic repositories of grey literature. Information will be sought about Australia, the USA, Canada, the UK, New Zealand, the Middle East and Singapore. Preliminary findings will be reported.
Knowledge of current policies to minimise harm to workers from hot weather, and of the evidence base for these, will highlight existing gaps, identify future research priorities, and inform policies to reduce occupational exposures, improve resilience and increase adaptive capacity.

Climate change and health in the South Pacific: Assessing vulnerability and planning health adaptations in Pacific Small Island developing states

Oral

Session: Parallel session 15

Time: 3.00-3.15

[1]Lachlan McIver

[1]World Health Organization, South Pacific Office, Suva, Fiji

Pacific island countries (PICs) are among the most vulnerable in the world to the impacts of climate change, including the likely detrimental effects on human health. Between 2010 and 2012, the World Health Organization (WHO) South Pacific office supported eleven PICs to conduct climate change and health vulnerability assessments and compile national adaptation plans of action to minimise the health impacts of climate change on island communities in the South Pacific.
This work was conducted via a mixed-methods approach, which combined quantitative analysis of the available climate and health data with a rigorous, qualitative "Health Impact Asssessment" methodology. The resulting National Climate Change and Health Action Plans provide an evidence basis for health systems strengthening strategies aimed at avoiding the most serious impacts of climate change on health in PICs.
This presentation summarises the methodology, key findings and implications of this vulnerability assessment and adaptation planning work, undertaken by WHO in collaboration with Ministries of Health and a range of other partners from across sectors, and lays out an adaptation roadmap for the health sector and agencies supporting health and wellbeing in the South Pacific.

The impacts of climate change on infrastructure and ecosystems

Speedtalk

Session: Speedtalk session 2

Time: 5.05-5.10

[1]**Lisa McKinnon**, [1,2]Greg Fisk, [1]Rebecca Miller

[1]Arup Pty Ltd, Brisbane, Australia, [2]BMT WBM, Brisbane, Australia

In November 2012, the Abbot Point Cumulative Impact Assessment (CIA) was released detailing the cumulative environmental impacts associated with port expansion activities at the Port of Abbot Point in north Queensland. Commissioned by mining proponents and the port authority, the study represented a landmark approach to environmental assessment that was done both voluntarily and proactively by the proponents.

Supporting the CIA, were 16 technical studies exploring various environmental impacts. Two of the reports focussed specifically on climate change impacts and adaptation measures:

1. Potential impacts of climate change on the natural environment
2. Carbon footprint and climate change adaptation assessment for physical infrastructure

The first paper featured a vulnerability assessment and explored the impacts of climate change on the sensitive natural environment within the project areas, which included the Kaili Valley Wetland (A wetland of national significance), and the Great Barrier Reef World Heritage Area. The second paper analysed carbon emissions associated with the port's construction and future operation, and went on to explore the risk to physical infrastructure from the potential impacts of climate change making recommendations on building resilience into the future.

In presenting the methodology used to undertake these two technical studies on climate change, the authors will explore challenges associated with the development of key and critical infrastructure in coastal areas, the uncertainty and challenges of incorporating climate change into planning and decision making and provide insights and strategies for building climate resilient and adaptive approaches.

Taking the next steps towards building a city resilient to climate change

Oral

Session: Parallel session 22

Time: 11.30-11.45

[1]**Beth McLachlan**

[1]City of Melbourne, Melbourne, Victoria, Australia

This presentation will provide an overview of the key activities the City of Melbourne (CoM) is undertaking to build resilient in the city. CoM released its climate change adaptation strategy in 2009 and since then has undertaken a range of projects to understand and manage the associated risks facing the city.

Understanding the impact - CoM has undertaken research to further understand the impacts of climate change on our city, both from a social and an economic perspective. In 2010-11 CoM undertook social research to understand how our residents, businesses and visitors perceived the risks associated with climate change. In 2011 and 2012 two separate pieces of research were undertaken by CoM to understand the economic impact of two of the most significant climate change risks facing Melbourne, increased heat and floods. This presentation will discuss the findings of this research.

Working together - One of the key challenges facing any large community attempting to adapt to a changing climate is developing an effective approach to working together. CoM recognised the need for a network for those actively working on managing climate adaptation risks facing the Melbourne. In 2012 CoM established the Inner Melbourne Climate Adaptation Network (IMCAN) to facilitate this discussion. This presentation will discuss CoM's approach to understanding stakeholder's needs and building an effective network.

This presentation will also cover other program and activities CoM is undertaking to build a climate change resilient Melbourne.

Why should we take notice of you? Climate change science in complex community decision making

Oral

Session: Parallel session 32

Time: 2.00-2.15

[1,2]**Josie McLean**, [2]Sam Wells, [3]Brett Bryan, [2]Greg Lyle, [2]Wayne Meyer, [4]Chris Raymond, [5]Mark Siebentritt, [3]David Summers

[1]The Partnership, SA, Australia, [2]University of Adelaide, SA, Australia, [3]CSIRO, SA, Australia, [4]Enviroconnect, SA, Australia, [5]Mark Siebentritt & Associates, SA, Australia

The history and literature of community engagement is extensive and impressive. On the ground, there has been much good work done. But in relation to climate change mitigation and adaptation, it appears that community decision-making processes still struggle to embrace sound science…and the scientists who proclaim it. The complex socio-ecological systems within which decisions are made about landscape futures preclude certainty, and science, so long perceived as the champion of certainty, must develop the capacity to contribute to a cycle of 'action learning', rather than to supply 'right answers'.

This paper focuses on one approach to the facilitation of community decision making informed by climate science and scientists. It draws on our experience with complexity thinking and the dynamics of organisational change, seen through the lens of complexity. In particular, our research has explored the value of an envisioning process that facilitates adaptive change 'on the ground'.

We describe the contribution that envisioning can make to regional NRM planning and explore the conceptual flaws in planning processes based on 'Newtonian' or linear, mechanistic assumptions. Envisioning nourishes a more systemic, organic approach to planning and decision making, which honours the nature of complex living systems, and brings science and scientists to the table without alienating or patronizing the local community.

Finally, we touch on the institutional changes that could support and enable local communities as they shape sustainable landscape futures in collaboration with the best that science can contribute.

Adapted future landscapes - from aspiration to implementation

Oral

Session: Parallel session 12

Time: 1.15-1.30

[1]**Wayne Meyer**, [2]Brett Bryan,[2]David Summers, [1]Greg Lyle, [1]Sam Wells, [1]Josie McLean, [1]Travis Moon, [3]Mark Siebentritt

[1]University of Adelaide, Adelaide, Australia, [2]CSIRO Ecosystems Sciences, Adelaide, Australia, [3]Mark Siebentritt & Associates, Adelaide, Australia

Helping regions in Australia adapt through planning and implementing changes in land use for food and conservation in the face of changing climate, markets and social requirements is important. Studies have shown that it is theoretically possible to adapt well but this will require policy incentives and guidance for planning and actions. This project worked with Eyre Peninsula and the Murray Darling Basin NRM Regions in South Australia to test a new approach to engagement and planning and to help regions and communities plan better to become 'climate change ready'.

The research team worked with community representatives and NRM Board staff to review previous planning processes. The same groups then underwent an envisioning process to develop a shared vision of the region expressed through narratives of how they wanted to experience the planning process and the regional landscape. This brought disparate groups together and drew out explicit shared values, which when embedded in the planning process address how people really want to live within their region. This process informed the development of the user friendly and spatially explicit Landscape Futures Analysis Tool (LFAT). LFAT enables users to consider, quantify and interrogate different climate and market conditions and how these may impact upon the regional economy, land use and biodiversity. This process is now being used in these regions to facilitate engagement and inform their next round of regional planning and assist prioritisation of actions.

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Natural disasters in the Australian press: implications for climate change policy

Oral

Session: Parallel session 25

Time: 11.30-11.45

[1]Diana MacCallum, [1]**Garry Middle**, [1]Rebecca Scherini

[1]Curtin University, Perth, Australia

One of the acknowledged likely impacts of climate change will be an increase in both the frequency and intensity of natural disasters such as flood and fire. As such, natural disasters have the potential to serve as catalysts for the development of climate change adaptation policy. This paper is concerned with this potential, and takes as its starting point the extraordinary series of natural disasters that occurred in the summer of 2010-2011. The paper looks at the shape of public discourse surrounding two of these events - the Queensland floods and the Perth bushfires - through the medium of the press. Using a corpus of articles from the mainstream State and national newspapers (The Courier Mail, the Sunday Mail, the West Australian, the Sunday Times, and the Australian), we identify the key themes that dominate the press coverage, finding that climate change tends to be left almost entirely out of these accounts - both in the reporting of the events themselves and in commentary about their implications. The paper concludes with some discussion of this finding with respect, firstly, to some possible reasons for it and, secondly, to its implications for climate change adaptation policy in Australia.

Food safety practices and knowledge during heat waves: A survey of Salmonella and Campylobacter cases

Speedtalk

Session: Speedtalk session 4

Time: 5.05-5.10

[1]**Adriana Milazzo**, [2,1]Ying Zhang, [3]Ann Koehler, [4,1]Janet Hiller, [1]Peng Bi

[1]The University of Adelaide, Adelaide, South Australia, Australia, [2]The University of Sydney, Sydney, New South Wales, Australia,[3]SA Health, Adelaide, South Australia, Australia, [4]Australian Catholic University, Melbourne, Victoria, Australia

In Australia, heat waves are increasing in frequency, intensity and duration. Warmer ambient temperatures can compromise food safety with a potential direct effect on human health, being an increase in foodborne diseases. The aim of this project is to explore if people's knowledge, eating behaviours, food preferences, and food processing practices during hotter days, may contribute to increased cases of Salmonella and Campylobacter infection.
The project is in partnership with Communicable Disease Control Branch (CDCB) SA Health and is important because information from the survey will help to develop appropriate messages to the public about ways to prevent themselves or their family from becoming ill with infectious gastroenteritis during heat waves.
A cross-sectional survey to elicit information from Salmonella and Campylobacter cases about food safety practices of their households during hot weather, including an exploration of attitudes and knowledge is currently being conducted. Confirmed cases resident of South Australia and notified to CDCB with an onset of illness from 1 January to 31 March 2013 are invited to participate in the survey. The survey tool is a structured questionnaire in electronic or hard-copy format. Comparison analyses will be performed using t test and 2 test. Relevant ethical approvals have been obtained.
Results are preliminary and a full analysis will be available June 2013. The findings from this study will provide information for early warning systems to the public about the risk of Salmonella and Campylobacter infection during heat waves as well as policy recommendations at different government and non-government levels.

The Activation of policy and institutional responses to heat waves: a socio-cultural analysis

Oral

Session: Parallel session 27

Time: 11.00-11.15

[1]Annie Bolitho, [2]**Fiona Miller**

[1]University of Melbourne, VIC, Australia, [2]Macquarie University, NSW, Australia

It is vital to understand the socio-cultural terrain of complex decision making in response to heat extremes. Increasingly commonplace in cities, such events introduce multi-stress vulnerability, affecting health and well-being, finances, mobility, social relations and access to basic services. Planning to reduce heat vulnerability has become part of government business and community level planning. But how well are the social and equity dimensions of extreme heat addressed? Our research, based on interviews and desktop research in Melbourne Australia (2011), found tensions between addressing heat as an emergency versus heat as ongoing chronic stress. These tensions between approaches stand in the way of effective activation of an institutional response. In a complex decision making environment, consideration must be given to the development of relations between policy managers, non-government organisations and vulnerable people to be effective in extreme heat scenarios. Further, sharing disciplinary assumptions and approaches to protecting vulnerable people needs to be part of preparation for management of extreme heat. This will enable different actors to understand tensions between framing and responding to heat as an emergency versus heat as chronic stress, and to enact responses that take into account the often chronic structural factors that shape vulnerability.

Reconceptualising hospital facility resilience to extreme weather events using a panarchy model

Speedtalk

Session: Speedtalk session 6

Time: 4.50-4.55

[1]**Anumitra Mirti-Chand**

[1]University of New South Wales, Sydney, NSW, Australia

Hospitals have a pivotal role in disaster management and as a critical infrastructure provide healthcare needs in managing large scale injuries and illness associated with disasters. However, the fragility of the hospital built infrastructure to the increasing frequency and intensity of natural disasters in particular extreme weather events have been widely acknowledged. There is increasing evidence of hospital services being disrupted during such events. Given the vulnerability of hospitals to extreme weather and the significance of their service delivery to social and economic wellbeing, there is an urgent need for research into factors that contribute towards hospital resilience in these situations. Using a panarchy model to integrate theories of resilience, adaptation and learning, a new conceptual framework is presented to inform the development of more effective hospital resilience strategies.

Climate change and population vulnernability in Tuvalu

Poster

Session: Poster session

[1]**Racheal Missingham**

[1]Griffith University, Brisbane, Queensland, Australia

A number of extreme events are part of natural climatic variability. However there is a growing concern for affected population in Tuvalu, especially when the population have high likelihood of being vulnerable to significant impacts of climate change. The significant consequences of climate variation have forced people to migrate to safe place as the Pacific Islands Region are ill-equipped to address this issue in an effective manner (Morton et al., 2008). There is evidence of interdependencies between policy issues, climate changes and migration however it requires collaboration between the governments within Pacific Region. At the same time, existing programmes and policy frameworks have significant gaps that make it difficult to address the problem adequately. The purpose of this research is to explore the relationship between climate change and population vulnerability in Tuvalu to establish a policy analysis to develop effective policy responses to population vulnerability and how to adapt and mitigate the impacts of climate change.

Lessons learnt in translating climate data for use by impact scientists and policy makers

Speedtalk

Session: Parallel session 7

Time: 4.20-4.25

[1]Erin Roger, [1]**Polly Mitchell**, [1]Mark Littleboy, [1]Graham Turner

[1]Office of Environment and Heritage, Sydney, NSW, Australia

The NSW Office of Environment and Heritage is working to provide a regionally specific information resource outlining the best known information on climate change and the potential impacts for the Sydney Metropolitan Area. To enable this, researchers from the University of NSW have developed high resolution climate projections for the Sydney Metropolitan Area using dynamical downscaling to 2km grids. Impact researchers are translating this data into a series of biophysical impact assessments. Findings from this work are being compiled into the Sydney Climate Impact Profile. The project has encouraged the application of new data and built greater knowledge of the biophysical impacts of a changing climate for Sydney. Importantly, the project has also served as a test case for the delivery of raw data access and impact assessments for the broader NSW and ACT Regional Climate Modelling (NARCliM) project.

This presentation will discuss the lessons learnt in making large climatic datasets accessible and usable for impact scientists and policymakers. We discuss the observed "disconnects" that can occur between climate modellers and impact scientists. We highlight important issues with data formatting, data transformation, data quality assurance and differences in communication and terminology that can significantly affect the translation of projections data into usable climate impact information. Finally, we emphasise the importance of continued dialogue and knowledge sharing in order to ensure climate science is effectively interpreted into other research areas and into the policy-making process.

Understanding coral range expansions to enhance management strategies

Oral

Session: Parallel session 17

Time: 3.30-3.45

[1]**Toni Mizerek**, [1]Joshua Madin, [1,2]Andrew Baird

[1]Macquarie University, NSW, Australia, [2]James Cook University, QLD, Australia

Increased sea surface temperatures as a result of global climate change are contributing to the potential for alterations in marine species' range distributions. Hundreds of coral species thrive in the northern waters of Australia and recent observations have documented several of these species' ranges expanding poleward. I seek to understand and predict which coral species are more likely to move southwards along the Australian coast as waters warm and which native species will be most likely displaced. Using a comprehensive database of coral species traits and geographic ranges, I will present evidence that species that are generalists (in terms of the depths and water quality they tend to occupy), attached to hard substrates, and are able to grow "off reef" (e.g., on rock) are most likely to migrate southward along the New South Wales coastline. Based on present-day correlations of species ranges with environment (namely temperature), I will then present future predictions of range extensions based on climate change scenarios and species traits. Understanding the relationships between species' distributions, traits, and the environment, and thus predicting how those relationships may change, can directly inform monitoring efforts, the evaluation process, and ultimately inform the adjustment of management strategies through proactive rather than reactive efforts.

Rockhampton 2050: defining current and future climate hazard for planning consideration

Oral

Session: Parallel session 34

Time: 2.15-2.30

[1]Duncan Moore, [1]Martyn Hazelwood, [1]Bob Cechet, [1]Craig Arthur, [1]Ian French, [1]Richard Dunsmore, [1]Augusto Sanabria, [1]Tina Yang, [1]Martine Woolf

[1]Geoscience Australia, Canberra, ACT, Australia

Potential impacts of climate change present significant challenges for land use planning, emergency management and risk mitigation across Australia. Even in current climate conditions, the Rockhampton Regional Council area is subject to the impacts of natural hazards, such as bushfires, floods, and tropical cyclones (extreme winds and storm surge). All of these hazards may worsen with climate change.
To consider future climate hazard within council practices, the Rockhampton Regional Council received funding from the National Climate Change Adaptation Research Grants Program Project for a project under the Settlements and Infrastructure theme. This funding was provided to evaluate the ability of urban planning principles and practices to accommodate climate change and the uncertainty of climate change impacts. Within this project, the Rockhampton Regional Council engaged Geoscience Australia to undertake the modelling of natural hazards under current and future climate conditions.
Geoscience Australia's work, within the broader project, has utilised natural hazard modelling techniques to develop a series of spatial datasets describing hazards under current climate conditions and a future climate scenario. The following natural hazards were considered: tropical cyclone wind, bushfire, storm tide, coastal erosion and sea-level rise. This presentation provides an overview of the methodology and how the results of this work were presented to the Rockhampton Regional Council for planning consideration.

Alternative futures for climate change adaptation of coastal settlements and communities

Oral

Session: Parallel session 29

Time: 1.30-1.45

[1]**Phil Morley**, [1]Jamie Trammell, [1]Judith McNeill, [1]Ian Reeve, [1]David

[1]Institute for Rural Futures, University of New England, NSW, Australia

Though shaped by past elements, history demonstrates that future landscapes will be very different from those of the present. This is particularly so in coastal areas of rapid urban growth. The effects of climate change in the future will therefore be impacting on
these quite different landscapes, not on those we see today. To gauge the severity of these impacts we must understand the future settlement patterns likely to emerge. This project examines the past and present drivers of landscape change in the Northern Rivers region of north-eastern New South Wales, and then models several scenarios for the future, based on land use planning decisions that might be taken. For example, the two extremes are a scenario of 'deregulated' growth, and one which takes a high degree of precaution, a 'high climate adapted' scenario. The effects of these 'alternative futures' can be visualised, and the area of land, and number of people affected by climate change impacts, quantified.

Using the Köppen climate classification scheme to examine potential climate change in South East Australia

Speedtalk

Session: Speedtalk session 7

Time: 5.10-5.15

Tim Morrissey, [2]Harvey Stern, [2]Robert Dahni, [3,4]Leanne Webb, [3,4]Penny Whetton, [4]Craig Heady, [3,4]John Clarke

[1]Office of the Commissioner for Environmental Sustainability, Melbourne, Victoria, Australia, [2]Bureau of Meteorology, Melbourne, Victoria, Australia, [3]Climate Adaptation Flagship, Aspendale, Victoria, Australia, [4]CSIRO, Marine & Atmospheric Research, Aspendale, Victoria, Australia

The modified Köppen climate classification scheme, developed for Australia by BoM, is a useful tool for visualising climate change projections and communicating potential impacts by making direct comparisons to present day conditions.
We used the Köppen scheme to generate a map of current climate zones (based on 1975-2004) for SE Australia. Victoria is dominated by Temperate climate in the south and drier Grassland in the north. Desert and Subtropical climate zones are present in New South Wales. We compared baseline climate zones to outcomes from 23 CMIP3 models for the years 2030 and 2050 under the SRES scenarios A1FI, A1B and B1.

Overall, in 2050 there was a decrease in the median area of Temperate (from 55% to 37%) and Grassland (from 40% to 35%) zones. These decreases were matched by increasing southward movement of Desert and Subtropical climate zones. We analysed future climate outcomes for selected locations in Victoria. In Mildura, all models showed a warmer climate by 2050 with a transition from Grassland to Desert classification in 57% of models under A1FI and 22% under B1 scenarios. Avalon, currently in the Temperate zone, shows an emergent Grassland climate in many of the models and, under A1FI, this is the dominant (74%) outcome. Outcomes for central Melbourne show a warmer climate in 2050 and transition to a drier Grassland climate is a possibility under A1FI. We discuss the implications for adaptation in areas that have the greatest potential change, such as Northwest Victoria.

Perceived coastal distress in tsunami affected Andaman Islands of India and psychological/behavioural resilience to climate change

Speedtalk

Session: Speedtalk session 4

Time: 4.50-4.55

[1]**Ruchi Mudaliar**, [1,2]Parul Rishi

[1]Sant Hirdaram Girls College, Bhopal, Madhya Pradesh, India, [2]National Institute of Technical Teachers' Training and Research, Bhopal, Madhya Pradesh, India

Islands are examined due to their increased vulnerability to climate change related hazards like flooding, sea-level rise, storms, cyclones etc. Out of the several projected impacts of climate change in India, coastal zones are apprehended to suffer most devastating effects. India has been identified as one amongst 27 countries which are most vulnerable to the impacts of global warming related accelerated sea level rise (UNEP, 1989). Under article 6 of New Delhi Work Programme (2007), a special effort to foster psychological/behavioral change has been stressed through public awareness. In view of this, a psychological assessment of Indian islanders' perceptions, stressors and resilience to climate change was conducted in Tsunami affected Andaman islands of India (N=100 adult respondents) using Islanders' Perception to Climate Change Inventory (IPCCI) classified into subsections like Climate Change Perceptions, Islanders' Distress, Coping/Adaptation and Psychological Resilience. Results were discussed in line with human-climate interface/ psychological variables in order to suggest tradeoffs between individual, community and institutional responses to natural disasters so that resilience and subjective well being can be further promoted in islanders to overcome the anticipated distress from Tsunami like environmental events.

Climate resilient seaports

Oral

Session: Parallel session 16

Time: 3.30-3.45

[1]**Jane Mullett**, [1]Darryn McEvoy

[1]RMIT University, Melbourne, Victoria, Australia

As highlighted by the National Adaptation Research Plan for Settlements and Infrastructure, seaports are vital to Australia's current and future prosperity and there is recognition that climate change impacts will pose challenges to the operation of seaports and their associated infrastructure over coming decades. However, whilst there has been considerable emphasis placed on the importance of ports and the need for anticipatory planning to ensure a sustainable ports system in the future, the integration of climate change impacts into decision-making processes remains at an embryonic stage, and in many cases the required technical detail remains lacking. This presentation will highlight some of the challenges involved when assessing the risks that Australian ports need to contend with; not only contributing to the knowledge-base generally but also describing the development of an integrated assessment methodology that can be replicated for other cases and other infrastructure types. Particular attention will be paid to the interpretation of climate projections, reconciling climate data with research needs (assessing the vulnerability of infrastructural and functional assets), and contextualising the data with information on non-climate drivers. The presentation will conclude by highlighting some of the major implications of ensuring the resilience of Australian seaports.

Climate Smart Seaports: online decision support tool for climate resilient seaports

Speedtalk

Session: Speedtalk session 10

Time: 4.50-4.55

[1]**Jane Mullett**, [1]Darryn McEvoy, [1]Heinrich Schmidt, [1]Sophie Millin, [1]Alexei Trundle, [1]Ravi Sreenivasamurthy, [1]Guilluame Prevost

[1]RMIT University, Melbourne, Victoria, Australia

Building on NCCARF-funded research into the resilience of seaports to a changing climate, this project is creating an online decision support tool which can be readily used by port authorities and others in Australia and potentially internationally. This activity will involve three discrete components: (1) the sourcing and refinement of multiple large scale data sets needed for context specific climate change adaptation decision-making; (2) the integration of both primary and transformed data; and, (3) the development of innovative software that provides an interactive interface (developed in consultation with port authorities) for considering future climate change impacts, the implications for organisational risk management strategies, and the identification of possible adaptation options. This ANDS-funded Applications project adds value by building on scientific knowledge, translating science into usable information for the policy community, and through direct application by practitioners.

Rapid assessment model for reconstruction following extreme weather events in Victorian parks

Speedtalk

Session: Speedtalk session 6

Time: 4.40-4.45

[1]Joseph Mumford

[1]Parks Victoria, Melbourne, Victoria, Australia

Climate change presents new challenges for managing Victoria's parks. In the last decade the parks system has experienced a number of major bushfire and flood events that are consistent with scientific projections for extreme weather events that are more frequent, more intense and more widespread. The high cost to respond and recover from these events has given impetus to improve planning for risks and reconstruction that builds resilience for future events. Two key adaptation responses have followed Parks Victoria using its established risk based management approach to understand the potential impacts of climate change. 1) The recovery planning Visitor Experience Rapid Assessment Process (VERAP). This provides a strategic basis for making rapid decisions about the treatment of visitor sites which have been impacted by extreme weather events. Site treatments include: reinstatement, redesign or reduction. VERAP incorporates the key components of the visitor experience offer: setting, activity and infrastructure, into emergency recovery of visitor sites. Major parks such as Wilsons Promontory and the Grampians that have experienced several extreme weather events over 2010 and 2011 are used as examples. 2) The Future Coasts spatial datasets for sea level rise and storm tides for 4 scenarios (2009, 2040, 2070 & 2100) have been used to assess parks with vulnerability due to low lying marine and coastal environments along the Victorian coast. Parks in Port Phillip, Westernport and Corner Inlet will be used as examples for risks associated with sea level rise and storm tide impacts on environmental and infrastructure assets.

Walking on Country with Spirits: Enhancing adaptive capacity through Aboriginal research tourism

Speedtalk

Session: Speedtalk session 1

Time: 4.40-4.45

[1]Helen Murphy, [1,2]Marilyn Wallace

[1]James Cook University, Cairns, Australia, [2]Bana Yarralji Rangers, Rossville, Australia

This paper describes an Aboriginal research tourism enterprise with a specific focus on how climate change information is gained and shared between Aboriginal people and the scientific community within a tourism context. This paper describes the Aboriginal research tourism enterprise of Bana Yarralji located in the Wet Tropics World Heritage area. Aboriginal research tourism is a relatively new phenomenon whereby scientists, students and volunteers pay to experience cross cultural collaboration in research on Aboriginal land. Aboriginal people throughout northern Australia experience high levels of vulnerability to climate change. The competition for research and grant monies in climate change research is fierce, yet the impact is enduring and profound for Aboriginal people in the Wet Tropics. This paper describes how Bana Yarralji have acknowledged climate change as an impact on their culture and livelihoods and how they have in turn incorporated their own monitoring activities into their product range of research tourism opportunities. This research is important as it describes how an Aboriginal group identified a gap in the tourism market and are using this opportunity to create jobs, foster knowledge exchange and mitigate the effects of climate change. The results from this research demonstrate that knowledge of climate change adaptation and mitigation can be achieved through tourism enterprise and offers outstanding opportunities to both the scientific community and students alike for cross cultural collaboration in climate research activities.

Understanding the adaptive capacity of Small-to-Medium Enterprises (SMEs) to climate change and variability

Speedtalk

Session: Speedtalk session 6

Time: 4.45-4.50

[1]**Janina Murta**, [1]Natasha Kuruppu, [1]Pierre Mukheibir

[1]Institute for Sustainable Futures, Sydney, Australia

Small to medium enterprises (SMEs) play an important role within socio-economic systems. Comprising 96 per cent of all private businesses in Australia, SMEs are the largest employers and significant contributors to GDP. The extent to which this sector adapts to climate change risks will thus shape the extent to which society in general, deals with these same stresses. This study examines the underlying factors and processes shaping the adaptive capacity of SMEs in Australia to climate change.

In exploring the processes that mediate adaptive capacity of SMEs, the study adopts theories from Political Ecology and draws on literature on vulnerability and hazards.

A central conclusion is that contextual processes operating externally to the SMEs at various spatial scales, and at different tiers of governance, are critical to enhancing the adaptive capacity of SMEs. These processes have been largely overlooked in formal programmes that aim to build business resilience to climate extremes; these tended to be reactive and focus on business recovery during and after disaster events rather than altering the vulnerability context through anticipatory prevention and preparedness or adaptation planning.The research indicates that many of the measures required to enhance the adaptive capacity of SMEs in ensuring business continuity under climate change can be integrated into existing processes and networks. There are opportunities on several fronts to build on existing programmes and strengthen existing networks to support vulnerability reduction.

Would somebody please listen – Applying insights from behavioural economics and social psychology to coastal adaptation

Speedtalk

Session: Speedtalk session 2

Time: 5.20-5.25

[1]Konar Mutafoglu

[1]Global Change Institute, University of Queensland, St. Lucia, Queensland, Australia

To understand and manage climate impacts, individuals, communities, businesses, and governments need to process climate information, assess risks, and evaluate different adaptation options under uncertainty. Such a complex process places a number of burdens that may result in barriers to effective adaptation. This work provides an overview of findings from behavioural economics, social psychology and related fields that are relevant to adaptive behaviour. The case of coastal adaptation serves as an example to discuss some techniques to overcome these constraints and barriers.

Decision-makers can underlie cognitive constraints that lead to inconsistent, biased or seemingly irrational decisions. Facing the uncertainty of climate projections, it may be tempting to call for more data, and more detailed regional or sectoral assessments. With more choice options, individuals as well as organizations may be reluctant to take decisions. In such situations, mental shortcuts and rules of thumb replace a structured decision-making progress. Relevant to climate adaptation are also cognitive limits to process probabilities or non-linear developments.

For managing climate impacts, the capability of taking time-consistent decisions becomes crucial. When confronted with choices at different points in time, decision-makers may opt for inconsistent choices. A further important area relates to how information is processed, based on prior knowledge or beliefs as regards climate risks, which has to be taken into consideration when presenting new findings to decision-makers. In an organizational context, further behavioural effects such as group dynamics are relevant as well. These and the above factors warrant for special care when communicating climate information.

Planning for sustainable urban water systems in adapting to a changing climate - a case study in Can Tho City, Vietnam

Oral

Session: Parallel session 2

Time: 3.30-3.45

[1]**Minh Nguyen**, [1]Stephen Cook, [1]Magnus Moglia, [1]Luis Neumann, [2]Hieu Trung Nguyen

[1]Climate Adaptation Flagship, CSIRO, Melbourne, Australia, [2]College of Environment and Natural Resources, Can Tho University, Can Tho, Viet Nam

The Climate Adaptation through Sustainable Urban Development was a research initiative supported by the AusAID-CSIRO Alliance, which focussed on how to bring sustainable urban development principles into practice, as an effective means of adapting to climate change. The project in Can Tho City, Vietnam, investigated the use of Integrated Urban Water Management principles to improve the planning of urban water services, through which to enhance the resilience of the city to climate change. The project demonstrated an approach to build adaptive capacity for local communities in Mekong Delta region.

The project ran over two years from October 2010 to September 2012, with three focus areas: (1) understand the current context for water service provision in the city, and implications of climate change; (2) develop a set of strategic adaptation options with the city; and (3) demonstrate 'no-regret' adaptation options through pilot case studies. The research was underpinned by the development of strong partnerships with local stakeholders, and the active involvement of local research partners.

The project has produced a range of outputs targeted to providing practical knowledge and useful tools that support planning for adaptive and sustainable water supply and sanitation systems. The project developed the new research for development capacity through working alongside local research partners. Also, the project has introduced a systems way of thinking, which encouraged local stakeholders to depart from traditional 'silo' management to an integrated thinking and collaborative approach. The project team received the City Award in recognition of the contribution to the city's development.

Service life of housing structures in a changing climate

Speedtalk

Session: Speedtalk session 2

Time: 4.45-4.50

[1]**Minh Nguyen**, [1]Xiaoming Wang, [1]Guy Barnett

[1]CSIRO Climate Adaptation Flagship, Melbourne, Australia

The service life of a structure is defined as the lifetime that a structure is considered to maintain an acceptable level of performance. Billions of dollars are spent annually maintaining the service life and thus performance of existing infrastructure against material degradation, which is strongly governed by local climate and the surrounding environment. However, climate change science has projected a different climate in the future to the one that we experience today. These changes in local climate are likely to affect the rate of degradation in materials and therefore the expected service life of structures.

This presentation outlines a quantitative approach for assessing the impacts of future climates on the durability performance of construction materials commonly used in housing, including structural steel and timber. These assessments were made using available durability models developed for structural engineering purposes, with the results used to estimate the changes in service life of housing structures in a changing climate. Climate change projections were developed using the emission scenario A1FI and nine different Global Circulation Models. To demonstrate the approach, the outcomes are presented for four Australian cities covering diverse climates: Melbourne, Sydney, Brisbane and Townsville.

The implications of this research and the opportunities for progressively incorporating climate change adaptation into the mainstream risk management and business planning of organisations responsible for the construction of new housing and for those managing large housing portfolios are discussed. The study formed part of a recent NCCARF project on adaptation pathways for low income housing.

Adaptation Research Synthesis - Lessons for State Government policy anddecision makers

Oral

Session: Parallel session 21

Time: 4.15-4.30

[1]**Michael Nolan**, [1]Jennifer Cane, [1]Laura Cacho, [1]Nicholas Dircks, [2]Greg Picker, [3]Guillaume Prudent-Richard, [1]Peter Steele, [1]Sandra Valeri

[1]AECOM, Melbourne, VIC, Australia, [2]AECOM, Brisbane, QLD, Australia, [3]AECOM, Canberra, ACT, Australia

Adaptation research is useful when it helps people make informed decisions that reduce risk and increase resilience to the impacts of climate change. This presentation will explore the NCCARF Adaptation Synthesis Project, which provides a synthesis of research outputs for each Australian state and territory. This synthesis informs state and territory policy makers of the strategic implications and lessons that can be learned from adaptation research. It seeks to present findings in a way that will enhance adaptation understanding of decision-makers in state government.

The research examined for this synthesis explores a broad range of themes and sectors, such as natural resource management, primary production, emergency management, health, and community resilience. However, the synthesis looks across themes and captures cross-sectoral findings. Lessons explored in the presentation may include:

- Recommendations of ways to increase resilience and adaptive capacity pre- and post- extreme events through better messaging and communication;
- An understanding of community expectations of government regarding adaptation;
- The challenges and recommendations regarding the timing and scale of adaptation;
- How experience with previous climate-related disasters can help and hinder adaptation action; and
- The constraints of current models and economic approaches for financing adaptation.

The NCCARF Adaptation Synthesis Project also highlights some of the key findings of the research regarding how researchers and decisions-makers can better engage and focus their research on practical outcomes. The presentation will explore the challenges of coordinating outcome-based, policy-relevant research activities and how these issues may be overcome to improve research outcomes for both researcher and end user.

Have we got farmers' attitudes to climate change wrong? Experiences from Victoria and WA

Oral

Session: Parallel session 4

Time: 4.00-4.15

[2]Graeme Anderson, [1]Chris Evans, [1]**John Noonan**, [2]Danielle Parke, [1]Chris Sounness

[1]Curtin University, Western Australia, Australia, [2]Department of Primary Industries, Victoria, Australia

Research in WA in 2008 showed only a third of farming community participants accepted climate change was occurring. Scepticism and uncertainty with poor understanding of the associated issues, in an environment where there was a high frequency, range and volume of messages about climate change in various forms, was common. A 2011 Victorian survey identified low belief in climate change; however, it showed farmers were responding to the impacts of climate change. These studies provide insights into farmer attitudes and behaviours about variability of climatic conditions and climate change.

Profiling in the WA study identified three climate change attitude typologies - 'Acceptors', 'Uncertains' and 'Sceptics'. The typologies were defined by statistical linked patterns associated with climate change, science and scientific information and experience of living in an area or farming. Such attitudes indicate the need to implement different approaches to diffusing climate information.

Curtin University's RuralGROWTH program in WA and DPIV's climate extension program, independently used approaches where climate change and impacts were framed within local and industry contexts: acknowledging farmers' knowledge, experience, observations and language. The approaches reduced divergence between farmer and science knowledge forms, enabling pathways for scientific knowledge to be linked and incorporated into farmers own knowledge forms without conflict.

There are many barriers blocking farmer "acceptance" of climate change as yearned for by many scientists and policymakers. The Victorian and WA experiences provided new approaches capable of creating better spaces in which to realistically consider climate and the adaptation pathways open to farming businesses.

Coastal urban climate futures in South East Australia: from Wollongong to Lakes Entrance

Oral

Session: Parallel session 3

Time: 3.15-3.30

[1]**Barbara Norman**

[1]University of Canberra, ACT, Australia

The southeast coastal region of Australia provides a unique opportunity to examine small town communities in the context of climate change. This is when coastal pressures are apparent but still of a scale where strategic intervention could make a long-term difference to coastal urban futures. The key research question explored is what a climate adapted Australian settlement would look like from the perspective of coastal small town communities to 2030. This presentation will outline the key issues, challenges, scenarios and findings. The research focused on seven local government areas – Wollongong, Shoalhaven, Shellharbour, Kiama, Eurobodalla, Bega and East Gippsland, involving two states and relevant regional organizations. An interdisciplinary approach was taken involving coasts and climate change, urban and regional planning, health and wellbeing. A distinctive element of the methodology was a focus on local and regional perspectives. Focus groups involving key government decision makers raised significant issues including governance. A key outcome is an understanding of two contrasting scenarios – business as usual and a more collaborative approach to coastal urban futures. Policy implications for coastal urban futures for the southeast coast are then discussed. In conclusion some principles are suggested as a framework for consideration for climate adapted small coastal towns 2030

The contributions of microfinance organisations to reducing vulnerability to climate change

Oral

Session: Parallel session 23

Time: 12.15-12.30

[1]**AKM Nuruzzaman**, [1]Jon Barnett

[1]The University of Melbourne, Melbourne, Australia

Research and policy both recognise that many people in Bangladesh are highly vulnerable to climate change, for they are both extremely exposed to climate related hazards and adaptive capacity is very low. Bangladesh is also well known for the extent and effectiveness of its microfinance industry: some 60% of the country's population are actively engaged with at least one microfinance organisation. Microfinance organisations provide capital and skills and help build social networks. It is to be expected, then, they would help reduce vulnerability to climate change, although until now this has never been empirically examined. The objective of this presentation is to explain the contributions microfinance organizations make to reducing vulnerability to climate change in Bangladesh. It discusses findings from research investigating the outcomes of the work of one national-level and one local-level microfinance organisation, both working in a disaster-prone coastal area in south-western Bangladesh. Quantitative and qualitative data was collected through interviews, focus group discussions and participatory observations over 10 months between 2011-12. Preliminary results indicated that while microfinance can help reduce vulnerability, it is effective only at the margins by helping people with immediate needs post-disaster, while the deep social causes of vulnerability - such as poverty and gender discrimination are not always sufficiently addressed. Nor has microfinance helped reduce peoples' exposure to climate risks. So, while the current model of microfinance might help many households to reduce vulnerability in the short-term, it is not always effective in helping people to get beyond the vulnerability trap.

Property, Power, and Process. The role of property value in climate adaptation.

Oral

Session: Parallel session 21

Time: 4.00-4.15

[1]**Tayanah O'Donnell**

[1]University of Western Sydney, Sydney, Australia

Since 2007, climate change discourse has shifted significantly in its focus on adaptation contra mitigation strategies. At the same time, various response strategies designed to aid and encourage local, placebased adaptation have been scrutinised and analysed for both effectiveness in attempting to mitigate against the impacts of climate change and in terms of aiding broader adaptation plans. Increasingly, and for a number of reasons, law as an institution became a tool that both drove and supported such adaptation strategies, particularly in the context of sea level rise and coastal planning, within Australia.
A comparative case study has been completed in two coastal councils located in New South Wales, Australia. Port Stephens and Lake Macquarie Local Government Areas were chosen due to having a significant amount of residential property 'at risk' resulting from expected increased flood and coastal hazard events due to expected climate change induced sea level rise, and also because of their contrasting policy positions on climate change. A predominately qualitative methodology was utilised to explore climate change adaptation in the context of the rule of law, the public and private property divide, and place-based governance.

Yield, carbon density and climate change impact on Bagras (Eucalyptus deglupta Blume) in smallholder tree-based agroforestry systems in Northern Mindanao, Philippines

Poster

Session: Poster session

[1]**Richmund Palma**, [2]Wilfredo Carandang

[1]Misamis Oriental State College of Agriculture and Technology, Claveria, Misamis Oriental, The Philippines, [2]University of the Philippines Los Banos, Los Banos, Laguna, The Philippines

Agroforestry systems using Eucalyptus deglupta Blume for timber and biomass production are essential options for smallholder agroforestry farms in northern Mindanao, Philippines for the reason that they amalgamate timber and food production. In this study, the multiple linear regression analysis was used to develop an appropriate prediction model for estimating yield and carbon sequestration stand attributes (i.e. age, site index, spacing, basal area, provenance), rainfall, temperature in woodlot or block planting. Results showed strong association among variables. It was found that about 88.70 % proportion of variance of yield can be predicted from the set of independent variables. Comparison of yield and aboveground biomass accumulated by bagras from alley, boundary and woodlot was in order woodlot > boundary > alley. Based on the models, future climate scenario had shown an inverse relationship between yield and seasonal mean rainfall. Predicted yield will increase by 0.1515 m^3 (64 bd ft) per tree with decreasing seasonal mean rainfall (100mm).

Adapting communication conventions: communicating climate change adaptation to Aboriginal peoples

Oral

Session: Parallel session 25

Time: 11.45-12.00

[1]**Rob Palmer**

[1]University of Adelaide, South Australia, Australia

Global research shows that communicating climate change is a difficult and challenging exercise. Layer climate change adaptation upon that communication challenge and the messaging process becomes increasingly difficult. Add one more layer, that of communicating climate change adaptation to Aboriginal peoples, and the challenge seems insurmountable. Research conducted by universities and commercial entities such as the UK marketing firm Futerra highlight that communicating big picture, gloomy messages about climate change puts people off, causing the communication process to fail. We present a study that shows the opposite and indicates communicating climate adaptation benefits from presenting the big picture, but in local contexts. In this conference paper, we use a case study approach to describe a methodology for how to effectively communicate climate change adaptation to Indigenous peoples. Our case study, working with the Arabana people of South Australia demonstrates that the conventional thought on how to effectively communicate climate change is not necessarily applicable to communicating climate change adaptation to Indigenous peoples. Using a combination of visual, aural and online tools, the methodology we developed and trialled has demonstrated an effective way of communicating climate change adaptation to Indigenous peoples. Given the significant decline in support around the world for taking urgent action on and adapting to climate change, our study could make a significant contribution for reframing the way governments, ENGOs and others communicate climate change adaptation to society.

Changing science needs for different management paradigms on a protection - restoration spectrum

Oral

Session: Parallel session 24

Time: 12.15-12.30

[1]**Rachel Pears**, [1]Roger Beeden, [2]Rebecca Albright, [3]Eva Abal, [2]Ken Anthony

[1]GBRMPA, Townsville, Australia, [2]AIMS, Townsville, Australia, [3]Great Barrier Reef Foundation, Townsville, Australia

In the face of increasing pressures on the Great Barrier Reef ecosystem, marine park managers and scientists are recognising the need for good, collaborative research focused on management solutions. Demand for exploring unconventional options is likely to increase, along with calls to consider more interventionist strategies than currently used. Guidance is needed on which solutions could form safe, cost-effective management strategies, including what would be required to thoroughly assess proposals.
Ocean acidification is an example of an emerging threat to coral reef ecosystems that poses serious management challenges. The imperative is to avoid serious change to the acidity of the ocean. Management objectives under the Great Barrier Reef Climate Change Adaptation Strategy and Action Plan recognise that managers and scientists have a role in informing the public policy debate about climate change and ocean acidification implications for reefs. With considerable uncertainty about the global response to climate change, we also need to consider what can be done in tandem to reduce or delay the impacts of ocean acidification.
As environmental values and conditions deteriorate from good to poor, the management paradigm also shifts along the spectrum from protection of values to arresting declines and then to restoration or enhancement. For ocean acidification, the attention may move from protecting values and supporting natural adaptation and resilience to assisted adaptation and restoration of values or enhancement of ecosystem services. Scientists and managers are exploring potential solutions and associated knowledge gaps, and considering where these might be applicable on this spectrum.

Indigenous Leadership for Climate Change

Oral

Session: Parallel session 8

Time: 1.00-1.15

[1]**Rafe Pfitzner**

[1]The University of Adelaide, Adelaide, Australia

I am an Indigenous researcher and environmentalist; identifying with the Kokatha People. I have an Environmental Management degree from Flinders University and am currently a Masters Candidate at Adelaide Univeristy where my research topic is "Indigenous Leadership for Climate Change".
Being an Indigenous person, looking after and respecting the environment holds special importance to me. It is this 'sacred duty' (as I consider it to be) that has lead me to focus my research on Indigenous Environmental Management. Specifically, my research is focussing on on the intertwining themes of Indigenous Leadership and Climate Change.
The rationale for the research comes simply from the fact that climate change is one of the most important environmental challenges currently facing societies (both Indigenous and non-Indigenous). And that I have a deep love and respect for and connection to Indigenous people and culture and its wellbeing.
My research is examining what "leadership" for climate change means to Indigenous communities. This examination is being undertaken, in part, through at least two (intended) case studies: 1) The Kokatha People and 2) The existing group of NCCARF Indigenous Communities researchers (utilising a "delphi method" technique on researchers across all of the IC research projects). A third potential case study is the Ngarrindjeri Nation.
The second case study will explore an important aspect to the Indigenous leadership dynamic: the fact that non-Indigenous decision makers (who reside within western power structures such as state and federal governments) make decisions that directly impact Indigenous communities.
The research outcomes will have both local (to the case study communities) and widespread (in terms of government policy and decision making) relevance and will, hopefully, help to inform future work and leadership efforts by both Indigenous and non-Indigenous people managing climate change that impacts on Indigenous communities.

One regional collaborative governance structure is unlocking doors and leading the way to transformational change

Oral

Session: Parallel session 29

Time: 2.30-2.45

[1]**Evelyn Poole**, [2,1]Cecilia Woolford, [1]Heather Horrocks

[1]DEWNR, SA, Eyre Peninsula, Australia, [2]EPICCA, SA, Eyre Peninsula, Australia

The Eyre Peninsula, an ecotone bounded by desert and ocean, is home to unique ecosystems and an economy dependent on natural resources. Higher temperatures, less rainfall and rising sea levels in a climate-changed future will bring both challenges and opportunities.– Formed in 2009, the Eyre Peninsula Integrated Climate Change Agreement (EPICCA) is now moving beyond consolidation of collaborative arrangements to joint delivery of adaptive actions within the region.

Through EPICCA, the region's peak bodies have a governance mechanism capable of facilitating progress towards integrated, co-ordinated, community- and industry-endorsed change within the region: a crucial element in achieving transformational change within a resilient and sustainable environment. In a region susceptible to the southerly progression of climate zones, EPICCA identified that despite extensive research on climate change being undertaken, it sat in silos not easily accessible to stakeholders. For this reason EPICCA conducted an audit to establish a usable, manageable, comprehensive knowledge and research database suitable for analysis and able to be synthesised so as to identify gaps.

This paper will explore the role of EPICCA as the catalyst in leading the region's key stakeholders through a research-based process towards the development of an adaptation framework. The paper will illustrate how EPICCA provides overarching collaborative guidance for key practitioners to inform government while advocating for support to achieve key stakeholder goals: NRM in the preparation of a climate-change-ready landscape scale plan; RDA looking forward in terms of renewable energy opportunities; and local government in assessing the risk to their extensive infrastructure.

Marine population genetics: identifying marine regions of high diversity and low connectivity through meta-analysis

Poster

Session: Poster session

[1]**Lisa Pope**, [1]Cynthia Riginos, [1,2]Jenny Ovenden

[1]The University of Queensland, Brisbane, Qld, Australia, [2]Molecular Fisheries Laboratory, Brisbane, Qld, Australia

Knowledge of connectivity and genetic diversity are key components for effective reserve design and the protection of endangered species. Using genetic methods to determine population boundaries is extensively used in commercial fisheries, to set sustainable limits on harvest for current and future resource management. We have undertaken a literature review to examine the marine animal species that have been studied at a population level, around Australia. Using this information we identify 'information gaps', species groups and regions that have been understudied. Using this database, we will perform a meta-analysis of genetic diversity and genetic divergence measures from multiple species to identify common 'barriers' around Australia, and regions of high and low genetic diversity. We aim to integrate this information into management plans, with a view to aiding future adaptive management to climate change of both commercial and endangered Australian marine species.

Spatial management for climate-related patchy disturbances in the Great Barrier Reef

Oral

Session: Parallel session 31

Time: 2.00-2.15

[1]**Bob Pressey**

[1]Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, Australia

The 2004 rezoning of the Great Barrier Reef (GBR) Marine Park put Australia on the world map as a leader in marine conservation. However, the 2004 zoning plan was based mainly on static depictions of marine biodiversity. Consequently, uncertainty surrounds its ability to promote the persistence of the GBR's biodiversity in the face of current dynamic disturbances or their future regimes under climate change. This uncertainty is underlined by the recent 50% loss of coral cover across the GBR since 1985, attributed to cyclone waves, crown of thorns starfish, and coral bleaching. Planning for the GBR's future must involve a better understanding of scenarios of these and other key disturbances, how disturbances interact with connectivity between reefs, and clear objectives linked to the GBR's resilience. This presentation describes an approach to designing spatial management in the face of dynamic disturbances. A first requirement is to understand spatio-temporal regimes of disturbances. This begins with time-series analysis as a foundation for ensemble modeling to project multiple scenarios under climate change and uncertainty. A second crucial requirement is to formulate quantitative objectives in relation to dynamic disturbances, and there are several ways of doing this. With models and objectives in place, systems of no-take and other marine protected areas (MPAs) can be reviewed for achievement of objectives into the future, noting when and how often objectives are not met. This analysis then informs revised design of MPAs to maximize achievement of objectives and the persistence of marine species and ecosystems.

How shared values and beliefs shape climate change responses: cultural biases, policy preferences, and behaviour

Speedtalk

Session: Speedtalk session 13

Time: 5.20-5.25

[1]**Jennifer Price**, [1]Zoe Leviston, [1]Iain Walker

[1]CSIRO, Floreat, WA, Australia

Cultural theory is an effective framework for understanding the conflicting perspectives about society and the environment that drive climate change responses. Cultural biases represent patterns of shared values and beliefs that have been linked to policy preferences, risk perceptions and behaviour. Despite compelling evidence of their role in shaping climate change responses key issues remain unresolved, and largely unquestioned. The underlying dimensional structure of cultural environmental biases is yet to be empirically tested, preventing identification of the role they play. The current research details quantitative measures of cultural environmental biases, identifying: a) their role in climate change adaptation behaviours and policy preferences; b) their underlying structure; and c) their stability over time. Three online surveys were conducted in Australia in 2010 (N=5036), 2011 (N=5030), and 2012 (N=5081), with 668 respondents completing all three surveys. Cultural environmental biases were related to adaptation behaviours such as taking out insurance and moving house due to climate impacts. They were also linked to carbon-relevant behaviours and support for carbon pricing policy. Cultural environmental biases shifted over time, however, with just 41% of the sample remaining constant. The degree of consistency an individual demonstrates is related to their belief in anthropogenic climate change, and can be predicted by right-wing authoritarianism, social dominance orientation, and socio-political locus of control. This suggests that while cultural environmental biases shape climate change responses, they are dynamic and open to influence. Policies and communication that appeals to these different perspectives and traits may shape adaption behaviours.

From the Tiwi Islands to Arnhem Land: Climate Change Risk Assessments and Adaptation Planning in the Tropical North

Oral

Session: Parallel session 8

Time: 1.30-1.45

[1]**Guillaume Prudent-Richard**, [1]Marcus Sainsbury

[1]AECOM Australia, Canberra, Australia

The presentation will focus on the challenges and specifics of working on climate change adaptation within Aboriginal communities. This project, funded through the Local Adaptation Pathways Program, helped to deliver climate change risk assessments and adaptation plans for six Shire Councils (Belyuen, Coomalie, East Arnhem, Tiwi Islands, Wagait and West Arnhem) of the Northern Territory. These Shire Councils are populated predominately by Aboriginal people (up to 95%).
Within the communities, there was a strong demand for information on climate change but also significant confusion (e.g. between greenhouse gases and air pollution, storm surge, sea level rise and tsunami). Communicating climate change proved challenging given the varying perceptions of the local communities in terms of climate, seasonal (e.g. up to 14 seasons in the local calendar) and timescale. There were a number of challenges including the high cost of travel in each community, the highest priority given to more pressing issues, the lack of relevant data.
The study found that while Aboriginal communities present significant vulnerabilities to climate change for some risks they is also a high degree of resilience within the community (for instance a strong recovery capacity after extreme events). The adaptation plans were developed in a workshop format and strongly considered the limited capacity of the Shire Council to develop and implement adaptation actions on account of their lack of resources (financial, human and technical) and also because of their lack of control over land use planning and land development in general.

Incorporating climate change impacts and adaptation in environmental impact assessment: Opportunities and challenges

Speedtalk

Session: Speedtalk session 13

Time: 4.45-4.50

[1]**Guillaume Prudent-Richard**, [1]Marcus Sainsbury

[1]AECOM Australia, Canberra, Australia

National governments and development agencies have invested considerable effort to develop methodologies and tools for climate change adaptation. However, these tools have largely been developed by the climate change community and their application within actual project settings remains quite limited. An alternate and complementary approach would be to examine the feasibility of incorporating consideration of climate change impacts and adaptation within existing modalities for project design, approval, and implementation. Environmental Impact Assessments (EIA) are particularly relevant in this context.

The study undertaken by the Organisation for Economic Co-operation and Development (OECD) and AECOM shows that there is ample scope for employing EIA procedures as a vehicle for enhancing the resilience of projects to the impacts of climate change. A number of entry points have been identified to incorporate climate change impact and adaptation considerations, from the strategic phase that precedes the initiation of the EIA, to the scoping, detailed assessment and implementation stages.

Several national and sub-national authorities as well as multilateral development banks have already made some progress in terms of examining the possibility of incorporating climate change impacts and adaptation measures within the context of EIA modalities. To a large extent, however, the goal of incorporating climate change impacts and adaptation within EIAs remains more aspirational than operational. While a number of governments have signalled their intent to move in this direction, this assessment could find examples in only three countries of projects that considered climate change as part of EIAs.

Engaging the private sector in adaptation

Speedtalk

Session: Speedtalk session 9

Time: 4.40-4.45

[1]**Guillaume Prudent-Richard**

[1]AECOM Australia, Canberra, Australia

Adaptation to climate change is recognised as an equally important and complementary response to mitigation. There has been considerable expansion of policy and economic analyses to assess adaptation efforts and progress. The core emphasis, however, has been on activities that are primarily financed and implemented by public entities. Less attention has been paid to the role of the private sector in fostering adaptation. However, success in adaptation depends heavily upon the decisions made within the private sector.

This paper considers the principal risks that businesses are likely to face due to climate change, the actions they have taken to address these risks, and how they are managing current climate variability and adapting to future climate conditions. This paper addresses the questions of (i) What motivates private actors to undertake adaptation actions? (ii) What factors determine processes of adaptation? (iii) What is the role of government in enabling and encouraging the private sector to take action on adaptation to climate change?

Businesses' attitudes towards adaptation and the actions taken to address risks arising from climate change are analysed using a three-tier framework that considers companies' actions in terms of their: (1) risk awareness; (2) risk assessment; and (3) risk management. This paper considers case studies based on information collected from a number of companies and is supplemented with publicly available information, supporting literature, and an analysis of companies' responses to the Carbon Disclosure Project. The key findings were published in an OECD report in 2011.

Links between climate variability, vegetation cover and dust storm frequency in Australia

Poster

Session: Poster session

[1]**Christa Pudmenzky**, [1]Harry Butler

[1]Australian Centre for Sustainable Catchments, University of Southern Queensland, Toowoomba, Queensland, Australia

Australia has one of the most variable climates in the world and 70% of the continent is within the arid and semi-arid zone, receiving less than 400mm of rainfall and is the largest dust source in the Southern Hemisphere. The climate is influenced by the El Niño-Southern Oscillation phenomenon and is the prime driver of extreme weather events. 50% of annual rainfall variability in northern and eastern Australia is linked to the ENSO cycle. Drought is probably the most economically costly climate event by reducing agricultural output and having social impacts on rural communities. Sustained drought conditions reduce vegetation cover in arid and semi-arid regions, exposing soils to increased dust storm activity in the future. Agricultural land is under increasing pressure to produce more food and fibre to support an increasing population.
This research investigates the relationship between climatic conditions and vegetation cover in erodible areas of the Lake Eyre Basin, Channel Country and north-western NSW (i.e. is it possible to use climate information to predict remote sensed vegetation cover). To test the possibility, data from the 2000 to 2012 time period was used due to the range of climatic changes. The development of a Climate Aridity "Vegetation" Index (CAVI) together with medium to long term weather forecasts could provide a valuable tool to improve current land management practices. With the projected increase in global population from 8.9 to 9.3 billion people by 2050 reduction in soil erosion and the improvement of land condition for food production is imperative.

How will the health of remote Australian communities be affected by climate change?

Speedtalk

Session: Speedtalk session 4

Time: 5.00-5.05

[1]Jane Addison, [2,3]**Digby Race**

[1]Jane Addison Consultancy, Alice Springs, Northern Territory, Australia, [2]CSIRO Sustainable Ecosystems, Alice Springs, Northern Territory, Australia, [3]Ninti One Limited & the Cooperative Research Centre for Remote Economic Participation, Alice Springs, Northern Territory, Australia

Many areas of remote Australia have communities with poor health outcomes. With climate change, health is predicted to be further affected. To help guide adaptation discussions with communities in Cape York, Central Australia and the Kimberley, we i) explored exposure to climate change, ii) cross-referenced vulnerability indicators from the literature with demographic data, iii) identified vulnerable community segments, and iv) suggested how this vulnerability may manifest with climate change. Exposure levels do not seem to be significantly higher than other areas of Australia. Major population centres (i.e. >5,000 people) in remote Australia, such as Broome, Kununurra and Alice Springs, have low levels of sensitivity at the township level due to the high socioeconomic status of a large proportion of the population. However towns, communities and outstations outside these major centres have relatively high levels of vulnerability. This is due to low socioeconomic status, poor health and large numbers of children. Given high levels of uncertainty, adaptation measures to climate change should follow key risk-related adaptation principles. In general, addressing socioeconomic disadvantage by, for example, improving primary health care for cardio-respiratory disease, is likely to be the adaptation measure to climate change that best meets all such principles. Other 'soft' measures, such as climate related health education or creating back-up plans for ongoing health care facilities that may be affected by extreme weather events (e.g. renal units), may also be appropriate. In this

Effective adaptation to climate change for coastal property development in Victoria

Speedtalk

Session: Speedtalk session 10

Time: 5.10-5.15

[1]**Alianne Rance**

[1]The University of Melbourne, Melbourne, Australia

With the muting of the climate change debate, there has been a judicious shift toward attenuation of associated climatic impacts through adaptation. The observation of the wider impacts of changed weather patterns as well as increased risks from physical exposure to sea level rise, erosion, and storm surge, with implications for coastal infrastructure, has motivated much action on the part of local government in coastal Australia. However, property developers driven through regulation or lack thereof have not been so energetic in this sphere. The relationship between local government and property developers, especially in the minefield that is coastal Greenfield development, has been tenuous at best. In the light of climate change impacts and associated movement in policy arenas, tension is set to rise.

New legislation or even broad governance to clarify approaches for adaptation planning is pending and end users may be legally required or encouraged to utilize a particular approach in conducting their adaptation planning process. Yet, the interaction and engagement between property developers and local government in the development of coastal urban communities must first be explored.

This PhD research investigates the principles for monitoring and evaluation in the context of climate change adaptation and encompasses these within a framework applicable to property developers and local government in coastal Victoria.

Considerations of climate risk in new coastal developments

Speedtalk

Session: Speedtalk session 2

Time: 4.55-5.00

[1]**Alianne Rance**

[1]The University of Melbourne, Melbourne, Victoria, Australia

Climate legal risk and adaptation law is an evolving field and spans a range of issues including corporate law, regulatory risks, and insurance risks to name a few. Climate change risk varies from other corporate risks due to its far reaching impacts across all aspects of company operations, but eventually it will become of the traditionally considered risks that corporations must attenuate when it comes to strategic planning. But what of the property industry and new developments with long time frames? How can property developers consider their climate risk and act to attenuate it? Questions surrounding who bears the primary liability for climate risk in the context of coastal greenfield property development, what are the roles and responsibilities surrounding climate change adaptation for property developers and what would motivate them to act are now due consideration.
This presentation considers these pressing issues in the context of coastal greenfield development in Victoria.

Climate change indicators for interdisciplinary reporting

Oral

Session: Parallel session 15

Time: 4.15-4.30

[1]**Scott Rawlings**

[1]Office of the Commissioner for Environmental Sustainability, Victoria, Australia

The Commissioner for Environmental Sustainability is responsible for producing a State of the Environment Report for Victoria every five years. Critically, the Commissioner is concerned with producing reporting products that are more focussed on the wider public as an audience, address the gaps in science communication, and more nuanced in how they articulate the social and cultural impacts of climate change.

To this end, our approach explains how changes in the natural environment due to climate change impact on the well-being of Victorians. We have used the "Five Capitals" model to derive indicators that accurately reflect both the environmental changes driven by climate and the social and human implications of that change. The direct effects of climate change are primarily environmental, thus the ecosystem services concept is suitable for linking environmental challenges to social impacts and priorities. The community values and priorities of the ecosystem services of urban, agricultural and coastal communities vary considerably - reflecting the dominant social and business sectors in these regions. Ultimately, sustainability reporting and the development of a functional set of indicators enhances the policy cycle. The transfer of data and information into knowledge and decision making is crucial. To make effective decisions faster - and for those decisions to be supported by clear policy implementation accountability - we need innovative ways of collecting and cataloguing the information and knowledge we use. This is particularly critical for environmental research where the barriers between research and policy (and between research disciplines) are considerably vexed.

Developing resilient green roofs for Adelaide

Speedtalk

Session: Speedtalk session 2

Time: 5.00-5.05

[1]**Mostafa Razzaghmanesh**

[1]University of South Australia, Adelaide, Australia

Adelaide is the capital city of the driest state in Australia and it currently faces three major challenges, namely urbanisation growth, water scarcity and climate change. The consequences of these threats put more stress on the urban water cycle and increase metropolitan temperatures through urban heat island effects. Introducing green infrastructure through water sensitive urban design is one of the solutions to reduce the harmful impacts of urbanisation while providing additional amenity and water quality benefits for communities and the environment. This paper describes the results of a current research project that is investigating the water quantity and quality effects and thermal benefits of two different types of green roofs, namely intensive and extensive.

Two study sites are used. The first is a full scale green roof, at ANZ House in the Adelaide CBD. The other one consists of a series of small scale green roofs located at the University of South Australia's Mawson Lakes campus. The results of the water quality studies show it is still possible to reuse this runoff for nondrinking purposes such as toilet flushing and urban landscape irrigation. Laboratory and field investigations of rainfall and runoff confirm that green roofs can retain significant amounts of stormwater and can also mitigate the peak flow and attenuate the time of concentration. The thermal benefits of green roofs have also been investigated through two scenarios of cold and warm days. The outcomes indicate that the thermal variation of the media is less than surrounding areas and on cold days the media's temperature is warmer than outside and on warm days it is colder. Integrating green roofs into the built environments of Adelaide could work as a climate change adaption tool that could yield significant benefits.

Opposing trends affecting Climate Change adaptation in agriculture in New South Wales

Oral

Session: Parallel session 19

Time: 4.00-4.15

[1]**Greg Reid**

[1]NSW Dept of Primary Industries, NSW, Australia

Primary producers are attempting to adapt to climate change but there are demographic, economic and structural forces working in opposing directions. Water use efficiency measures are highly desirable however rising electricity prices are making some of these high pressure systems uneconomic. Sustainable land management is a high priority on family farms however rising debt and the aging demographic of Australian farmers is driving increasing corporatisation in agriculture. Diversification is an important strategy in a variable climate however high capital costs favour specialisation. Rising insurance costs are leaving producers more vulnerable to climatic impacts. Carbon credits were expected to help stabilise farm incomes but also favour a reduction in available farmland. Negative production impacts of these trends would be expected to be countered by rising prices however in a global economy the result can instead be a transfer of food from countries with lower production costs. If climate change adaptation is to have a net positive effect on food security then integrated policies and incentives will be needed that compensate for counter trends in the agricultural sector.

Re-conceptualising community resilience in Australian disaster risk management

Oral

Session: Parallel session 6

Time: 3.00-3.15

[1]**Kimberley Reis**, [1]Deanna Grant-Smith, [1]Paul Burton, [1]Michael Howes, [3]Michael Heazle, [1]Peter Tangney, [2]Karyn Bosomworth

[1]Griffith School of Environment and the Urban Research Program, Griffith University, Queensland, Australia, [2]Climate Change Adaptation Program, Global Cities Research Institute, RMIT University, Victoria, Australia, [3]Griffith Asia Institute and School of Government and International Relations, Griffith University, Queensland, Australia

This presentation summarises the outcomes of a recent NCCARF project investigating the integration of climate change adaptation and disaster risk management to enhance community resilience in Australia. This was done via a comparative analysis of reports from official inquiries into three Australian disasters. They included: the 2009 Victorian bushfires; the 2011 Perth Hills bushfires; and the 2011 Brisbane floods. Interviews and workshops were conducted with key stakeholders representing social welfare, environmental, emergency management, and planning interests. This paper confirms and builds on recent international and national findings regarding approaches to enhance community resilience. It finds that while the idea of community resilience is becoming increasingly popular within the disaster risk reduction community, current framings of both 'community' and 'resilience' have been oversimplified. This has particular implications for how responsibilities for disaster resilience may be shared, and the role of community engagement. We argue that a re-conceptualisation of 'community' and 'resilience' is needed to ensure that the benefits promised can be realised.

Personal encounters with climate change: Their status, significance, and adaptation implications

Poster

Session: Poster session

[1]**Joseph Reser**, [1]Graham Bradley

[1]Griffith University, Gold Coast, Qld, Australia

Recent national survey findings in Australia relating to public risk perceptions, understandings, and responses to climate change and natural disasters have revealed the surprisingly powerful significance and seeming influence of perceived direct experiences with environmental changes or events over the past ten years which respondents thought might be due to climate change. Equally surprising was the finding that 45% of respondents across two sequenced surveys in 2010 and 2011(N= 7443) reported having such encounters. Comparisons between those with and without such experiences revealed dramatic differences across virtually all core variables being researched, including belief/acceptance, perceived risk, concern, distress, psychological adaptation, objective knowledge, and behavioural engagement. As the research also examined the nature and extent of reported prior experience with natural disasters, it was possible to compare the relative influence of these two differing types of direct experiences across respondents. Perceived direct experience with climate change evidenced far stronger relationships with mediating psychological variables than personal experience with natural disasters. The phenomenon, threat, and multi-modal nature of climate change exposure and experience has required a reflective re-consideration of the nature of direct and indirect exposure and experience, and the mediating roles of sense-making processes, interpretive lenses, and assumptive worlds in our respective climate change encounters. The presentation reports and discusses these research findings, convergent literatures, possible explanations, and implications relating to public understandings, psychological adaptation, and inter-relationships between direct and virtual exposure and experience to environmental events and changes associated with climate change.

Are the general public mental models consistent? A numerical assessment

Oral

Session: Parallel session 4

Time: 3.15-3.30

[2]**Claire Richert** () presenting, [1]Fabio Boschetti, [1]Iain Walker, [1]Jennifer Price

[1]CSIRO, WA, Australia, [2]AgroParisTech, Paris, France

We have developed a computational model of the mental representations people use to understand climate change, mitigation, and adaptation options. The model can be parameterised according to different beliefs and values commonly held among the public, and allows us to check the consistency of the expectations such beliefs and values generate.
We asked 250 Australians to 'run their mental model' for us; we asked members of the public to 1) parameterise our model according to their actual beliefs and values and 2) assess what the consequences of such beliefs and values may be. This allows us to compare the respondents' expectations to the model results. With the exception of the economic cost of mitigation and adaptation initiatives (which are generally largely overestimated), their choice of parameters is fairly well aligned with current scientific opinion. Also, at a group level, the combination of the results of each participant's mental model is reasonably consistent with the computational model, at least in terms of general trend. However, when such projections are analysed at an individual level, consistency drops significantly, showing that most participants draw conclusions which may be inconsistent with their own assumptions.
Finally, we studied the relation between the participants' mental models and their worldviews, political preferences, attitudes towards the environment and other cognitive traits. We found that the main predictors of their choices were their stated environmental commitment and their 'concern for future consequences'. This clearly highlights how climate change is understood both as an environmental and a social dilemma issue.

Framing and re-framing drought within agriculture

Oral

Session: Parallel session 19

Time: 4.15-4.30

[2]**Lauren Rickards**, [1]Peter Hayman

[1]SARDI, Adelaide, Australia, [2]University of Melbourne, Melbourne, Australia

Understanding the adaptation challenge in agriculture requires that we understand the changing phenomenon of drought. To do so requires not only physical science, but social science, for how drought is framed by farmers, scientists and policy makers within agriculture has changed over time. This paper draws on historical and social science research to map out the way drought has been framed during three overlapping eras of agriculture from the 1900s to present: productivity, sustainability and climate change. It argues that within the first two eras drought has been interpreted as, first, a disruption and business risk and, second, an environmental risk in dryland farming and irrigation. It then highlights the various roles attributed to drought within the current climate change era: an analogue for future conditions and a source of adaptive capacity; an obstacle to adaptation; a window of opportunity for transformational change; and a signal event. Examining the different ways in which drought is framed within agriculture is crucial for understanding the mixed policy signals and heated discussions about drought within the sector. As such, it is crucial for identifying competing needs and for progressing effective adaptation to drought and other climatic risks. Furthermore, interrogating how drought is framed within agriculture casts light on some of the reasons many farmers resist the anthropogenic climate change message by highlighting assumptions about the role of science in the sector.

Cloud Nasara* Pacific Climate Animation Project: communicating climate science in the Pacific region

Speedtalk

Session: Speedtalk session 7

Time: 5.15-5.20

[9]Ula Majewski, [1]Rebecca McNaught, [2]**Jill Rischbieth**, [7]Salesa Kaniaha, [3]Phillip Malsale, [4]Brad Murphy, [5]Christopher Bartlett, [6]Shannon Owen, [8]Joseph Siri

[1]Red Cross Climate Centre, The Hague, The Netherlands , [2]Commonwealth Scientific and Industrial Research Organisation - CSIRO, Melbourne, Australia , [3]Vanuatu Meteorology and Geo-hazards Department, Port Vila, Vanuatu, [4]Australian Bureau of Meteorology, Melbourne, Australia, [5]SPC-GIZ Climate Change Program, Port Vila, Vanuatu, [6]EyeSpy Films, Melbourne, Australia, [7]SPREP, Apia, Samoa, [8]JKS GRAFIKS, Port Vila, Vanuatu, [9]AVID - Red Cross, Melbourne, Australia

The Cloud Nasara Pacific Climate Animation Project aims to increase awareness of the science and impacts of climate variability in the Pacific, and to provoke discussion around how communities can take 'low regrets' actions to prepare for future El Niño and La Niña events and adapt to climate change.
Two short comical animation films are being developed as communication tools. One film will give an overview of climate processes and impacts in the Pacific region as a whole. The other film will be specifically focused on Vanuatu's climate as a pilot country. They will be accompanied by a comprehensive 'tool kit' which will include resources to help facilitators link the information presented in the animation to decision making and action.
The Cloud Nasara project is being developed through an ongoing consultative process, which includes research, focus groups, forums and direct communication with key stakeholders in Vanuatu and across the Pacific region. Cloud Nasara will be launched in July 2013.
The films and accompanying resources will be useful for organisations, governments, schools, regional bodies and community groups throughout the Pacific Island countries and territories. They may assist those working in fields that address climate risk such as climate change adaptation, disaster risk management, health, food security, community planning, and environmental protection.
*In Vanuatu, a 'nasara' is a meeting place

Development of a generic framework to determine the economic impact on NSW locations from natural disaster events

Oral

Session: Parallel session 14

Time: 2.15-2.30

[1]**Kevin Roche**

[1]Risk Frontiers, Macquarie University, Sydney, Australia

Development of a generic framework to determine the economic impact on NSW locations from natural disaster events
Measuring the impacts of natural hazards is a fundamental step and a necessary condition to enable efficient decisions, including those around resource allocation, to assist in progressing national capability in recovery and making communities more resilient. Insurance only covers part of the losses in an adverse event. Traditionally, estimates of economic losses focus on the financial cost of, and insurance payouts for, what has been or would be destroyed in a given event scenario. In this paper a framework is developed that can be used to estimate both the direct and indirect costs using a computable general equilibrium (CGE) model. The CGE model enables the interdependencies and linkages across the various sectors and regions of the Australian economy affected by a natural disaster event to be identified. By evaluating the distributive effects of these relationships we can determine the winners and losers at different levels (sectorial, business, household and geographic) throughout both the affected region and general economy. From this, effective actions can be taken to speed up the recovery process. In addition they provide an indication of the recovery elements, such as supply choke points, which may restrict the rebuilding and restoration effort. At present there is no generally available model or set of tools that can model the economic recovery costs of a natural disaster event in Australia. This framework addresses this gap and will provide extensive evidence for prioritising interventions, risk mitigation measures (especially where lifelines are concerned) and risk management.

Public or private responsibility for adaptation? Legal and regulatory considerations

Oral

Session: Parallel session 28

Time: 11.15-11.30

[1,2]Lisa Caripis, [1,2]Lee Godden, [3,2]**Francine Rochford**, [1,2]Jacqueline Peel, [3,2]Rachel Carter, [1,2]Jude Wallace, [4,2]John Handmer

[1]University of Melbourne, Melbourne, Australia, [2]Victorian Centre for Climate Change Adaptation, Victoria, Australia, [3]Latrobe University, Victoria, Australia, [4]RMIT University, Melbourne, Australia

Where does government's responsibility for climate change adaptation end and the private sector's begin? In the aftermath of another summer of bushfire and floods, this is a question on the lips of policy-makers, insurers, industry and business, and the general public. Answers are contentious, with significant cost, liability and policy implications. Governments through COAG have sought to answer this question through the adoption of a statement of understanding of the 'Roles and responsibilities for climate change adaptation in Australia'.

But asking this question assumes there is a clear divide between the public and private sector; that government departments and agencies operate in a realm distinct from that of business and community. Shifts to privatise government functions, embed market and corporate thinking in government operations and to strike 'partnerships' between government and industry mean that a public-private spectrum rather than clear divide is a more appropriate lens through which to develop answers to the question of responsibility.

We categorise the ways in which law regulates responsibility proactively and reactively, for example through legislatively enshrined statutory functions and duties, the building code and planning law, and liability in contract and negligence law. When applying this typology to the multi-sectoral and -scalar governance of flood risk in floodplains in rural Victoria, we find key areas of overlap and gaps. We show that development of policy responses to allocate roles and responsibilities for adaptation to climate change needs to take into account the existing legal framework to identify constraints, leverage points and enabling capacity.

The challenges of climate change adaptation for judges: developing new methodologies for judicial reasoning in climate change litigation

Oral

Session: Parallel session 7

Time: 4.00-4.15

[1]**Nicole Rogers**, [2]Brendan Mackey

[1]Southern Cross University, Lismore NSW, Australia, [2]Griffith University, Gold Coast Queensland, Australia

In the last decade we have seen the rise of innovative climate change litigation. This often involves the creative deployment of existing legal concepts; in the absence of comprehensive climate change legislation, lawyers have been forced to explore the potential for climate change mitigation and adaptation in existing regulatory regimes. Yet the outcomes are rarely successful. Many judges appear reluctant to adapt existing law to the exigencies of a climate changed future.

By way of contrast, the majority of scientists have accepted that such a future is inevitable and drastic measures are needed. In reaching this conclusion they have embraced new methodologies, involving simulation modelling, transdisciplinary perspectives and speculative futuristic scenarios. This departure from Popperian science serves as an example to those judges who are operating within conservative models of statutory interpretation and precedent in reaching their decisions. Judges must depart from such well-entrenched disciplinary traditions if they wish to engage with speculative future visions in decision-making in climate change litigation.

There is an urgent need for judicial education in the science of climate change mitigation and adaptation, in the associated ecological and societal consequences, and in scientific methodologies. In this paper we identify disciplinary constraints on judicial thinking in existing climate change litigation, analyse the judicial use and understanding of scientific findings and scientific methodologies in such case law, and suggest new methodologies for judicial decision-making. A transdisciplinary approach is the first step in identifying and challenging the constraints which prevent effective adaptation outcomes in climate change litigation.

Living with Nature - Ceremony is Adaptation

Speedtalk

Session: Speedtalk session 1

Time: 4.50-4.55

[1]**Phillip Roos**

[1]Deakin University, Victoria, Australia

Aboriginal people of the South-west coast in Victoria live close to the land, and they have a distinctive way of identifying our connection with the world. Instead of viewing actions of nature and man as instant and individual disconnected processes, they tend to see the whole picture. This wholeness with nature is embedded within tradition, culture, settlement patterns, daily activities and ceremony. For centuries the Wathaurong and Gadubanud people have been confronted with changing ecological and climatic events, and living close to nature required an in depth knowledge of sea level rise, tidal changes, landscape changes, behaviour of animals, and the availability of food sources. Reviewing the concept of wholeness with nature, backed by extensive literature reviews, this paper seeks a better understanding of the past indigenous environmental management practices of the coastal region, and considers its possible application for future coastal planning under climate change effects and sea level rise.

Indigenous population movement in south east Australia during a 20th century drought event

Oral

Session: Parallel session 29

Time: 2.45-3.00

[1]**James Rose**

[1]University of Melbourne, Melbourne, Australia

Between 1918-1920 severe nation-wide drought resulted in the closure of numerous govenment reserves designated as living areas for Aboriginal people in central-western NSW (Beckett 1994, 2005; Donaldson 1980; Kabaila 1996). The semi-arid Cobar Peneplain region in particular was severely affected, and much of the Indigenous population evacuated, either by choice or under government relocation programs, to peripheral areas with more relaible water sources (ibid.). To handle this sudden population concentration, large-scale government-run settlements were established at several outlying locations, notably at the towns of Menindee, Brewarrina and Coonamble, on the Darling, Barwon and Macquarie Rivers respectively. Although this major population concentration was partly reversed during the subsequent two decades, its effects were permanent, and few of the remote locations previously occupied by Aboriginal people were ever systematically resettled. While there are numerous first-hand accounts of this event, recorded by anthropologists, linguists and historians (see above), there appear to be no formal large-scale studies of population-wide adaptation to this climate event. Utilizing large-scale genealogical and geospatial population data collected from public sources, this paper will present 3-dimensional computer visualizations of the Aboriginal population's response to this event, beginning in the two decades preceeding it, and over the six decades following. This modelling shows a population initially distributed over a relatively high number of smaller remote settlements, suddenly concentrating into a small number of larger settlements, and then partly redistributing to mid-range towns, and later to major urban centres.

Climate change and its impacts on planning and adaptation strategies (case study from Punjab and Sindh: Provinces in Pakistan)

Poster

Session: Poster session

[1]**Awais Sadiq**

[1]LaTrobe University, Victoria, Australia

Climate change is one of the biggest issues which the world is facing at the moment. "Climate change refers to a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (United Nations Framework Convention on Climate Change 1992, p. 3). The human beings are solely responsible for making our climate and atmosphere so vulnerable. The seasons are shifting, temperatures and sea levels are rising and our planet still has to supply us and all the living creatures with food, water, and fresh air and safe place to live.

Climate change now is such a reality for Pakistan from which Pakistan cannot escape. The geographical location of Pakistan is such that any change in climate will bring severe impacts on the country. Although the contribution of Pakistan to global climate change is low but still it is one of the most vulnerable countries to climate change. Climate change is no longer a choice for the country, it is now a major issue and which the country has to deal itself. The country does not have enough resources to combat the issue so the main objective of my research is to develop some adaptation strategies for climate change in a country like Pakistan where there is so much uncertainty.

Patterns of climate change and coping strategies of small farmers in mountainous area of Kaghan Valley, Northwest Pakistan

Speedtalk

Session: Speedtalk session 6

Time: 5.00-5.05

[1]**Umair Safdar**, [1]Babar Shahbaz, [1]Dr. Tanvir Ali, [1]Shoukat Al

[1]University of Agriculture, Faisalabad, Punjab, Pakistan

The mountainous areas of northwest Pakistan are typified by patches of agriculture field and terrace farming, while continuation of livelihood depends on agriculture and livestock in this region. These mountainous areas are very vulnerable to climate change and climatic extremes. Kaghan Valley was selected purposively because it is a fragile area and changing of weather patterns and climate change negatively affects the source of livelihood of the people. The study was designed to analyze the patterns of climate change and how small farmers cope with climate change and climatic extremes. The results designate that there has been significant change in climate pattern in the study area for the last fifty years and this change has its adverse impacts on the agriculture and livelihoods of small farmers. Food storage, crop rotation and migration were reported as the most experienced coping strategy of the small farmers to build their resilience against climate change. It is therefore suggested that alternate agricultural practices should be introduced to build the resilience of the people and forest must be conserve to avoid deforestation. In this regard agricultural extension and forest department have to play their role to build the capacity of the small farmers to cope with the changing trends of climate.

Key words: Climate change, Coping strategies, Mountainous area, Kaghan Valley

Application of SWAT model for climate change impact analysis on Yass River flow: a sub-catchment of Murrumbidgee River

Speedtalk

Session: Speedtalk session 5

Time: 5.10-5.15

[1]**Partha Pratim Saha**, [2]Ketema Zeleke, [3,4]Mohsin Hafeez

[1]School of Environmental Sciences, Charles Sturt University, Wagga Wagga, NSW, Australia, [2]School of Agricultural and Wine Sciences, Charles Sturt University, Wagga Wagga, NSW, Australia, [3]School of Environmental Sciences, Charles Sturt University, Albury, NSW, Australia, [4]GHD, Pty Ltd, Brisbane, QLD, Australia

Australia is the driest inhabited continent with variable climate and the country is vastly exposed to the impacts of climate change. Water resources management is expected to be more challenging as most of the future climate projections are indicating reduced water availability. Comprehensive research is required to identify the probable impact of climate change on the water yield of major catchments because each individual catchment has unique characteristics. This research uses the physically based distributed watershed model "Soil and Water Assessment Tool" (SWAT) to analyse the impact of climate change on Yass River watershed in the Murrumbidgee catchment, Southern New South Wales. A hydrological model was developed in SWAT using 90m SRTM DEM, Dynamic Land Use of Australia, and Digital Atlas of Australian Soil. The model was successfully calibrated and validated for 1993 to 2011 flow with a combination of manual and auto calibration techniques. Sequential uncertainty fitting (SUFI-2) and parameter solution (ParaSol) algorithm were used for auto-calibration. Nash Sutcliffe Efficiencies (NSE) of 0.83 and 0.78 for calibration and validation respectively indicate very good agreement between measured and simulated flow. Average of four GCMs downscaled data for three main IPCC scenarios: B1, A1B and A2 were used to simulate the stream flow of the river for three future periods: 2030, 2050 and 2090. All the simulations indicate reduced flow ranging from 22% to 78% where 2090 flow of A2 scenario being the worst. The seasonal variation also shows decreasing trend except A1b, B1 autumn and A2 winter flow of 2030.

Climate Change Adaptation with People Participation: A Case study of village Panchayat in India

Poster

Session: Poster session

[1]**Gita Sahibi**

[1]Forest, Shimla, India

Water scarcity, unemployment, lack of higher education, degradation, timber, fuel wood, increased fodder demands, low farm income & poverty, compelled the people of villages under study in the Indian Himalayas to reach a common platform and chalk out means for adaptation to meet with these challenges posed by climate changes. Villagers constructed check dams, water harvesting structures, water tanks, spurs, raised 32 hectares of plantations, water ponds, mangers (feeding stalls for livestock), and vermi compost units. This study is based on the data collected from a sample of 50 beneficiary households from Panchayat. Control samples of 25 households drawn from one village adjoining to selected Panchayat, having similar agro-climatic conditions. Analysis reveals that after community participation, the area under irrigation increased by 38 percent. Number of graduates, middle standard & primary level increased. The green cover increased by 25 percent, incidences of forest offences have declined by 58 percent, 42 percent reduction in extraction of fodder from the forests, livestock grazing have declined by 90 percent, 80 percent increase in forest crop protection due to community participation. Dependence for fuel wood, and fodder from forest, decreased by 45 and 20 percent respectively. Increase in use of LPG gas, milk production and employment in regular service by 30, 67, and 30 percent respectively. The production of cash crops, vegetables flowers, organic farming use increased by overall 45 percent respectively.
Poverty alleviation, improvement in living standards, decrease in dependence on forest resources, increase in green cover, milk, crop production due to people participation in climate change adaptation.

The Oasis model, as a sustainable response to global changes, combating desertification and climate change adaptation in Morocco.

Poster

Session: Poster session

[1]**Adil Said**

[1]International Institute of Tourism, Tangier, Morocco

Oases represents an extraordinary source of knowledge for all drylands, or those threatened by desertification. In Morocco, Oases cover about 7 Millions ha.
A specific program for adaptation to climate change has been initiated. It aims at reinforcing the resilience of oasis ecosystems and their ways of life and methods of production, as well as at safeguarding their historical and cultural heritage.
Oases are a model for efficient resource management for the whole planet. They can become a new model for development and economy through the actions undertaken to safeguard and value them.
The vast desert lands, including the oases, offer enormous renewable energy opportunities, such as solar energy to name only one.
High-quality, eco-friendly tourism which respects the environment offers opportunities yet not fully explored.
Oases are a model of sustainability and adaptation despite their know-how and capacity to adapt to a hostile environment, the populations of these zones need the support of new technologies and strong partnerships in order to safeguard and sustain their heritage.
These ambitious programs are based on a participative and partnership-based approach, founded on agreements with the regions, provinces, and communes. They give the local actors a central role to play in development.
The oasis is an extraordinary model for the whole planet. The work that has been started within the strategy of mitigation and adaptation to climate change in resilient oases in Morocco requires building solid partnerships and mobilizing important funds in order to safeguard this model of sustainability.

A world with less water - Adapting to a changing climate in the Riverina

Oral

Session: Parallel session 5

Time: 3.45-4.00

[1]**Marcus Sainsbury**, [1]Guillaume Prudent-Richard, [1]Nicola Glenndining

[1]AECOM Australia, Canberra, Australia

In 2010-2012 AECOM was engaged by the Riverina Eastern Regional Organisation of Councils (REROC) to undertake a multiple stage climate change and water security adaptation program. This program supported ten local councils and two water utilities in terms of climate change risk assessment and adaptation.
The project included the identification of past and future climate trends. Both changes in mean variables and extreme events such as intense rainfall were considered. During the first two stages of the project these inputs were used to identify changes in water availability and the implications for REROC local governments and regional industries. The third stage of the project focused on the potential risks to assets owned and operated by the REROC Councils (in terms of potable, wastewater and stormwater services) as well as impacts on land use planning and strategic development.
Current asset management practices were documented and benchmarked against best practices. Detailed risk assessments were undertaken for each asset class for a range of climate change risks using an online risk assessment tool. The project also considered implications of climate change and reduced water availability to land use planning and strategic development by reviewing the adequacy of current practices and tools and considering changes in the regional competitiveness. Finally, initiatives were proposed to Councils to address the identified risks and one initiative was selected for further work in the form of a pre-feasibility study.

"Switch off", part-time environmentalism or effective engagement? The limited impact of the deficit model on people's responses to climate change

Poster

Session: Poster session

[1]**Rodolfo Sapiains**, [1]Robert J (Bob) Beeton, [2]Iain Walker

[1]The University of Queensland, Brisbane, Queensland, Australia, [2]CSIRO, Perth, WA, Australia

Climate change communication is complicated. Neither massive information access nor consensus in the scientific community has been enough to achieve sufficient public support for non-controversial climate change actions. Two decades after the 1992 Rio summit, scientific publications have grown exponentially but the public remains divided about the causes, magnitude and solutions needed to address the problem. This paper reports a qualitative study conducted in Australia to explore people's responses to climate change communication. Overall, scientific consensus does not impact on those whose belief system is incompatible with the message. Through the cultural cognition process people filter the information to accommodate it to their own values and beliefs. Our conclusions suggest that trying to convince or educate such peoples about climate change or environmental issues in general using the deficit model strategy will fail. Different narratives should be built to promote actions on climate change, emphasising the positive consequences of the actions and their coherence with cultural beliefs and values of different groups.

Expecting adaptation: the who, when, where and what of managing the Great Barrier Reef in a climate stressed world

Oral

Session: Parallel session 24

Time: 11.00-11.15

[1]**Chloe Schauble**

[1]GBRMPA, Townsville, Australia

The challenge of looking after the Great Barrier Reef is set to get harder as our climate changes. What do we expect of the agencies, industries and communities that manage and use this global treasure?
The Great Barrier Reef Marine Park Authority has set out on an incredibly important, yet unavoidably challenging, adaptation journey. After five years of striving to put theory into practice what has been done, who have we worked with, what's been achieved, and where we are going next? Find out in this introductory presentation for the Adaptation in action for the Great Barrier Reef special session.

The human face of climate change: Adaptation in a vulnerable coastal community context

Oral

Session: Parallel session 3

Time: 4.15-4.30

[1]**Paul Schneider**

[1]Massey University, Palmerston North, New Zealand

Climatic changes are being recorded and experienced and coastal communities are already adversely affected with impacts projected to intensify. Adaptation is embryonic at best and needs to take place in the face of already diverse and contested interests presenting coastal communities with a dilemma: Well-intentioned approaches dressed in the rhetoric of adaptation are compounding existing problems by fostering unsustainable and maladaptative development. While 'business as usual' dominates, the need for new governance modalities has never been more urgent. This research focuses on New Zealand's Coromandel Peninsula in a case study that underscores the need to understand the 'messy' local factors that present barriers to and opportunities for climate change adaptation. Drawing upon insights from and integrating political ecology and environmental planning, this research is based on an ethnographic approach that provides new insights about adaptation barriers and opportunities. Particular attention is focused on the relationship between adaptation rhetoric (as legislative and guidance imperatives, and case law), and multiple local realities (in vulnerable, multilayered community setting). The narratives garnered from the research revealed a disjunction between rhetoric and reality and suggests practical ways forward. These suggested ways forward do not involve technical solutions. Instead, the findings show that adaptation needs to be located in innovative governance approaches founded on processes of constructive deliberation. Consequently, current consultative processes and social order which have proven to be incapable of addressing this vexatious situation need to be transformed.

Climate Change Adaptation in Cities: a Synthesis-Analysis for Sydney

Oral

Session: Parallel session 16

Time: 4.15-4.30

[1,2]**Sandra S. Schuster**, [2]Erica C. Tinio, [2]Michael Neuman

[1]Independent Consultant, Sydney, NSW, Australia, [2]City Futures Research Centre at University of New South Wales, Sydney, NSW, Australia

Sydney is expected to experience warmer temperatures, more variable rainfall, increased evaporation, rising sea levels and an increased risk of flooding and bushfires. This presentation demonstrates Sydney's vulnerability to these changes and expected impacts on key sectors of society and diverse Sydney metro ecosystems. Sydney's planning concept of 'multi-centralisation' promotes many large regional centres, which serve catchment areas across the metropolitan area.
Themes addressed in the presentation are:

- Urban form, land use and sustainability.
- Temperature and the UHI effect.
- Bushfire.
- Riverine flooding including flash flooding.
- Coastal flooding.
- Social impacts and adaptive capacity.

Our review canvassed, synthesised, and analysed national and international examples of local Climate Change Adaptation (CCA) in the built environment. Key examples of adaptation strategies include:

- Evaluation of future options and scenarios for urban form and structure using comparative life cycle methods.
- Green spaces; creation of light coloured reflective surfaces; more compact city design.
- Distance enhancement between bushland and developments; use of hazard reduction measures, community education and engagement.
- Distribution and decentralisation of green infrastructure to reduce stormwater run-off, adoption of early warning systems.
- Mitigation of sea level rise risk through protection and accommodation and use of comparative life cycle cost benefit analysis to assess the most appropriate and effective strategies.
- Providing ameliorative infrastructures and facilities to vulnerable communities.

Climate Change Adaptation in Sydney: a Synthesis

Poster

Session: Poster session

[1,2]**Sandra S. Schuster**, [2]Erica C. Tinio, [2]Michael Neuman

[1]Independent Consultant, Sydney, NSW, Australia, [2]City Futures Research Centre at University of New South Wales, Sydney, NSW, Australia

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- Providing ameliorative infrastructures and facilities to vulnerable communities.

Strengthening community resilience to extreme weather events using trans-dimensional, multi-hazard Self Assessment

Oral

Session: Parallel session 29

Time: 1.45-2.00

[1]**Jenny Scott**, [1]Jennie Cramp, [1]Michelle Rose

[1]Ku-ring-gai Council, New South Wales, Australia

Ku-ring-gai Council completed its climate change adaptation strategy in 2010. The key adaptations emerging from the merit analysis demonstrated sustainability and risk reduction to more than one hazard type. The Climate Wise Communities (CWC) program developed in 2012 sought to deliver these high priority adaptations. Three pilot workshops were conducted which focused on bush fire. These workshops tested a new method from RMIT to enable community members to identify bush fire hazards, self assess their vulnerability and examine the adequacy of their bush fire plans. This method guides self assessment across the personal, property and neighbourhood dimensions. It promotes the reality of shared responsibility as central to reducing vulnerability and explores the local context through people's experience of past bushfire events. This method highlights the resilience benefits from participating in an interdependent network. It also allows the most vulnerable residents to be included in the neighbourhood response framework without being labelled as 'vulnerable'. Participation was enhanced by targeting existing community networks such as schools and Bushcare groups and through the neighbourhood's 'social facilitator' because such people often bind neighbourhoods together. The participatory nature of the workshops provided excellent opportunities for residents to develop and strengthen local connections; share past experiences; explore locally relevant questions and clarify areas of concern. This interactive format proved valuable in developing a shared responsibility compared with more traditional methods of presentation. The challenge for Ku-ring-gai Council now is to expand the RMIT method into a multi-hazard approach including bushfire, storms, floods and extreme heat.

Recovering from natural hazards under a changing climate: lessons from cyclone Yasi

Oral

Session: Parallel session 6

Time: 3.45-4.00

[1]**Silvia Serrao-Neumann**, [1]Florence Crick, [1]Jenny Wadsworth, [1]Darryl Low Choy

[1]Griffith University, QLD, Australia

Climate change is expected to increase the frequency and intensity of extreme weather events affecting Australia. This is likely to add extra pressure to emergency management services, which are already stretched, especially if multiple extreme events occur over a short period of time. An example of this situation occurred in early 2011 when Queensland was affected by major flood events followed by category four tropical cyclone Yasi. Additionally, recovering from disasters caused by natural hazards is a long and complex process that requires further understanding in particular in terms of how it can contribute to adapting to climate change. This paper aims to contribute to this understanding by focusing on the recovery process of the Cardwell community which was severely affected by tropical cyclone Yasi on February 2nd 2011. Drawing on empirical data collected through two series of interviews and seven workshops conducted between 2011 and 2013, the paper reports on the experiences of community members related to the response and recovery from Yasi. In particular, the paper highlights the areas that need further improvement in the disaster response and recovery phases. Lessons learnt from cyclone Yasi are then discussed to inform future climate change adaptation initiatives related to the emergency management sector.

The emergence of local climate change policy: international diffusion or local development?

Speedtalk

Session: Speedtalk session 13

Time: 5.15-5.20

[1]**Rukuh Setiadi**, [1]Paul Burton

[1]Urban Research Program, Griffith University, QLD, Australia

This presentation draws on research that is concerned with improving our understanding of how climate change policy responses are developed in localities such as cities, municipalities and provinces and why different policies develop in different places.
It is widely accepted that while climate change is a global phenomenon, adaptive responses are best developed locally to suit local conditions. However, it is also believed that localities can learn from each other in developing their responses and that processes of policy learning and transfer can help in this. The presentation provides a critical review of the general literature on policy development, policy learning and policy transfer and applies this to a selection of international experience of local climate change policy development. The review compares four major strands of literature: innovation and diffusion models; advocacy coalition frameworks; institutional analysis and development; and multiple streams approaches. In the application of these strands of analysis to local cases of climate policy development particular attention is paid to the interaction of local factors with external factors such as the promotion of good practice by international NGOs and transnational networks of climate policy advocates.
The presentation concludes that while there is some evidence of structured processes of policy diffusion and learning among localities concerned with the development of climate change policy, local factors are more important in these processes.

Integrating landslide risk assessment into city spatial planning in improvement of climate change resilience, case study Tarakan City, East Kalimantan Province, Indonesia

Speedtalk

Session: Speedtalk session 5

Time: 4.50-4.55

[1,2]**Budhi Setiawan**, [2]Zamsyar Giendhra Fad

[1]University of Sriwijaya, Palembang, Indonesia, [2]Secretariat of Climate Change Resilience, Jakarta, Indonesia

In current situations related to climate change, decision-markers and stakeholders either participate in or drive the assessment, shifting from research-driven approaches to assessment integrated toward policy marking (UNDP, 2005). Since 2008, the Government of Indonesia has explored the use of a risk assessment approach climate change adaptation planning. Several case studies have been done including the preparation of a national document, namely Indonesia Climate Change Sectoral Roadmap, Climate Change Risk and Adaptation Assessment in the Province of South Sumatera, the Province of Nsa Tenggara Barat, Greater Malang and the City of Tarakan (Soeroso et. all, 2012).
Tarakan is a city in a small island in Indonesia that is tipped to be prone to the impact of climate change. The interdecadal variation of rainfall indicate a potential climate (data at 1960s) when the decadal mean of monthly rainfall during April-August decreased by about 100 mm compared to its longterm average (Hadi, et all, 2012).
Historically, Tarakan has experienced many landslides in its riverways and other ground- water bodies. Several landslides have caused loss of properties and even lives. Generally, landslides, erosion and sedimentation are very closely related to the condition of surface water flow and water behavior underground, where a high quantity of groundwater could cause landslides; also, a heavy flow of surface water on relatively open lands is causing erosion and sedimentation. Thus, landslides, erosion, and sedimentation problems in Tarakan are important considerations as strategic issues in city planning in improvement of climate change resilience.

There is more to it than public transport

Poster

Session: Poster session

[1]**Rosemary Sharples**

[1]University of Technology, Sydney, Sydney, NSW, Australia

Like all other facets of life, everyday travel will need to adapt to the new realities of a changing climate, by, for example, reducing the number and length of journeys undertaken by vehicles whose energy source involves the burning of fossil fuels at any stage in order to reduce the amount of greenhouse gases emitted. This is particularly relevant to journeys by car.
When trying to find solutions to a dilemma, it can be instructive to study the way similar problems have been handled in the past. There have been occasions where it has not been possible to continue to travel as before because transport infrastructure has been damaged. People have been required to rethink their travel behaviour to accommodate the change.
Motorists' responses to these, and less extreme, situations show that there is a wide range of possible reactions beyond simply changing route. The responses vary over time and are not confined to a single action. Several examples of complex strategies will be presented. The evidence is that less extensive changes are made first, with more major ones only being used if these more minor ones are not adequate. This provides some indications of how people are likely to behave if substantial changes are required in their travel.
Climate change has its own characteristics, which make it unique. However, knowledge of motorists' responses to damaged transport infrastructure can give planners some insight into how they might most productively guide and facilitate necessary changes.

Climate adaptation in the Abrolhos Islands fishing community: a cascade of environment, management, economic and social changes

Speedtalk

Session: Speedtalk session 3

Time: 5.15-5.20

[1,3]**Jenny Shaw**, [2]Nick Caputi, [1]Laura Stocker

[1]Curtin University Sustainable Policy Institute, Fremantle, WA, Australia, [2]WA Fisheries and Marine Research Laboratories, Hillarys, WA, Australia, [3]Western Australian Marine Science Institution, Perth, WA, Australia

Global, national and regional changes to the marine environment are following predicted patterns. More recently, fine-scale changes consistent with climate predictions are being documented in Australian marine systems. Adaptation strategies have been developed, and in some cases implemented, in relation to fisheries management. However, little research has been conducted on the socio-economic consequences to communities of this cascade of climate, environmental, and management changes. This paper explores the social changes in a rock lobster fishing community at the Abrolhos Islands, Western Australia. From 2006 to 2012 there was a very low settlement of post-larval lobsters, including the lowest rate in 40 years in 2008/09. The reduction in lobster larvae appears to be climate driven. Significant effort and catch reductions were imposed across the entire fishery. The linkages between climatic, environmental and subsequent management, economic and social changes have been investigated. Key findings are that the management changes resulted in almost half of the boats leaving the fishery over a 3-4 year period. Fishers generally had to make the decision to sell or lease their licences (unit entitlement) or buy units from other fishers. The fishers who remained have altered their patterns of fishing so that they fish to price, coming to the Islands only when the price is high, often supplementing their income with alternative livelihoods. Wives and children no longer stay on the Islands, with many wives having to work on the mainland instead. Clubs, sporting fixtures and schools have closed down as a result, leading to community collapse.

Adapting Between the Flags: enhancing the capacity of surf life saving australia to cope with climate change

Oral

Session: Parallel session 3

Time: 4.00-4.15

[1]**Shauna Sherker**, [1]Norman Farmer, [2]Russell Richards, [2]Oz Sahin, [2]Marcello Sano, [2]Rodger Tomlinson, [2]Daniel Ware

[1]Surf Life Saving Australia, Sydney, Australia, [2]Griffith Centre for Coastal Management, Gold Coast, Australia

Surf Life Saving Australia (SLSA) has assets and facilities exposed to climatic drivers, including 311 surf life saving clubs (SLSCs) and more than 160,000 trained volunteers delivering coastline services.
We employed a range of methods to identify climate change adaptation options and to explore adaptive capacity, combining stakeholder engagement, systems thinking, system dynamics and Bayesian network modelling within selected SLSCs.
Stakeholder workshops, involving national SLSA representatives, surf lifesavers, lifeguards, local council and community representatives focused on asset management, lifesaving operations and the role of local clubs in increasing community resilience.
A first round of workshops was the base to identify relevant adaptive responses from stakeholders. These included the defence of current assets, their relocation and retreat, and the improvement of lifesaving operation through training and equipment upgrades. At a national level, improving partnerships with external organisations, building capacity to provide guidance for clubs and mainstreaming climate adaptation in current procedures were identified as priorities for climate change resilience.
A second round of workshops was centred on a Bayesian belief network modelling exercise to identify the determinants of implementing these adaptation options, such as type of funding, knowledge in developing options, and will for change. Adaptive capacity determinants fell into three broad categories: (i) funding, (ii) technical knowledge and (iii) social and institutional networks.
Other outputs anticipated from this important study include: user friendly case study outcomes and factsheets on coastal hazards and adaptation options relevant to SLSA.
Acknowledgements: The project was funded by NCCARF and SLSA

Integration of species distribution models and metapopulation models to investigate the potential impacts of climate change on the endangered rainforest shrub Triunia robusta (Proteaceae), endemic to the south-east Queensland, Australia

Poster

Session: Poster session

[1]**Yoko Shimizu**, [1,2]Arnon Accad, [1]Richard Warrick, [1]Scott Burnett, [1]Mike Powell, [1]Alison Shapcott

[1]Genecology Research Centre, The University of the Sunshine Coast, Queensland, Australia, [2]Queensland Herbarium, Department of Science, Information Technology, Innovation and the Arts, Queensland, Australia

Climate change is already affecting plant distributions, and the species predicted to be the most vulnerable are the ones that have small, isolated populations and low genetic diversity. Many studies have modelled the potential impact of climate change on plant distributions, however, the majority are based on geographical and a-biotic factors and often ignore the potential effects on species population demographics and ecological dynamics. This research focuses on investigating the potential long-term viability and extinction risk of the endangered rainforest shrub Triunia robusta under projected climate change scenarios through an integration of species distribution models and metapopulation models. Triunia robusta is endemic to the Southeast Queensland, Australia, and its habitat is restricted to small subtropical rainforest fragments. Here we present preliminary results of potential impact of climate change on T. robusta distribution using a maximum entrophy approach. MaxEnt version 3.3.3k was used to predict the current distribution of T. robusta using high resolution climate surface data obtained from SIMCLIM© and environmental data from Queensland state government as to be used as the baseline model. Future climate projection surfaces were developed for each decade between 1990 and 2070 with A1F1, A1B and A2 SRES scenarios, and the Maxent baseline model was then projected onto these future climate surfaces to investigate the potential changes in distribution. The predicted future distribution of T. robusta under climate change scenarios will later be used to develop a spatial framework for metapopulation models and population viability analysis (PVA).

Working out what to put where in the landscape in a climate ready future

Oral

Session: Parallel session 19

Time: 3.00-3.15

[2]**Mark Siebentritt**, [1]Wayne Meyer

[1]University of Adelaide, SA, Australia, [2]Mark Siebentritt & Associates, SA, Australia

Landscape science has progressed to the point where modelled data presented in various visual formats can provide detailed maps of how combinations of future climate, commodity prices and carbon price impact on land management options such as agriculture, carbon plantings, biodiversity conservation and weed management. This information is valuable for informing the development of NRM and regional development plans and is of general interest to farmers and land managers. But as we strive to produce maps with finer resolution, longer term forecasts and increasingly complex scenarios, we risk presenting information that either distresses landholders if their property ends up on the wrong side of a "red line" or leads them to challenge the validity of underlying models; both outcomes acting as a barrier to use what we regard as best available science. This paper identifies implementation learnings relevant to application of the results of landscape science, drawing on the experience of the Adapted Future Landscapes project in the Eyre Peninsula and South Australian Murray-Darling Basin NRM regions, which involved both researchers and end users in its design and delivery.

Psychological theories of environmentally responsible behaviour

Speedtalk

Session: Speedtalk session 4

Time: 4.40-4.45

[1]**Donna Simpkins**

[1]Monash University, Melbourne, Australia

The field of psychology is intimately associated with behaviour change and therefore is ideally suited to helping address behaviour change within the individual or community to generate environmentally significant benefits. A body of research within environmental psychology has explored the area of environmentally responsible behaviour (ERB), which refers to any individual or set of behaviours which consciously seeks to minimise the negative impact of their behaviour on the environment, such as by recycling, buying organic products, and reducing waste and energy use. Much of this research has sought to explain why people engage in environmentally responsible behaviours and what the barriers are to engaging in these behaviours. A key feature of this body of research has been the recognition of a 'value-action gap', whereby people's environmental behaviour does not match their stated values or attitudes regarding the environment. Numerous theoretical frameworks and models have been developed to explain and predict individual's environmentally responsible behaviour. However, currently no conclusive answers have been found.
This presentation will give an overview of a number of influential psychological frameworks and models which have arisen from research and continue to inform thinking on ERB. The presentation will conclude with a review of the author's current PhD work in progress which will apply the Transtheoretical Model to the area of ERB, specifically energy use.

A comparative study of sustainable development initiatives in two public health enterprises

Poster

Session: Poster session

[1,2]**Judith Singleton**

[1]Griffith University, Brisbane, QLD, Australia, [2]University of Queensland, Brisbane, QLD, Australia

Public health enterprises have a significant carbon footprint. As responsible corporate citizens, and particularly since their core business is to treat public health as well as provide preventative health information, they should be endeavouring to not only reduce their carbon footprint, but move towards becoming truly sustainable enterprises - sustainable in the sense of recognising the inter-relationships between economic, social and ecological systems.

This research was an exploratory study of the sustainable development initiatives in Queensland Health (QH) and the NHS England (NHS). Due to time constraints, it was a 'snapshot' and involved two phases - the first phase consisted of a thematic content analysis of publicly available documents on the websites of the sustainable development units of QH and the NHS and the second phase consisted of interviews with the staff of these two units.

Consistent themes were found between the two phases for both QH and the NHS, with the NHS documents and interviews demonstrating a broader, strategic, systems approach and the QH documents and interviews showing a much narrower, facilities and utilities focus. Evidence of good examples of practice was seen with both enterprises, but the actual extent of the uptake of sustainability enterprise-wise was unclear from this study.

This research argues for a systems approach to transition these enterprises to sustainable enterprises. The strategic, systems-focused approach of the NHS England would benefit Australian public health enterprises as they strive to build capacity for climate change adaptation.

Enhancing adaptive capacity in South East Queensland

Oral

Session: Parallel session 35

Time: 2.45-3.00

[1]**Tim Smith**, [1,2]Anne Roiko, [1]RW (Bill) Carter, [1]Dana Thomsen, [1]Julie Matthews, [1]Noni Keys, [1]Marcus Bussey, [3]Russell Richards, [3]Marcello Sano

[1]Sustainability Research Centre, University of the Sunshine Coast, Queensland, Australia, [2]School of Public Health and Smart Water Research Centre, Griffith University, Queensland, Australia, [3]Griffith Centre for Coastal Management and Griffith Climate Change Response Program, Griffith University, Queensland, Australia

This paper presents the findings of the Adaptive Capacity theme of the South East Queensland Climate Adaptation Research Initiative (SEQCARI), Australia's largest single investment in a regional adaptation research initiative that ran over 3-years. While many adaptation plans have been (and are being) developed, often little consideration is given to the various factors (adaptive capacity) needed for their successful implementation. This paper presents an assessment of adaptive capacity across a range of sectors in South East Queensland. A multi-method approach was adopted for the research, including an historical assessment of adaptive capacity, analysis of socio-economic trends affecting the region, participatory systems workshops, and Bayesian Belief Network (BBN) analysis. A number of recommendations will be presented to build adaptive capacity in the region based on the findings. We conclude that the major issue impacting adaptive capacity is not the availability of physical resources but the dominant social, political and institutional culture of the region.

Assembly processes at biogeographic transition zones in tropical-to-temperate eastern Australia

Oral

Session: Parallel session 17

Time: 3.45-4.00

[1]**Brigitte Sommer**, [2]Maria Beger, [3]Peter L. Harrison, [4]Russ C. Babcock, [1]John M. Pandolfi

[1]Australian Research Council Centre of Excellence for Coral Reef Studies, The University of Queensland, Brisbane, Australia, [2]Australian Research Council Centre of Excellence for Environmental Decisions, The University of Queensland, Brisbane, Australia, [3]Marine Ecology Research Centre, Southern Cross University, Lismore, Australia, [4]CSIRO Marine and Atmospheric Research, Brisbane, Australia

Understanding how and why ecological communities vary along spatial and environmental gradients is critically important to predicting how they may respond to climate change, and for their management and conservation. Biogeographic transition zones, in particular, are projected to undergo multidimensional changes, both through altered environmental conditions and shifts in the distribution of organisms. The ambient energy hypothesis postulates that patterns in species distribution and abundance are linked to available energy. Here we test this hypothesis for benthic communities in the tropical-to-temperate transition zone in eastern Australia (24°48′S to 32°48′S), where tropical, subtropical and temperate taxa overlap and corals occur at the margins of their ranges. We quantify variation in species abundance distribution along the latitudinal and environmental gradients and demonstrate systematic spatial variation in community structure. High-latitude reefs are typified by widely distributed, generalist, stress-tolerant coral species. Although over 80% of coral species recorded in the study region are tropical, their contribution to overall abundance in the region is limited, as they are generally narrowly distributed and rare, except at northerly locations. This highlights interspecific differences and species interactions with the environment as key drivers of community organisation in biogeographic transition zones. Close coupling between patterns in community structure and gradients of available energy supports the ambient energy hypothesis and suggests that benthic communities in the tropical-to-temperate transition zone will be sensitive to climate change. Our findings enable predictions of how communities may respond to projected change and inform spatial management, marine reserve planning and policy-making under climate change.

Cross-border governance to support climate change adaptation in Australia – prospects and pitfalls

Speedtalk

Session: Speedtalk session 13

Time: 5.00-5.05

[1]**Wendy Steele**

[1]Griffith University, Brisbane, Queensland, Australia

The impacts of climate change do not adhere to conventional governance boundaries. Floods, for example do not stop at the state border, nor are storm surges contained within local government jurisdictions. Whilst this may appear self-evident, this 'inconvenient institutional truth' poses considerable challenges to existing and deeply embedded governance frameworks. Despite growing recognition that implementing effective adaptation initiatives will require transcending artificially imposed bureaucratic and/or administrative boundaries, the cross-boundary governance implications of climate change adaptation have been largely ignored within the Australian context (partly as a result of the historical context and nature of Australian federalism). What can we learn from existing cross-border governance initiatives in order to strengthen and improve cross-border climate change adaptation in Australia?

Climate adaptation engineering and risk-based design and management of built infrastructure

Oral

Session: Parallel session 16

Time: 3.15-3.30

[1]**Mark Stewart**, [1,2]Xiaoming Wang

[1]The University of Newcastle, Newcastle, Australia, [2]CSIRO Climate Adaptation Flagship, Highett, Australia

The impact of climate change on infrastructure performance is a temporal and spatial process, but most existing models of infrastructure hazard and performance are based on a stationary climate. Moreover, relatively little attention has been paid to quantifying the costs and benefits of adaptation strategies (retrofitting, strengthening, enhanced designs) for built infrastructure and assessing at what point in time climate adaptation becomes economically viable - we define this as 'climate adaptation engineering'. The presentation will describe how risk-based approaches are well suited to optimising climate adaptation strategies related to the design and maintenance of new and existing infrastructure.
Risk-based decision support is described to assess the risks and economic viability of climate adaptation measures. An important aspect is assessing at what point in time climate adaptation becomes economically viable, and decision preferences for future costs and benefits (many of them intergenerational). Stochastic methods are used to model infrastructure performance, effectiveness of adaptation strategies, exposure, and costs. The concepts will be illustrated with current research of risk-based assessment of climate adaptation strategies including designing new houses in Queensland subject to tropical cyclones and other extreme wind events. For example, it was found that increasing design wind loads for new houses in Brisbane and South East Queensland will lead to a net benefit of up to $10.5 billion by 2100. This anticipatory adaptation measure will help pave the way for more efficient and resilient infrastructure, and help 'future proof' existing infrastructure to a changing climate.

Climate adaptation engineering for extreme events - a Climate Adaptation Flagship cluster

Poster

Session: Poster session

[1]**Mark Stewart**

[1]The University of Newcastle, NSW, Australia

The CSIRO Climate Adaptation Flagship has recently provided over $3 million to establish the Climate Adaptation Engineering for Extreme Events Cluster. The cluster brings together researchers from across Australia with a wide range of expertise, and includes the University of Newcastle, James Cook University, University of New South Wales, Swinburne University of Technology, University of Western Australia, and the CSIRO Climate Adaptation Flagship.
The cluster aims to assess the risks, benefits, and costs of climate adaptation strategies, and recommend those that are practical and cost-effective - we define this as 'climate adaptation engineering'. The cluster partners will identify and develop climate adaptation strategies using innovative design and construction processes - these will rely on the latest developments in engineering technology to ensure durable, environmentally friendly and less vulnerable infrastructure. The effect of extreme wind, heat and floods on the cost-effective of adaptation strategies for houses, commercial and industrial buildings, bridges, power poles and railway infrastructure will be assessed. A key innovation of the cluster is to bring risk and uncertainty into the decision-making process. Research partners will consider uncertainties of climate change projections and infrastructure vulnerability into model development using latest probabilistic and reliability analysis techniques. Added to this will be a decision-support framework that balances economic, social and environmental aspects of climate adaptation to ensure adaptation solutions that are robust and acceptable to all stakeholders. The poster will describe the aims and scope of the cluster, explain the research plans, and provide details of industry involvement.

Adaptive Syngeries: An institutional analysis of urban resiliency and governance

Oral

Session: Parallel session 2

Time: 3.15-3.30

[1]**Ryan Stock**, [1]Pamela Barclay, [1]Cara Bastoni, [1]David Eisenhauer, [1]Masooma Hassan, [1]Melody Lopez, [1]Leila Mekias, [1]Sundeep Ramachandran

[1]University of Michigan, Ann Arbor, MI, USA

Can the cities and people of the Laurentian Great Lakes adapt to climate change while improving economic, social, and ecological resiliency? Answering this question requires understanding how social, economic, political and ecological processes interact over various spatial and temporal scales to shape climate adaptation. Climate models project warmer temperatures and shifting precipitation patterns with an increased likelihood of extreme events by the end of the 21st century. To better understand how the Great Lakes region can adapt to climatic impacts, we evaluated the adaptive capacity of four cities in Ohio (Avon Lake, Dayton, Elyria, and Toledo) by conducting an Integrated Assessment that measured various capitals and capacities presumed to increase a system's ability to respond favorably to climate impacts. Further, using the Institutional Analysis and Development Framework, we investigate how each government manages that adaptive capacity to achieve positive adaptive outcomes.

We conducted a total of sixty interviews with policy- and decision-makers. Using qualitative coding software data was analyzed to identify leverage points, synergistic projects and partnerships. A key finding is that each city is experiencing significant storm water impacts, extreme heat events, and influx of invasive species. Approaches to managing these impacts include broad stakeholder engagement, private-public partnerships, and forming regional networks. However, scarce resources, incomplete knowledge, and unclear vision constrain the potential of these innovative initiatives to increase resiliency. Using an institutional analysis framework to identify system leverage points and opportunities, our research offers lessons and methods to better understand how governance of climate change adaptation progresses.

Coastal adaptation to climate change: factors affecting governance, knowledge, the consituency and implementation

Oral

Session: Parallel session 10

Time: 1.15-1.30

[1]**Laura Stocker**

[1]Curtin University, Perth, Australia

This paper reports on some research findings of the Governance Theme of the Coastal Collaboration Cluster. The present research has sought to enhance the governance of coastal adaptation. Governance for coastal adaptation requires going beyond the science deficit model. A new analytical framework is presented to identify key interactions and issues affecting coastal adaptation. Four domains are considered important. 1. Knowledge includes science, lay, managerial and Indigenous knowledges. 2. Governance includes decision-makers, policy-makers and a wide range of stakeholders. 3. The constituency includes the community and private sector and their political power. 4. Implementation includes management strategies and monitoring regimes. The key emergent issue in the analytical frame is captured by the notion of 'legitimacy'. Legitimacy includes: legitimacy of knowledge about coastal adaptation to climate change; legitimacy to make significant governance decisions around coastal adaptation; legitimacy of the means by which those decisions are implemented; and legitimacy of the policy process as conferred by the policy-takers, the constituents. Legitimacy is conferred as a result of a 'quadalog' or mutual conversation among the above four domains. Conferral results when certain criteria are met. Governance has to meet criteria of efficacy and accountability. Knowledge has to meet criteria of adequacy and cogency. Implementation has to establish appropriate standards and professional practice. Constituency confers legitimacy when it accepts that knowledge and actions meet criteria of credibility and salience. The paper identifies the issues that influence whether these criteria are met or not.

Supporting decision-making in the sugar cane industry with integrated seasonal climate forecasting

Poster

Session: Poster session

[1]**Roger Stone**, [2,1]Yvette Everingham, [1]Christa Pudmenzky, [1]Torben Marcussen

[1]Australian Centre for Sustainable Catchments, University of Southern Queensland, Toowoomba, Queensland, Australia, [2]James Cook University, Townsville, Queensland, Australia

Climate forecasting has the potential to have immense value for the Australian sugar industry, especially in regard to the provision of timely warning of excessive rainfall occurring during the critical harvest periods of autumn/early winter and spring/early summer. While statistical climate forecasting approaches have been demonstrated to provide modest skill and value for sugar industry management decisions, key issues in regards to provision of longer lead times and also for those decisions related to harvesting in autumn/early winter remain a problem. Development and application of fully coupled ocean-atmosphere model seasonal (and intra-seasonal) climate forecast systems offer major opportunity for improved management decisions and industry cost savings, especially for those periods for which statistical forecast systems have not proven useful and in the provision of more useful seasonal climate forecasting outputs under future climate change. Integration of recently developed dynamical seasonal climate forecast systems with cane and sugar growth simulation models would also provide considerable value to the sugar industry in terms of the provision of more accurate forecasting of potential yield and commercial cane sugar (CCS) for this industry.

eReefs: Responding to a changing climate in the Great Barrier Reef

Oral

Session: Parallel session 17

Time: 3.00-3.15

[1]**Greg Stuart**, [2]Theresa Fyffe, [3]Andreas Schiller, [4]Richard Brinkman, [5]Paul Lawrence

[1]Bureau of Meteorology, Brisbane, QLD, Australia, [2]Great Barrier Reef Foundation, Brisbane, QLD, Australia, [3]CSIRO, Hobart, TAS, Australia, [4]Australian Institute of Marine Science, Townsville, QLD, Australia, [5]Queensland Department of Science, Information Technology, Innovation and the Arts, Brisbane, QLD, Australia

eReefs is a response by Australian and Queensland Government agencies plus private investors to mitigate the risks associated with the multiple use of the Great Barrier Reef. The project uses the latest measurement technologies to monitor and deliver observations together with a suite of integrated and data assimilating models across paddock, catchment, estuary, reef lagoon and ocean scales. By 2015, the project partners of eReefs (BoM, CSIRO, AIMS, the Queensland Government and the Great Barrier Reef Foundation) will deliver a framework to explore and predict the impact of factors such as temperature, chlorophyll, nutrients, turbidity and pH, and provide an interactive visual picture of the reef and its component parts. Further enhancements through citizen science initiatives within eReefs will allow the broader community to engage on the health of the reef - contributing monitoring information and learning about the reef.

This paper outlines the progress made in delivering the foundations of eReefs. These are: a) a dashboard to access and analyse remotely sensed water quality data across the reef; b) numerical models to simulate hydrodynamics, sediment transport and nutrient concentrations; and c) an information system that allows increased discovery, access and re-use of the eReefs data sets.

This unprecedented level of access to information will allow coastal land and marine managers, industry, and the community to make informed decisions about the changes to the environment and their impact on it. Systems such as eReefs provide an integral component of the adaptive management framework required to live within a changing climate.

A Comparative Study on the Decision Making Process of the Coastal Climate Adaptation of Bangladesh

Oral

Session: Parallel session 28

Time: 12.15-12.30

[1]**Nahid Sultana**

[1]The University of NSW, Sydney, Australia

The maintenance of people's livelihoods in the coastal zone of Bangladesh largely depends on the climate adaptation strategies adopted by the key stakeholders and the local government. Although national plans encourages stakeholder engagement during the development phase, their efforts tend to be topdown in nature, which creates critical gaps between national and local level governance. Consequently, the outputs of Integrated Coastal Zone Management Plan (ICZMP, 2005), National Adaptation Action Plan (NAPA, 2005) and Bangladesh Climate Change Strategy and Action Plan (BCCSAP, 2009) are ineffective in the phases of implementation, monitoring and evaluation to achieve the sustainable livelihood strategy for the coastal zone. The aim of this paper is to understand how stakeholders and practitioners at different scales (national, district, local) make decisions for diverse coastal districts. It reports on a comparative study of a coastal island and a coastal estuarine region in Bangladesh, and assessed people's adaptive capacity to climate change. Its findings demonstrate that the selection of priority components by government agencies and local stakeholders in relation to 'sustainability decision making' can help to overcome the institutional gaps and risks related to climate change. Considering the barriers to the effective implementation of national plans e.g. ICZM, NAPA and BCCSAP, these case studies provide an evaluation of the successes and failings of the process, and its relevance for similar regions in other developing countries of the world.

Rationalist policy-making for climate change adaptation: a cautionary tale from disaster risk management in Australia

Oral

Session: Parallel session 7

Time: 3.30-3.45

[1]**Peter Tangney**, [1]Michael Heazle, [1]Paul Burton, [1]Michael Howes, [1]Deanna Grant-Smith, [1]Kim Reis, [2]Karyn Bosomworth

[1]Griffith University, Brisbane, Queensland, Australia, [2]RMIT University, Melbourne, Victoria, Australia

The linear, 'rationalist' policy model is the principal means by which governments justify and evaluate policy decisions, despite its practical difficulties and the widespread criticism it has received when accounting for the complexity, uncertainty and divergence of opinions and values associated with contemporary policy problems. Our research, part of a NCCARF-funded project to integrate climate change adaptation and disaster risk management (DRM), demonstrates how rationalist 'predict-then-act' approaches promote unrealistic public expectations of DRM and a reactive approach to natural hazards overall. Examining institutional responses to three recent natural disasters across Australia, our research also reveals how rationalist policy making masks normative decisions behind technical 'evidence'; over-relies on technical expertise, engineering and the reduction of exposure to natural events; while neglecting the types of social capital required when engineering provisions inevitably fail, or fail to provide the level of protection expected of them. We propose an alternative approach, in line with the pressing need for climate change adaptation and the practical difficulties of reducing uncertainties. By re-casting the existing Prevent, Prepare, Respond, Recover model of DRM in terms of a normative, incremental policy cycle, we argue that DRM can become more adaptive to future climates so that communities will be progressively better prepared for each new climate extreme. This approach focuses on managing uncertainties rather than reducing them and building resilience not simply through the reduction of hazard exposure, but through the reduction of community vulnerability, explicit consideration of normative policy priorities and increased community engagement in climate risk debates.

Scaling-up, scaling-down, and scaling-out: Local planning strategies for sea-level rise in NSW, Australia

Oral

Session: Parallel session 35

Time: 2.15-2.30

[1]**Bruce Taylor**, [1]Ben Harman, [2]Matthew Inman

[1]CSIRO, Brisbane, Australia, [2]CSIRO, Sydney, Australia

Globally, sea-level rise is expected to impact on many coastal regions and settlements. While mitigation of global greenhouse gas emissions remains an important task, adaptation is now seen as a critical component of the policy equation. Local government are key players in adaptation planning and managing risk through their mandated role in land use planning and development control. Yet, managing the predicted impacts of climate change is proving to be a complex and difficult task for planners and policy makers. This paper reports on a case of local governments deliberating on possible planning responses to address future sea-level rise impacts in New South Wales, Australia. Using structured discussions involving expert knowledge of planners and other technical experts engaged in a collaborative network in the Sydney region, this paper explores the feasibility of implementing planning measures at the local and regional scale to respond to inundation risk. The research presents practical examples of how local governments use specific scale-oriented strategies to engage private and public actors at different levels to help manage the legal, financial and technical risks associated with coastal adaptation.

Modelling Sub-daily Rainfalls for Flood Estimation

Poster

Session: Poster session

[1]**Phoung Thi Cu**

[1]University of Technology, Sydney, Australia

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.
When catchment modelling is used for prediction of flood flow quantiles, the uncertainty of the prediction to related to the robustness of the calibrated catchment modelling system. As shown by Umakhanthan and Ball (2004), the rainfall model used to predict the rainfall over the catchment significantly influences predictions obtained from the modelling system. Presented in this paper will be a discussion of the data analysis undertaken to provide adequate information for robust flow predictions.

The analysis presented will use a catchment in Vietnam (the Ba River system) as a case study. The focus of the analysis will be the disaggregration of daily rainfall information into sub-daily rainfall data to enable development of a suitable rainfall model for simulation of flood flows in the Ba River catchment. The disaggregation technique discussed is the non-parametric method developed by Sharma and his colleagues referred to as "Method of Fragments". Use of this technique for both current and future climatic conditions will enable assessment of climate change impacts on predicted flood flow quantiles.

Buffering our aquatic habitats from climate change: using riparian vegetation to reduce impacts on stream biodiversity and ecosystem function.

Speedtalk

Session: Speedtalk session 3

Time: 4.55-5.00

[1,2]**Ross Thompson**, [2]John Beardall, [2]Jason Beringer, [2]Michael Grace, [2]Darren Giling, [2]Jim Thomson, [2,3]Paula Sardina

[1]University of Canberra, Canberra, ACT, Australia, [2]Monash University, Melbourne, VIC, Australia, [3]Consejo Nacional de Investigaciones Científicas y Técnicas, Caba, Argentina

Understanding the effects of changing climates on the processes which support aquatic biodiversity is of critical importance for managing aquatic ecosystems. Using manipulative experiments, we assessed the community-level responses of aquatic ecosystems to a realistic future temperature regime which included extreme events. There was evidence of major changes in community composition, with an unpredictable suite of species favoured. Body size of component species declined, and there was evidence that the top-down (grazing) influence of stream invertebrates was reduced, allowing increased algal biomass. Emerging aquatic insects were smaller, and timing of emergence was altered, with potential impacts for terrestrial consumers which rely on this resource. In some species, there were temporal mismatches between emergence of the sexes, with potential impacts on species' persistence. Field studies were used to determine the potential for riparian plantings to reduce stream temperatures of sufficient magnitude to mitigate against these effects. There was evidence that riparian replanting was sufficient to cool stream reaches to a degree consistent with preventing the predicted increases under climate change scenarios. There is potential therefore to use revegetation activities to mitigate against the impacts of warming climates in aquatic processes and biodiversity.

Climate change on film: pass the popcorn, choc top and catastrophe

Oral

Session: Parallel session 25

Time: 11.15-11.30

[1]**Dana Thomsen**

[1]Sustainability Research Centre, University of the Sunshine Coast, Queensland, Australia

Communication of climate change adaptation messages presents persistent challenges in terms of mainstream engagement. This paper presents an analysis of the potential integration of climate change storylines within popular films. Danger, inspiring protagonists, seemingly insurmountable hurdles, and opportunities for character growth and development are the holy grail of popular films. Climate change has all of these. But, perhaps most importantly, climate change offers a connection that transcends geographical, temporal and cultural boundaries. The analysis presented in this paper is focused on mechanisms with the potential to portray climate change as a transformative and inspiring contemporary narrative for mainstream film audiences. These are used to develop character archetypes and compelling narrative structures from official climate change reports authored by the Intergovernmental Panel on Climate Change and associated media in Australia. Analysis based on Joseph Campbell's influential theory of universsal mythology and recent conceptual adaptations by Christopher Vogler and others for screen writers.

Communicating social change towards sustainability: The narrative power of values, social identity and the human act

Poster

Session: Poster session

[1]**Christopher Thornton**

[1]University of South Australia, Adelaide, South Australia, Australia

Recent findings from Common Cause Research in the UK strongly argue that mainstream marketing tactics appealing to the extrinsic human values of power, wealth, image and status can fundamentally undermine behaviour-change for sustainability. To support this concern, the research agenda below identifies three interdependent factors thought to be crucial for improving behaviour-change commmunication.
Drawing from G. H. Mead's theories on social identity, Ricoeur's narrative hermeneutics and studies on human values by Common Cause Research, this study contends that communication for sustainability should elicit intrinsic values, self-efficacy and social collaboration in the public sphere, instead of fear and on-going social competition. To demonstrate this, case studies will be made of sustainability initiatives including the Transition Network and CAT, to explore alternative community relations that demonstrate lasting adaptations for environmental change. Analysis of the emergent narratives and social phenomena from these contexts will describe how self-authored communities build their narrative identity towards social resilience. As Ricoeur states, human freedom, is recovered by reclaiming the potential of being as act. This concept is central to the argument that motivating sustainability is determined not by appeals to reason or purchase choice but by the social and narrative practices that shape who we believe we are.
Therefore, 'selling' sustainability, as outlined by the UNEP for example, may be strategically misguided and unlikely to drive the depth of change needed for sustainability long-term. Instead, this study aims to participate in a redirective practice of design which seeks to communicate a shift towards a participatory social ecology.

Climate adaptation and sustainable livelihoods: An analysis of selected subsistence communities of West Timor, Indonesia

Speedtalk

Session: Speedtalk session 1

Time: 5.15-5.20

[1,2,3]**Yenny Tjoe**

[1]Griffith University, Brisbane, QLD, Australia, [2]Centre of Excellence for Sustainable Development for Indonesia, Brisbane, QLD, Australia, [3]University of Indonesia, Jakarta, DKI Jakarta, Indonesia

The traditional subsistence production is an important part of rural Indonesia. For many rural households, yields from subsistence production are the main source of food to maintain their health and livelihoods. Like commercial agricultural producers, the subsistence communities are highly exposed to the current extreme drought conditions.
A number of studies have examined the impact of climate change-related harm on commercial farming and coastal regions, but little research is done in the context of subsistence communities. Through a combination of quantitative and qualitative methods, this research investigates the factors that contribute to livelihood vulnerability of the subsistence communities to extreme droughts, one in an upland region and the other in a coastal area. It then identifies ways to create capacity building and learning environments for adaption of the subsistence communities.
A quantitative method consists of primary data collected through a household survey. Data gathered will be used to produce a vulnerability index for each community. The relationship amongst responses will be explored using Probit analysis. The qualitative method involves a participatory action research. The information gathered from the survey (about the knowledge of subsistence communities, types of tools and skills) will be used to stimulate community participation in the operation of research, including identification of specific issues and experimenting with solutions.
By providing the formative insights into the knowledge of subsistence communities and their associated activities, this research contributes to the existing knowledge of rural livelihoods and to the validation of data for future planning and suitable rural development.

Ethno-religious diversity and climate change adaptation in Australia

Poster

Session: Poster session

[1]**Stephanie Toole**, [1]Natascha Klocker, [1]Lesley Head

[1]University of Wollongong, Wollongong, New South Wales, Australia

In recent years, climate change research and policy initiatives have foregrounded the importance of adaptation at the local scale, including in households. Research into the 'everyday' adaptive roles and capacities of Australian households is a rapidly growing area of research interest. However, the vast majority of existing research into household understandings of climate change adaptation has been overwhelmingly 'white'. This research explores Australian households' understandings of, and attitudes towards, climate change adaptation through the unique lens of ethno-religious diversity. Addressing this knowledge gap is particularly important as Australia is a country of high ethnic diversity and immigration, and understandings of (and engagements with) the environment and environmentalism have been shown to differ on the basis of ethnicity and religious faith. To address this aim, 679 survey responses were collected from New South Wales households across a range of ethnic groups (Chinese, Arabic speaking, Vietnamese, Filipino, Indian and Anglo-Australian) and religious affiliations (e.g. Hindu, Sikh, Muslim, Christian and Atheist). The findings indicate that understandings of climate change and perceptions of the need for adaptation were not constant across ethnic and religious groups. Perceptions of household responsibility for climate change adaptation also diverged markedly according to respondents' ethnicity and religious beliefs. Given the growing importance and urgency of climate change adaptation, as well as an increasing awareness that the household is a crucial site of analysis, this research makes a case for further diversifying ethnicity and religion in climate change debates.

Farmers' awareness and response to climate variability and change in North-West Cambodia

Speedtalk

Session: Speedtalk session 1

Time: 5.00-5.05

[1]**Van Touch**, [1]Robert John Martin

[1]University of New England, Armidale, Australia

Climate predictions for Cambodia are for increases in temperatures and rainfall with the likelihood of wetter monsoon seasons and less rainfall in the dry seasons. A baseline survey of 832 households was conducted in North-Western Cambodia in 2012 to determine upland cropping farmers' awareness and response to climate variability and climate change (Martin et al. 2013).
Production of upland crops, mainly maize and cassava makes up 80% of farm income in the region where there is an area of 50,020 ha under crop production. Farmers usually grow two upland crops per year. Early Wet Season (EWS) crops are planted in February-March and in the Main Wet Season(MWS) crops are planted in July-August. The predicted trend for shorter wet seasons and longer dry seasons could potentially make the EWS more prone to drought and for adverse impacts of high rainfall events in the MWS.
Most farmers observed that the climate was getting hotter (56%) and wetter (70%) which is consistent with climate predictions but not with the Battambang rainfall records which show a declining trend for rainfall since 1982. Most farmers also said that increasing temperature(58%) and rainfall (70%) had affected their farming activities and they were not aware of measures to cope with increasing temperature or rainfall. Follow up research is required to better understand the farming systems in North-West Cambodia and how farmers can adapt to perceived and predicted climate change.

Green Infrastructure and the Urban Heat Island: Is it adaptation, and does it matter if it isn't?

Oral

Session: Parallel session 13

Time: 2.00-2.15

[1]**Alexei Trundle**, [1]Karyn Bosomworth, [1]Darryn McEvoy

[1]RMIT University, Melbourne, Australia

This presentation will reflect on a recently completed cross-disciplinary project examining Melbourne's Urban Heat Island and the potential reduction of this phenomenon through enhanced use of Green Infrastructure. Green Infrastructure offers a number of potential ecosystem services and benefits, ranging from stormwater retention to increased energy efficiency. Similarly, Green Infrastructure represents only one of a large range of approaches for reducing urban heat, with alternatives including high-albedo 'cool roofs', street planning for enhanced airflow, and active transport infrastructure.

Although Green Infrastructure is regularly incorporated into adaptation strategies and planning, the link between cooling the urban form's microclimatic conditions - already significantly hotter than their rural surrounds - and increased temperatures due to an enhanced greenhouse effect is rarely critically discussed or explained. Furthermore, the scale, form and spatial distribution of these cooling benefits, as well as the relationship (or lack thereof) between these benefits and the costs associated with Green Infrastructure implementation, often lacks systematic examination at an actor-based level.

The research approach integrated thermal imaging, policy analysis and green infrastructure expertise, with the aim of developing a decision framework for Green Infrastructure implementation in Urban Heat Island hotspots. This presentation will highlight the key findings from this study, with a focus on state and municipal level governance strategies for the mainstreaming of green infrastructure. These practical implementation measures will form the basis of reflections on a wider theoretical question underpinning the research;

Not just talking to the "Greenies": effects of self-concordance on individual adaptation

Oral

Session: Parallel session 4

Time: 3.30-3.45

[1]**Kerrie Unsworth**, [1]Jon Heath, [1]Ilona McNeill

[1]University of Western Australia, Perth, Western Australia, Australia

When trying to help an entire population adapt to climate change, we will be communicating not only with people who want to help the environment but also those who do not think about it very much. We propose that, if done cleverly, this will not matter. Instead, we hypothesise that the degree to which adaptation is connected to an individual's important goals is what will affect adaptation, not just whether they care about the environment or believe in climate change. For example, if a person believes that using the air-conditioner less helps them to save money for a holiday then they are more likely to turn the air-conditioner off than if the behaviour was connected only to an environmental goal which the person did not care about. Therefore, we hypothesise that self-concordance (the number of positive connections between the person's adaptive behaviours and their other values, identities and goals) will be strongly and positively related to adaptive coping and behaviour. Across three survey studies we found support for this hypothesis. The effect of self-concordance was related to adaptive coping and behaviour, above and beyond the effects of environmental values and anti-environmental beliefs. This means that people with more hedonistic or individualistic goals might also be influenced to engage in adaptive behaviours, if they can be convinced that adaptation helps them to achieve those goals. Practically, this means that we need to identify common goals, such as being healthy or saving money, and demonstrate how adaptation leads to these goals.

What about me? Reporting the results of the effect of emotion on individual climate change adaptation in a workplace setting

Poster

Session: Poster session

[1]Sally Russell, [2]Kelly Fielding, [1]Alice Evans, [3]**Kerrie Unsworth**

[1]Griffith University, Nathan, QLD, Australia, [2]The University of Queensland, St Lucia, QLD, Australia, [3]The University of Western Australia, Crawley, WA, Australia

Researchers to date have generally neglected to explore the affective dimensions of mitigation and adaptation behaviours for individuals. This is somewhat surprising in view of evidence that emotions are reactions to significant events and provide an impetus for action. In this paper we present the results of three studies where we aimed to examine how emotions in response to climate change affect individual adaptive behaviours in the workplace. Using the Cognitive-Motivational-Relational (CMR) theory of emotion (Lazarus, 1991a) we proposed that different emotions may be elicited in response to climate change and that these emotions would have differing effects on adaptive behaviours. Using two experimental studies and one correlational survey study, we examined how different appraisals, or evaluations, of climate change result in different emotions and behaviours. In our studies we examined two key emotional attributions: goal congruence (the extent to which an outcome is likely to lead to harm or benefit), and the ascription of blame (an attribution of the cause of an event). Preliminary results show that goal congruence is particularly important in determining emotional responses to climate change. Furthermore, results also show that when participants felt enthusiasm, worry and hope in relation to climate change reported more intentions to engage in adaptive and mitigation behaviours. Overall, the results suggest that both positive and negative emotions are important in driving behavioural responses to climate change. We further outline the results of these studies and highlight the important implications for businesses and policy makers.

Sea Level Rise and Contaminated Sites - More Challenges and Hard Decisions Lie Ahead

Oral

Session: Parallel session 3

Time: 3.45-4.00

[1]Paul van der Beeke

[1]Golder Associates Pty Ltd, Perth, Western Australia, Australia

A contaminated sites practitioner will provide perspectives on emerging issues for future contaminated sites management. Investigating and cleaning up these sites is scientifically challenging at the best of times. Sea level rise adds further complexity which will need to be addressed sooner than many realize, long before actual inundation occurs.

There are many potentially contaminating industries and land uses located on coastal and estuarine shores that will be submerged in the decades ahead. The submerged land will become part of the marine environment requiring more onerous cleanup standards, at greater cost.

Why should property owners and occupiers pay for the added cost to meet the more stringent criteria? Should they be compensated? Does the hierarchy of responsibility enshrined in current legislation still apply? What if the liabilities default to the banks or to Government if the responsible parties cannot pay? Who will pay when property values collapse in vulnerable areas as it becomes indisputable that inundation is going to happen? This realization may occur within 20 years.

Should adaptation include mandatory relocation with the demolition of all the buildings and infrastructure so that contamination investigation and remediation can occur in time? Are we thinking about the policy and legal framework that would allow this to occur? What if we do nothing? These are difficult questions with unpalatable answers.

Major challenges and hard decisions lie ahead for the community, policy makers, owners, occupiers, banks, legal profession and Governments. This presentation will outline the issues and suggest some approaches and actions.

Identifying Climate Change refugia for freshwater biodiversity across Australia

Oral

Session: Parallel session 26

Time: 12.00-12.15

[1]**Jeremy VanDerWal**, [2]Cassandra James, [3]Doug Ward, [3]Samantha Capon, [1]Lauren Hodgeson

[1]Centre for Tropical Biodiversity and Climate Change, School of Marine and Tropical Biology, James Cook Univeristy, Townsville, QLD 4811, Australia, [2]Centre for Tropical Water and Aquatic Ecosystem Research, James Cook Univerity, Townsville, QLD 4811, Australia, [3]Australia Rivers Institute, Griffith Univeristy, Nathan Campus, Nathan, QLD 4111, Australia

Freshwater ecosystems have very high biodiversity relative to their areal extent. They are particularly vulnerable to climate change because of their limited extent, their limited connectivity and, in much of Australia, their susceptibility to drying resulting from the high variability of temperature and rainfall. Identifying, protecting and managing freshwater refugia that will help protect Australian biodiversity from the impacts of climate change must be a key component of all future conservation planning and policy. Here we investigate the relative stability of biophysical attributes and species assemblages of freshwater ecosystems regimes across the Australian continent. We not only assess the relative stability or general refugial value of regions across all of Australia, but also highlight the outcomes for areas currently recognised as ecologically important (e.g., RAMSARs). Climate change is highly spatially and seasonally variable. Future stable and unstable areas have been identified; we highlight the relatively stable areas that will be areas of least concern. However, many regions and freshwater biophysical features will experience climates well outside their current range of variability and thus there will be significant changes in assemblages. Within unstable areas refugia will be a high priority, for example areas where temperatures are ameliorated through shading from vegetation or topographic shading.

Climate change and Australian birds - adaptation for the next half century

Oral

Session: Parallel session 33

Time: 2.00-2.15

[1]**Stephen Garnett**, [1]Don Franklin, [2]Glenn Ehmke, [3]**Jeremy VanDerWal**

[1]Charles Darwin University, NT, Australia, [2]BirdLife Australia, VIC, Australia, [3]James Cook University, QLD, Australia

In the first continental analysis of the effects of climate change on a faunal group, we classified 396 Australian bird taxa as being very highly exposed, sensitive or both. Of these 42 Australian terrestrial and inland water bird taxa are likely to have <10% of their current climate space remaining by 2085, 12 marine taxa have breeding sites that are predicted to be 10% less productive than today, and 61 terrestrial taxa are likely to be exposed to more frequent or intense fires. For most taxa actions that are already important will continue to be essential to effective conservation - of these the most prominent are fire management, weed and feral animal control for terrestrial taxa and, for marine taxa, controls on fishing. In the meantime, in order to identify climatic refugia within the landscape, there is a need for fine scale modelling of regions identified as having numerous highly exposed bird taxa. Regions that have particularly large numbers of taxa that are both sensitive and exposed are Cape York Peninsula, the Wet Tropics and the large continental islands. Secondly the intensity of monitoring should be increased to ensure change is detected in time for action, with the ongoing Atlas of Australian Birds being the most cost-effective means of monitoring most taxa. Although hugely uncertain, the cost of managing Australia's birds over the next 50 years to ensure they persist in the face of climate change is estimated at $20 million per year - $48,000 per year for each taxon.

Using climate and biodiversity indicators to identify macroscale refugia for terrestrial biodiversity across Australia

Speedtalk

Session: Speedtalk session 3

Time: 4.40-4.45

[1]April Reside, [1]Stephen Williams, [1]**Jeremy VanDerWal**

[1]James Cook University, Townsville, QLD, Australia

Refugia will be required to safeguard biodiversity against the worst impacts of climate change. The challenges for science are to develop robust predictions on the location and characteristics of crucial refugia, and how best to protect their refugial properties. We investigated the utility of incorporating both environmental and biotic data to predict macro-scale refugia for terrestrial biodiversity across Australia. For the environmental predictors we used paleo climate, recent (past 60 years) climate, and projections of future climate involving likely scenarios and 18 general circulation models. For biodiversity predictors we modelled the distributions of over 1700 vertebrate species for current and projected future. For all predictors, we focussed on metrics indicating stability, as climate stability is known to be correlated with high diversity and endemism. We determined the areas with the lowest proportional change and lowest long-term variance in climate variables, as well as the lowest turnover in species composition for each taxonomic group. We found that areas identified as having the greatest climatic stability were highly dependent on the metric and time frame used; however, the southern coast of Australia appears to have the least absolute change. The general trend for biodiversity predictions is that climate space will shift east and south; and the areas with the lowest species turnover occur in these areas, even when accounting for the original species richness. The next challenge is to incorporate the refugia into comprehensive climate change adaptation strategies to help protect Australia's biodiversity from the worst impacts of climate change.

Bridging the gap between end user needs and science capability: decision making under uncertainty

Oral

Session: Parallel session 7

Time: 3.00-3.15

[1]**Danielle Verdon-Kidd**, [1]Anthony Kiem, [1]Emma Austin

[1]University of Newcastle, NSW, Australia

There is a recognised gap between what climate science can currently provide and what end users of that information require in order to make robust adaptation decisions about their climate related risks. This issue is emphasised within the water resource management and agricultural sectors due to high uncertainty surrounding precipitation projections and has been identified as a major barrier preventing successful climate change adaptation outcomes. This paper details the outcomes of an extensive survey and workshop aimed at clearly identifying and quantifying this gap. A number of recommendations have arisen from this study in order to help bridge the gap. It is recommended that communication and packaging of climate information be improved via a formalised 'knowledge broker' program. It is also suggested that a 'terms of reference' for key climate change related words be developed and agreed upon by both climate science providers and end users to reduce the misuse of terminology and confusion that subsequently arises. Further, it is recommended that additional research be conducted into natural variability and baseline risk to provide a realistic background on which climate change projections and associated uncertainty are assessed. Finally new tools and methods to integrate between projections and decision making (e.g. decision support tools) that deal explicitly with uncertainty need to be developed and implemented within the adaptation community. While it is unrealistic to ever expect that we can close the gap, it is clear that there are opportunities to start bridging the gap.

A health and social services perspective on climate change and disability

Oral

Session: Parallel session 27

Time: 12.00-12.15

[1]**Rae Walker**, [1,2]Wendy Mason

[1]La Trobe University, Melbourne, Australia, [2]SEHCP Inc, Melbourne, Australia

Institutions serving the Australian community need to adapt their core functions and evolve to address the impacts of climate change relevant to their mandate. The SEHCP Inc has begun this process with its 30 member community based health and social service agencies. In this paper we discuss the impacts of climate change on people with a disability, arguably the most vulnerable population in the community, and the implications for organisations striving to meet their community's needs.

The most common definition of disability used in Australian official statistics is 'any limitation, restriction or impairment which restricts everyday activities and has lasted or is likely to last for at least six months' (ABS 2010). Most of the information about climate change and disability is in reports on aspects of disadvantage, exacerbated by climate change, experienced by people with disabilities. The one issue on which there is a small body of research is on the experience people with disabilities have of emergencies and extreme weather events.

In this paper we report on a literature review and agency consultations that explore a health and social services approach to two major impacts of climate change on people with a disability. The first is engagement with the inequities people with a disability experience as market-based climate change policy initiatives take effect. The second is engagement with emergency planning to establish an inclusive response strategy that reduces the disproportionate harms (unmet needs, long term decline in function, potential for high mortality), in this population group.

A health and social services perspective on climate change related violence

Speedtalk

Session: Speedtalk session 4

Time: 5.10-5.15

[1]**Rae Walker**, [1,2]Wendy Mason

[1]La Trobe University, Melbourne, Australia, [2]SEHCP Inc, Melbourne, Australia

Institutions serving the Australian community need to adapt their core functions and evolve to address the impacts of climate change relevant to their mandate. The SEHCP has begun this process with its 30 member community based health and social service agencies. In health violence is more complex than the climate change literature suggest. In this paper we discuss the impacts of climate change on the issue of violence and the implications for health and social service organisations striving to meet their community's needs.

Violence is defined by the WHO as: 'The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that results in or has a high likelihood of resulting in injury, death, psychological harm, mal-development or deprivation.' Self directed violence includes self harm and suicide. Interpersonal violence includes family violence (against children, partners and elders) and community violence (against acquaintances or strangers). Collective violence may be social, political or economic. The magnitude of harm, in descending order, is violence against self, interpersonal violence and, finally, collective violence.

In this paper we report on a literature review that frames the intersection of violence and climate change using the WHO violence and health framework linked to the current impacts of climate change. We consider: the impacts of extreme weather events on mental health, self harm, and interpersonal violence; and the pathways to collective violence and some evidence that suggests interventions to reduce the risk of collective violence occurring.

Walking on Country with Spirits: Enhancing adaptive capacity through Aboriginal research tourism

Speedtalk

Session: Speedtalk session 1

Time: 4.40-4.45

[1]Helen Murphy, [1,2]Marilyn Wallace

[1]James Cook University, Cairns, Australia, [2]Bana Yarralji Rangers, Rossville, Australia

This paper describes an Aboriginal research tourism enterprise with a specific focus on how climate change information is gained and shared between Aboriginal people and the scientific community within a tourism context. This paper describes the Aboriginal research tourism enterprise of Bana Yarralji located in the Wet Tropics World Heritage area. Aboriginal research tourism is a relatively new phenomenon whereby scientists, students and volunteers pay to experience cross cultural collaboration in research on Aboriginal land. Aboriginal people throughout northern Australia experience high levels of vulnerability to climate change. The competition for research and grant monies in climate change research is fierce, yet the impact is enduring and profound for Aboriginal people in the Wet Tropics. This paper describes how Bana Yarralji have acknowledged climate change as an impact on their culture and livelihoods and how they have in turn incorporated their own monitoring activities into their product range of research tourism opportunities. This research is important as it describes how an Aboriginal group identified a gap in the tourism market and are using this opportunity to create jobs, foster knowledge exchange and mitigate the effects of climate change. The results from this research demonstrate that knowledge of climate change adaptation and mitigation can be achieved through tourism enterprise and offers outstanding opportunities to both the scientific community and students alike for cross cultural collaboration in climate research activities.

Plans for an Australian Climate Extremes Service (ACES)

Speedtalk

Session: Speedtalk session 12

Time: 5.05-5.10

[1]**David Walland**, [1]Doerte Jakob, [1]David Jones

[1]Bureau of Meteorology, Melbourne, Victoria, Australia

The earliest impacts of climate change will be felt through extreme events which often act as a shock to systems that had previously appeared resilient. The most tangible and immediate way to adapt to a changing climate is to either protect against, or take advantage of, extremes.
The Bureau of Meteorology recognises the increasing need for tools and technologies to enable decision-makers to manage risks presented by extremes and considers sector-relevant indices could be valuable. The severe impacts of bushfires, heatwaves and flooding over the last three summers were felt throughout the health, energy, water, agriculture and disaster risk management sectors, and evidence the need for ACES. The Bureau is looking for partners and collaborators to progress it.
The Bureau is developing concepts to put extreme weather-related impacts into historical context, including the frequency and strength of past extremes. We are also looking at ways to forecast these key indices in the days ahead as well as potentially offering guidance over seasonal time scales. This intelligence will enable decision-makers to more effectively prepare for more extremes under a changing climate.
ACES will include robust assessments of sector-focused climate risks, early warnings on risks of extreme events, and aims to improve understanding and identification of key weather-related vulnerabilities
The proposed service will lead to better informed climate adaptation activities through improved understanding and identification of important points of vulnerability as well as increased recognition of the interaction between climate variability, climate extremes and climate change.

Perceptions of climate change adaptation among catchment management authorities: findings from an empirical study in Victoria

Oral

Session: Parallel session 12

Time: 2.15-2.30

[2,3]**Philip Wallis**, [1,3]Hartmut Fuenfgeld, [1,3]Sophie Millin, [1,3]Alianne Rance, [1]Kate Lonsdale

[1]RMIT University, Melbourne, Victoria, Australia, [2]Monash University, Melbourne, Victoria, Australia, [3]Victorian Centre for Climate Change Adaptation (VCCCAR), Melbourne, Victoria, Australia

The catchment-based Natural Resources Management (NRM) sector in Victoria is adapting 'with' a changing climate. Regional NRM is a sector that easily recognises the variability of Australian climatic conditions, having experienced the consequences of medium-term drought and extreme events, such as bushfires and floods. As such, the institutional arrangements in place to fulfill the role of Catchment Management Authorities (CMAs) as 'the caretakers of river health', while complex, are relatively flexible and community-focused as a result of earlier experiments in community-led governance. The unfolding effects of climate change in the long-term, however, may pose a different set of challenges to established management processes in the NRM sector and require NRM organisations to engage in different types of planning and decision-making in the context of uncertainty.

This paper discusses current perceptions of climate change impacts and adaptation and the institutional and organisational context for adaptation from the perspective of Catchment Management Authorities (CMAs) in Victoria. The paper presents preliminary findings from current qualitative social research, which investigated existing processes and systems that enable or hinder adaptation among Victorian CMAs. Institutional and policy context data is contrasted with additional primary data collected on CMA's perceived adaptation needs and their adaptive capacity. The paper concludes with a discussion of the policy implications the findings may have for better supporting adaptation among NRM bodies in Victoria and other states and territories.

Community preferences for roles and responsibilities for adaptation to sea level rise

Oral

Session: Parallel session 10

Time: 1.45-2.00

[1]**Elissa Waters**, [1]Jon Barnett

[1]The University of Melbourne, Victoria, Australia

It is widely recognised that there are legal, institutional and cultural barriers to climate change adaptation. A persistent and cross cutting-barrier is the lack of certainty, across both public and private domains, about who should be responsible for adaptation. Using the context of adaptation to sea level rise in Australia, this project aimed to investigate this barrier by studying community preferences for the distribution of responsibility for adaptation in two case study locations: Eurobodalla Shire in New South Wales and Mornington Peninsula Shire in Victoria.

The project undertook 80 hour-long interviews with a range of coastal users: business owners; home-owners; community organisation leaders; and coastal managers. The interviews elicited views on: current regimes of coastal management, the likelihood of sea level rise, and coastal adaptation policy options. Respondents were also asked about preferences for who should be responsible for a range of adaptation tasks, namely: providing information and creating knowledge; managing public assets; managing private assets; leading local planning; and paying for adaptation.

The findings reveal a widespread expectation for a significant role for government in all aspects of adaptation to sea level rise. They also show that coastal users have a well-considered set of preferences regarding the different roles and responsibilities of each level of government, and of the private sector. There is also some degree of consensus in these preferences. This presentation will outline the findings of this research and their implications for governance in adaptation to sea level rise and other adaptation contexts.

A typology of barriers to adaptation

Oral

Session: Parallel session 21

Time: 3.00-3.15

[1]**Elissa Waters**, [1]Jon Barnett, [1]Aedan Puleston

[1]The University of Melbourne, Victoria, Australia

Advances in adaptation science and policy increasingly show that there is a range of factors that impede climate change adaptation. Knowledge about barriers is, however, constrained by a limited body of evidence, both in Australia and internationally. In this study we develop a typology of barriers to climate change adaptation based on a unique body of evidence. Systematic analysis of over eight hundred pages of submissions to the Australian Productivity Commission's inquiry to barriers to adaptation, including from governments, the private sector, and civil society, reveals that there are five key kinds of barriers to adaptation. These concern governance, policy, uncertainty, resources, and psychosocial factors. The results of our study show that respondents prioritized these barriers differently according to the sector in which they operate. Overall however, some barriers are more important than others, with governance and policy being the major impediments to adaptation. This presentation will outline the typology and give examples from the submissions of barriers in the Australian context. The presentation will also explain the implications of our analysis for efforts to enable adaptation, including a discussion on sequencing steps to address barriers and the role of government in that process.

The Adaptation Plan of King Canute: Engaging communities on sea level rise

Speedtalk

Session: Speedtalk session 13

Time: 4.55-5.00

[1]Stuart Waters

[1]Twyfords, Wollongong, Australia

This oral presentation tells the story of a Collaborative Governance approach to decision making on sea level rise adaptation planning. Collaborative Governance is a five-step process for working with stakeholders on controversial projects to co-create enduring solutions. This presentation describes the co-creation of a long-term, multi-tiered sea level rise adaptation plan. It describes the Collaborative Governance (CG) model and the way in which it enabled diverse stakeholders to co-define their shared dilemma, co-design the collaborative decision-making process, co-create the plan and be ready to co-deliver it.
The presentation describes how the sponsoring agency (local council) went about building its internal commitment to work collaboratively with the at-risk community of stakeholders. It includes a discussion of how CG managed to bring together people representing the full spectrum of climate beliefs and non-beliefs to build a genuine commitment to work together on this vexed question.
Collaborative governance is designed for application in complex environments. This presentation describes the rationale one model of complexity provides for a collaborative approach to sea level rise adaptation planning. It also challenges the role of the climate "expert", presenting the case that our technical expertise is perhaps the biggest barrier to good adaptation planning.

Will climate change impacts be any worse than river regulation?

Poster

Session: Poster session

[1]**Anne Watson**, [1,2]Leon A. Barmuta

[1]University of Tasmania, Hobart, Tasmania, Australia, [2]Tasmanian Aquaculture and Fisheries Institute, Hobart, Tasmania, Australia

The shallow Tooms Lake dam was constructed in 1840 and supplies water for irrigation to much of the Tasmanian midlands, via Tooms River. Although this river has been regulated for over 170 years, the invertebrate community remains depauperate and dominated by fly larvae, worms and snails, in contrast to the diverse fauna of the adjacent unregulated Macquarie River. In addition, the 2006-08 drought impacted more severely on the macroinvertebrate community of Tooms River, showing that the biota have less resilience to drought and potentially to climate change, than the biota of the highly variable-flow Macquarie River.
There is a tendency to consider that the benefits of dams outweigh the detriments, but little monitoring has been done to actually measure the impacts of small irrigation supply dams. Despite this, further irrigation projects are proposed for the central midlands, with more dams and inter-catchment transfers of water to expand agricultural productivity and build resilience to drought and climate change.
The NCCARF 'Joining the Dots' project combined outputs from dynamically downscaled climate models with hydrological modelling and systematic biodiversity data as inputs to Bayesian Belief Networks (BBNs). The BBNs identified major impacts to Tasmanian freshwater biota from projected climate change. These impacts are predicted to be most severe in low rainfall regions which already heave high demand for irrigation supply, such as central midlands.
Is this the future for freshwater biodiversity in southern Australia? A prolifertion of dams to exacerbate the

Coming ready or not: Managing climate risks to Australia's infrastructure

Oral

Session: Parallel session 23

Time: 11.15-11.30

[1]Olivia Kember, [2,1]Stella Whittaker, [1]**Corey Watts**

[1]The Climate Institute, Sydney, Australia, [2]Manidis Roberts, Sydney, Australia

The Climate Institute, with research support from Manidis Roberts, reviewed the state of climate adaptation across several Australian infrastructure sectors. Research consisted of a desktop review of academic, business and government documents supplemented by engagement with companies, industry associations, regulators and government departments. Key findings were as follows: Australia still lacks a nationally coordinated approach to managing climate risks to major infrastructure, with much of the burden of policy implementation left to local councils. Information on Australia's preparedness for likely climate impacts is fragmentary and dispersed. The business response is uneven. Some organisations are moving to better understand and manage their exposure to climate risks. However, most infrastructure owners and operators are focused on maintaining their assets to standards based on historic, not future, climate. Laggards face no or little penalty, while early movers are hampered by fragmented information, and inappropriate and inconsistent regulation. Infrastructure is highly interdependent, but action on adaptation is isolated at the organisational level. The implications of climate impacts on interdependent systems and communities remain underexplored. Concern about climate change has fallen among those sectors most exposed. There is also emerging resistance to adaptive decisions at the community level. The implication of these trends is 'maladaptation' or counterproductive actions resulting in unnecessary costs, risks, and impacts to business, government and the community. The report makes recommendations for business and government.

Adaptation support strategies for Australia: addressing the gap

Oral

Session: Parallel session 11

Time: 1.00-1.15

[1]**Bob Webb**, [1]Jie-lian Beh

[1]ANU, Canberra, ACT, Australia

The presentation describes the outcomes of an NCCARF-funded project that identified end-user needs to support adaptation practice and decision-making, and reviewed international and Australian products and services currently available. This includes products, mostly web-based, that aim to assist in knowledge development and sharing, adaptation processes, and access to relevant data. It identifies a significant gap in meeting end-users' expressed needs across public, private and community sectors, and recommends product and enabling strategies to better deliver adaptation support within Australia.

Current product development and support is highly fragmented, leading to confusion amongst end-users, insufficient critical mass and continuity of resourcing for sustained product support and improvement, unnecessary duplication of effort, and fragmentation of learning. Categories of end-user need identified included entry-level planning, more complex decision making, and assurance and review over the management of adaptation issues. For public, private and community sector organisations grappling with adaptation there is an urgent need for products that will provide better guidance and more confidence.

The stakeholder consultations confirmed that some needs are likely to be common or 'core' across sectors and regions and others highly differentiated. The proposed strategies therefore address how common needs can be met, in some cases nationally, whilst distributed demand-driven approaches can best meet the differentiated needs.

The timing for a more coordinated strategic approach is right. There is potential to build on a number of current and proposed product initiatives which, if positioned and enhanced within a more intentional overall strategy, could collectively make a significant difference.

Principles for good adaptation governance: a more robust adaptation practice

Oral

Session: Parallel session 35

Time: 1.30-1.45

[1]**Bob Webb**

[1]ANU, Canberra, ACT, Australia

The presentation identifies ten principles for good adaptation governance and practice, and an overarching framework indicating how they can be addressed in the framing and management of adaptation initiatives. It is based on a combination of adaptation experience, drawing especially on local and regional projects in Australia; testing of the principles with a range of stakeholders; and a review of the relevant literature.

Climate adaptation is characterised by the diversity of organisational strategies, planning issues and decisions impacted. New and complex challenges arise from the need to address increasing current and future climate risks and uncertainties, and the underlying drivers of vulnerability and resilience. Potential responses range from incremental to transformational. New interdependencies arise from the pervasiveness of climate impacts across natural and human systems, sectors and scales; the need to consider different time horizons; and the nature and levels of uncertainty involved. This complicates decision-framing and objective-setting, which also often need to be embedded within broader (non-climate) issues and objectives.

Whilst analogies to each of these issues can be found in non-climate decision-making and policy areas, the combination of them in climate adaptation presents a unique challenge. It is little wonder that many organisations struggle to know where to start; and others get started but stall in moving from assessment to decisions.

Incorporating the set of principles more overtly into adaptation processes will facilitate a more holistic and strategic approach to adaptation initiatives, and the ongoing integration of learning from additional research and experience as it becomes available.

Prioritising children and young people's social and emotional wellbeing during and after climate-related extreme events

Oral

Session: Parallel session 1

Time: 3.15-3.30

[1]**Nadine Elizabeth White**, [1]Anne Graham, [2]Kylie Valentine, [3]Melinda Phillips

[1]Centre for Children and Young People, Southern Cross University, Lismore, NSW, Australia, [2]Social Policy Research Centre, University of New South Wales, Sydney, NSW, Australia, [3]Good Grief Ltd, North Sydney, NSW, Australia

Along with the aged and disadvantaged, children are especially vulnerable to the negative effects of climate change. Building resilience to climate change impacts is an urgent priority, particularly for children. Research has shown that a clear sense of how climate change is problematic for children and young people is not well understood and that Australian children risk falling between the research-policy-action cracks regarding climate change. Evidence-based programmes that reduce children's vulnerability and help them understand the impacts of climate change, including how they and their communities can best respond, are needed. Good Grief is an Australian owned, not-for-profit organisation that is committed to building resilience and fostering wellbeing in Australian communities. It provides programs for children, young people and adults challenged by loss and change, including the Seasons for Growth and Stormbirds programs. Stormbirds supports young people to understand and manage the changes they experience as a result of a natural disaster and enables them to develop coping, problem solving and decision-making skills. The partnership between *Good Grief*, the *Centre for Children and Young People* and the *Social Policy Research Centre* has identified an urgent research agenda that prioritises the social and emotional wellbeing of children and young people during and after climate-related extreme events. It is argued that programs that build resilience and adaptive capacity and reduce the contextual vulnerabilities of children and young people create pathways towards resilient climate adapted futures for Australian regional communities.

Price Regulation and climate risk – a case study of the energy distribution sector

Oral

Session: Parallel session 23

Time: 11.00-11.15

[1]**Stella Whittaker**, [1]Adam Davis

[1]Manidis Roberts, Sydney, Australia

Manidis Roberts, KPMG and The Climate Institute collaborated to undertake an exercise to credibly identify, quantify and cost climate impacts on city infrastructure (Melbourne) as a result of extreme heat event. We modelled the impacts on infrastructure and their interdependencies under a specified climate event. This provided a case study of the flow-on impacts of the damage to infrastructure from future climate events.
We explored the interdependencies that play out between businesses and infrastructure owners and operators under future climatic conditions, such as an extreme heat, sea level rise or extreme rainfall events. The exercise identified nodes of interconnectivity and interdependency and where there are critical infrastructure vulnerabilities to future climatic events. It also analysed flow-on effects throughout the economy of any resulting disruption to services and performance of assets as a consequence of these events. There have been very few exercises of this nature carried out to date, and this now forms an important body of research for the TCI Resilience Flagship Project and more widely.
An analysis found businesses and organisations are largely unprepared for a heatwave event of magnitude. 2030 predictions doubling both frequency and severity of impacts would severely overstretch budgets, infrastructure capacity, coping ranges and system interactions and would be unmanageable. The potential impact on individual businesses in terms of effect on total revenue was calculated. The exercise also shows that the responsibility for planning and actions to reduce vulnerabilities lies with multiple parties and not just those initially impacted. Systems resilience rather than sector resilience is required.

Climate impacts– analysing infrastructure interconnectivity and flow-on effects for Australian cities

Speedtalk

Session: Speedtalk session 2

Time: 4.40-4.45

[1]**Stella Whittaker**, [1]Olivia Kembler, [1]Adam Davis, [1]Nicki Hutley

[1]Manidis Roberts, Sydney, Australia

Manidis Roberts, KPMG and The Climate Institute collaborated to undertake an exercise to credibly identify, quantify and cost climate impacts on city infrastructure (Melbourne) as a result of an extreme heat event. We modelled the impacts on infrastructure and their interdependencies. This provided a case study of the flow-on impacts of the damage to infrastructure from future climate events.

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An analysis found businesses and organisations are largely unprepared for a heatwave event of magnitude. 2030 predictions doubling both frequency and severity of impacts would severely overstretch budgets, infrastructure capacity, coping ranges and system interactions and would be unmanageable. A typical potential impact on individual businesses is predicted to be a 0.2 - 1.1% reduction of total revenue. The exercise also shows that the responsibility for planning and actions to reduce vulnerabilities lies with multiple parties and not just those initially impacted. Systems resilience rather than sector resilience is required.

Improved climate-readiness of intensive livestock management through use of a Heat Load Index as an indicator of heat stress

Oral

Session: Parallel session 13

Time: 2.15-2.30

[1]Christine Killip, [1]**Andrew Wiebe**, [2,1]Des Reinhart

[1]Katestone, Milton, QLD, Australia, [2]Meat & Livestock Australia, Sydney, NSW, Australia

With temperature records being exceeded across Australia during last summer, the 'heatwave' has been a focus of public discussion. But what does this really mean for managing heat stress? Katestone has been working for many years with MLA to develop a forecasting system to assist with the management of heat stress in cattle. This system uses an algorithm developed specifically for Australian feedlot cattle, to calculate a heat load index (HLI) from meteorological parameters.

Media reports commonly focus on the forecast daily maximum temperature as the indicator of an upcoming heatwave. However, the important roles of high humidity, light winds and intense solar radiation in the generation of heat stress are not credited. Hence, the focus on maximum daily temperature is likely to confuse people and leads to poorly targeted actions for the management of heat stress. This is also relevant in the consideration and analysis of outputs from models of the future climate.

This paper reviews the reported heatwave conditions across Australia for last summer and compares daily maximum temperatures to the HLI and indicators for human heat stress. The approach is delivering increased climate resilience within the intensive livestock industry. It may also have wider implications for anticipating and managing heat stress in human populations providing a practical tool for adaptation to episodes of extreme heat.

Expert elicitation as a tool for identifying climate impacts, monitoring targets, and adaptation options

Oral

Session: Parallel session 26

Time: 11.45-12.00

[1]**Chris Wilcox**, [1]Alistair Hobday, [2]Lynda Chambers

[1]CSIRO Marine and Atmospheric Research Division and Climate Adaptation Flagship, Hobart, Australia, [2]Bureau of Meteorology, Melbourne, Australia

The first step in adaptation is understanding the species and ecological characteristics likely to be affected by a changing climate. This basic understanding is required for detecting impacts, and for identifying and evaluating potential adaption options. However, analyses suggest that up to 20 years of data is required to detect changes in vital rates and other characteristics of marine species in response to climate change. There are exceedingly few species for which records of this longevity exist, and this ignores the possibility that the measurements may not even cover those characteristics that respond to climate.

As an alternative to analyzing field data, we used expert elicitation to identify ecological traits of seabirds and marine mammals that were expected to respond to climate change. We surveyed 29 experts, who provided 41 survey responses covering 19 species. We investigated 5 general classes of ecological traits: foraging and diet, body mass, breeding phenology, breeding success, and population size. The goal of our study was to formalize the knowledge held by these experts in order to predict which traits would be most responsive to climate effects.

We found that foraging and diet related traits were expected to change the most with climate change, but that predictions for traits in this category were also the most variable across experts. Body mass was nearly as widely expected to change, but with much lower variance between experts. Indirect evidence suggests that while there may be some bias in responses, expert predictions are relatively reliable and can be used to design climate change monitoring and adaptation plans.

Exploring current analogues of future climate to evaluate the likely response of sensitive montane birds of the Australian Wet Tropics to a warming world

Oral

Session: Parallel session 34

Time: 2.45-3.00

[1]Alexander Anderson, [1]**Stephen Williams**

[1]James Cook University, Townsville, Qld, Australia

Among birds, tropical montane species are likely to be among the most vulnerable to climate change, yet little is known about how climate drives their distributions, nor how to predict or monitor their responses to temperature increases. Models of species' environmental niche have been used to predict changes in distribution with climate change among rainforest birds of the Australian Wet Tropics, but direct tests of the relationship between variables such as temperature, and species' actual distributions are few. Space-for-time substitutions, where warmer conditions are used as analogues of future conditions, offer an opportunity to test for species' responses to climate variables. We collected density data for rainforest birds across the elevational gradient in higher (warmer) and lower (cooler) latitude subregions within the Australian Wet Tropics (AWT). We first identified 28 species as potentially sensitive based on their unimodal elevational abundance response. Of these, environmental optima were located higher upslope in the lower latitude populations for 19 species, ten significantly so, with a median difference (~83m) concordant with that expected due to a latitudinal temperature difference of ~0.4 degrees (75m). These findings strongly suggest that temperature is a critical factor governing elevational distributions of these species, and that they are likely to shift upslope to track their preferred environmental conditions as climate warms. Our approach is sensitive enough to detect distribution shifts in response to small changes in temperature. We foresee important applications in the urgent task of detecting and monitoring the impacts of climate change on montane biodiversity.

Heat Ready? Caring for aged care residents in three Australian states

Oral

Session: Parallel session 13

Time: 1.45-2.00

[1]**Leigh Wilson**

[1]University of Sydney, Sydney NSW, Australia

Aged care facilities are home to an increasing number of frail aged people, a group who are more likely to experience adverse health effects in very hot weather. This study investigated the ways aged care facility staff care for older people on hot days in three Australian states and explored staff knowledge and thoughts on ways they could adapt practices to cope with increasing heat.

Two hundred and eighty seven aged care facilities in NSW, Queensland and South Australia were recruited into the study. Five hundred and sixty two staff were interviewed by telephone and asked about their knowledge of caring for older people on very hot days.

Staff used a range of strategies to keep elderly residents cool on hot days. These varied significantly by state, as did the level of staff knowledge and training on caring for the elderly in hot weather. Staff made positive comments about how they could improve practice, including temperature monitoring, hot day transfer packs and additional care support.

Staff knowledge of ways to care for older people was variable between states, however all staff mentioned strategies they used to assist residents when it was hot. The development of a consistent educational training module for aged care nursing staff would assist in the consistency of staff knowledge and practice during hot weather.

Reconceptualising "adaptation pathways" for informing responses to complex adaptation problems

Speedtalk

Session: Speedtalk session 10

Time: 5.15-5.20

[1]**Russell Wise**, [1]Russell Gorddard

[1]CSIRO Ecosystem Sciences, Canberra, Australia

Responses to change depend on knowledge of the nature of change, how change might affect things valued by society, and the rules that determine available choices. The prevailing interactions between knowledge, values and rules (kvr) have evolved under a relatively stationary climate and are (arguably) reasonably suited to supporting responses to incremental changes within the range of historical variability. Under climate change, however, unevenly distributed, non-marginal, and fundamentally uncertain impacts will mean values will be contested, preferences unstable or unknown, and governance unsuited to cross-scale responses. "Adaptation pathways" was introduced as a metaphor to help visualise and support decision making in contexts with uncertainty in knowledge but clearly-defined goals and limited distribution of power. These pathways approaches emphasised the adaptive nature of the decision process itself; allowing for sets of possible actions to be explored and sequenced in the face of deep uncertainty and inter-temporal complexity. This has limited usefulness in contexts where knowledge is uncertain, power is distributed, and goals are ambivalent. Here we present innovative contributions to the adaptation pathways conceptualisation to support responses to complex adaptation problems. We provide a perspective which emphasises the need to frame adaptation as both a decision problem AND as a process of societal change. The perspective stresses that if research and decision processes are to lead to better adaptation decisions, then adaptation strategies need to focus on influencing the co-evolution of the systems of kvr which surround critical decision processes. While acknowledging this is not easy, the 'adaptation pathways' and 'kvr' perspectives provide the concepts and frameworks around which stakeholders can engage and deliberate whilst also providing insights and guidance into the timing, intent and outcomes of possible interventions for steering the systems of kvr, and ultimately promoting more coordinated and strategic adaptation planning and implementation.

The association between temperature and work-related injuries in South Australia, 2001-2010

Poster

Session: Poster session

[1]**Jianjun Xiang**, [1]Peng Bi, [1]Dino Pisaniello, [1]Alana Hansen

[1]Discipline of Public Health, The University of Adelaide, Adelaide, Australia

Objective: To investigate the association between temperature and work-related injuries, to identify the groups of workers at high risk of heat-related injuries, and to explore the possible lagged effects of extreme heat on work-related injuries.
Method: Workers' compensation claims data were obtained from SafeWork SA for the period of 2001-2010 and weather data were collected from the Australian Bureau of Meteorology. The impacts of temperature on daily workers' injury rates were estimated by using generalized estimating equation models. A piecewise linear spline function was utilized to quantify the effect of temperature on work-related injury rates below and above thresholds.
Result: Overall, there was an association between temperature and work-related injuries in South Australia. One degree increase in temperature below 38°C was associated with 0.2% increase of daily injury rate. However, the injury risk declined significantly above this temperature. Specifically, the following groups of workers were at high risk of heat-related injuries: male workers; and young workers aged <=24. Occupations at risk were labourers; production and transport workers; and tradespersons. Industries showing an association between temperature and injuries were agriculture, construction, and overall outdoor industries. A lagged effect of extreme heat exposure on work-related injury risk has not been found.
Conclusion: The risk of work-related injuries is significantly associated with heat exposure, especially for vulnerable groups in the workplace. Relevant adaptation and prevention measures are required at both policy and practice levels to reduce heat-related injury risk particularly in regions with predicted increasing heat exposure due to climate change.

Predicting rainfall erosivity and hillslope erosion for climate impact assessment in the Sydney Region

Oral

Session: Parallel session 5

Time: 3.30-3.45

Xihua Yang

[1]NSW Office of Environment & Heritage, Parramatta, Australia

There is considerable seasonal variability in rainfall amount and intensity in NSW, particularly across the Sydney Region. These changes have significant effect on rainfall erosivity and soil erosion, but the magnitude of the impact is not well quantified because of the lack of high resolution rainfall data. Recently, the 2km rainfall data from regional climate models (NARClim-Sydney simulations) has become available for the Sydney Region at sub-daily time steps for the period 1990-2009 (present) and 2040-2059 (future). These recent climate projections allow detailed impact assessment and modelling of rainfall erosivity and hillslope erosion between the two contrasting periods. In this study, we developed a daily rainfall erosivity model specifically for the Sydney Region to estimate rainfall erosivity values from present and future daily rainfall data. We further produce time series hillslope erosion maps using revised universal soil loss equations (RUSLE) for the same periods. Both products are at monthly and annual intervals with a finer spatial resolution of 100m which can be used for climate impact assessment and soil erosion identification and rehabilitation. We implement these processes in a geographic information system (GIS) so that they are automated, fast, and repeatable. Our prediction on rainfall erosivity shows relatively good correlation with point-based Pluviograph calculation (R² = 0.66). The results indicate that hillslope erosion for bare soils will increase about 53% in the Sydney Region within the next 40 years, and changes are greater in the coastal and south-west regions in summer with the highest in February.

Building adaptation capacity through narratives

Oral

Session: Parallel session 32

Time: 1.30-1.45

[1]**Celeste Young**, [1]Roger Jones

[1]Victoria University, Victoria, Australia, [2]VCCCAR, Victoria, Australia

Communication has been identified as a key component of adaptation. Due to the size and complexity of adaptation tasks, a range of tools is required. These tools need to enable the participation of multiple stakeholders and build collaborative understandings that incorporate diverse areas of knowledge. Narratives are a key tool for enabling this. This presentation looks at the different types of collaborative narratives needed to enable aspects of adaptation. Through the lens of the practitioner this presentation shows the role of collaborative narratives and how they can inform understanding and decision making in the adaptation area. Using case studies it will also describe briefly some of the different processes for developing different types of collaborative narrative and illustrate how they can be applied and the different ways they can be communicated.
Cases studies include: Collaborative institutional and community adaptation narratives. Collaborative impact and solution adaptation narratives developed from a scenarios workshop at the Beyond the Mean workshop as a part of an NCCARF project Valuing Adaptation Under Rapid Change.

Adaptation and innovation - reframing adaptation implementation

Speedtalk

Session: Speedtalk session 10

Time: 4.40-4.45

[1,2]**Celeste Young**

[1]Victoria University, Victoria, Australia, [2]VCCCAR, Victoria, Australia

Adaptation at the implementation level has to date been primarily seen through risk frameworks. These frameworks serve the first part of the adaptation process which is to identify the problem and possible actions, and prioritise them. However, they do not address fully the next stage which is developing and implementing adaptation solutions. As described in the recent NCCARF report, Valuing Adaptation Under Rapid Change, adaptation practice is an emerging area of need. Adaptation practice requires that (often complex) knowledge from many sources be applied practically - innovation frameworks are very appropriate for this task. An innovation framework built around a core area of knowledge transfer and communication will provide the basis for iterative processes that allow for uncertain outcomes, multi-stakeholder involvement and foster social learning. Innovation frameworks that are already established and used in areas of industry and community development and can be more easily adopted by practitioners who are developing and implementing adaptation actions.
Using models from innovation research and a new communication framework for adaptation, this presentation will examine the major characteristics of innovation frameworks and how they can be modified and used to implement adaptation policy and practice.

Impact of climate variability on Plasmodium vivax and Plasmodium falciparum malaria in the high risk area of Yunnan Province, China

Oral

Session: Parallel session 27

Time: 12.15-12.30

[1,2]Yan Bi, [1]**Weiwei Yu**, [3]Wenbiao Hu, [4]Hualiang Lin, [3]Yuming Guo, [1]Zhiwei Xu, [1]Shilu Tong

[1]School of Public Health and Social Work, Institution of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Queensland, Australia, [2]Yunnan Center for Disease Control and Prevention, Kunming, Yunnan, China, [3]School of Population Health, University of Queensland, Brisbane, Queensland, Australia, [4]Guangdong Provincial Institute of Public Health, Guangdong Provincial Center for Disease Control and Prevention, Guangzhou, Guangdong, China

Malaria remains a public health problem in the remote and poor area of Yunnan Province, China.
This study aimed to identify the high risk area of malaria transmission in Yunnan Province, and to estimate the effects of climatic variability on the transmission of malaria in the identified area.
We identified spatial clusters of malaria cases using spatial cluster analysis at a county level in Yunnan Province, during 2005-2010, and estimated the weekly effects of climatic factors on P.vivax and P.falciparum using a distributed lag nonlinear model up to 10-week lags.
The results show that the primary cluster area was identified in western Yunnan along China-Myanmar border. The highest relative risk (RR) in malaria cases with a 1 °C increase in minimum temperature was 1.03 (95% CI, 1.01, 1.05) for P.vivax at a 7 week lag and 1.07 (95% CI, 1.04, 1.11) for P.falciparum at a 6-week lag; the highest RR with a 10-mm increment in rainfall was 1.03 (95% CI, 1.01, 1.05) for P.vivax at a 2-week lag and 1.04 (95% CI, 1.01, 1.06) for P.falciparum at a lag of 2 weeks; and the highestRR with a 10% rise in relative humidity was 1.24 (95% CI: 1.10, 1.41) for P.vivax at a 5-week lag.
China-Myanmar border is a high risk area for malaria transmission. Climatic factors appeared to be major determinants for malaria transmission in this area. The estimated lag effects for the association between climate and malaria are consistent with the life cycle of malaria parasite.

Development of a framework for Local Government adaptation strategies

Speedtalk

Session: Speedtalk session 13

Time: 5.05-5.10

[1]**Anis Zaman**, [1]Philip Jennings

[1]Murdoch University, Perth, Western Australia, Australia

Adaptation to the impacts of climate change is a fundamental challenge for Local Government Authorities (LGAs) in Australia. The severity and frequency of climate change events are increasing the vulnerability of local governments' operations and services. It is, therefore, important that the LGAs improve their adaptive capacity to increase their climate resilience. However, the current lack of capacity of LGAs inhibits them from taking appropriate measures to adapt to climate change. Development of this framework was undertaken to increase the adaptive capacity of the local governments to the impacts of climate change and help in the decision-making process by incorporating climate change adaptation into mainstream LGA operations and services. The framework identifies a range of concerns that need to be addressed to produce an effective adaptive management strategy for climate change by LGAs. While there are barriers that are related to the governance system of LGAs, such as commitment, competing priorities and lack of knowledge; there are external barriers as well, for example, access to networking and limitation of statutory authority. This paper presents the key features of the framework including Governance, Communication, Planning, Networking and Funding, and explains how this framework can assist LGAs to incorporate climate change adaptation into mainstream operations and services. Key steps to develop an effective implementation plan for climate change adaptation measures, including a mechanism to regularly monitor and evaluate the implementation are also discussed. Finally, this paper briefly discusses the findings from trialling the framework in several LGAs.

Older Chinese's perceptions, behaviors and attitudes towards heatwave and health: A comparison between urban and rural areas

Oral

Session: Parallel session 20

Time: 3.30-3.45

[1]**Ying Zhang**, [2]Jinna Wang, [2]Wei Ma, [4]Monika Nitschke, [3]Alana Hansen, [3]Peng Bi, [2]Baofa Jiang

[1]University of Sydney, Sydney, NSW, Australia, [2]Shandong University, Jinan, Shandong, China, [3]University of Adelaide, Adelaide, SA, Australia, [4]South Australian Department of Health, Adelaide, SA, Australia

More extreme heat events have been projected due to climate change and evidence suggests that older people are at a particular risk to extreme heat. However, research to understand their perceptions, attitudes and behaviors during heatwave is insufficient. Face-to-face interviews of randomly selected residents aged 60 years or over in Jinan city and rural areas in Shandong Province were conducted in late summer 2012. In total, 1208 questionnaires were collected with 600 from the rural areas. Compared to the urban area, in the rural areas, there were significantly higher proportions of the elderly who worried about how they would feel during heatwave (39% vs. 19%) and how to cope with it (5% vs. 2%), who received no phone calls (52% vs. 30%) and no visits (59% vs. 48%) during heatwave. A lower recall of heatwave warning messages (38% vs. 58%) and less willingness to make changes according to the messages (37% vs. 47%) were reported from the rural elderly. In addition, the adaptive behaviors during heatwave varied significantly between the two areas. Logistic models showed that having more social activities could significantly reduce morbidity during heatwave in both urban OR=0.51(0.29-0.88) and rural areas 0.41(0.25-0.67). In conclusion, the elderly living in the rural areas have more worries and fewer resources to cope with the health impact of heatwave in China. The differences in choosing adaptive behaviors, as well as its socio-economic determinants, should be considered in developing adaptive strategies and targeted intervention programs for the Chinese elderly. (Partially funded by China973Program: 2012CB955500-955502)

Program at a glance

Day 0 – Monday 24th June Evening

4.30pm – 5.00pm	Registration desk opens	**Level 3 Foyer**
5.00pm – 7.00pm	Welcome Reception Book launch: Climate Adaptation Futures	**Zeta Bar, Hilton Hotel**

Day 1 – Tuesday 25th June

8.45am – 10.00am	**Opening Plenary** – *NCCARF's achievements*	**Grand Ballroom**
10.00am – 10.30am	Morning tea	**Exhibition Space**
10.30am – 12.00pm	**Plenary 2** – *Information for Adaptation*	**Grand Ballroom**
12.00pm – 1.00pm	Lunch	**Exhibition Space**
1.00pm – 2.30pm	**Panel Sessions 1-4**	
2.30pm – 3.00pm	Afternoon tea	**Exhibition Space**
3.00pm – 4.30pm	**Parallel Sessions 1-7**	
4.30pm – 4.40pm	Short break	
4.40pm – 5.30pm	**Speedtalk Sessions 1-7**	
5.30pm – 7.00pm	Poster presentations and mixer	**Exhibition Space**

Day 2 – Wednesday 26th June

8.00am – 8.30am	**Welcome Tea, Coffee and Croissants**	**Exhibition Space**
8.30am – 10.00am	**Plenary 3** – *Challenges and barriers to adaptation*	**Grand Ballroom**
10.00am – 10.30am	Morning tea	**Exhibition Space**
10.30am – 12.00pm	**Panel Sessions 5-8**	
12.00pm – 1.00pm	Lunch	**Exhibition Space**
12.15pm – 1.00pm	**Side event:** Launch of the Biodiversity Report Card	**Level 3 Grand Ballroom B**
1.00pm – 2.30pm	**Parallel Sessions 8-14**	
2.30pm – 3.00pm	Afternoon tea	**Exhibition Space**
3.00pm – 4.30pm	**Parallel Sessions 15-21**	
4.30pm – 4.40pm	Short break	
4.40pm – 5.30pm	**Speedtalk Sessions 8-13**	
6.15pm – 7.15pm	Poster presentations and pre-dinner bar	**Exhibition Space**
7.15pm – 10.30pm	Conference Dinner Announcement of Climate Adaptation Champions	**Grand Ballroom**

Day 3 – Thursday 27th June

7.00am – 8.45am	**Side event:** Building the Business Case – breakfast briefing	**Level 4 Function Room 1**
8.30am – 9.00am	**Welcome Tea, Coffee and Croissants**	**Exhibition Space**
9.00am – 10.30am	**Plenary 4** – *Where do people fit in?*	**Grand Ballroom**
10.30am – 11.00am	Morning tea	**Exhibition Space**
11.00am – 12.30pm	**Parallel Sessions 22-28**	
12.30pm – 1.30pm	Lunch	**Exhibition Space**
12.40-1.30pm	Side event: NRM Planning meeting	**Level 3 Grand Ballroom**
1.30pm – 3.00pm	**Parallel Sessions 29-35**	
3.00pm – 3.30pm	Afternoon tea	**Exhibition Space**
3.30 pm – 5.00pm	**Closing Plenary 5** – *Where the rubber hits the road*	**Grand Ballroom**

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