

BOOK OF PROCEEDINGS

AUSTRALIAN CLIMATE CHANGE ADAPTATION RESEARCH NETWORK FOR SETTLEMENTS AND INFRASTRUCTURE



EARLY CAREER RESEARCHER

TWELFTH NATIONAL FORUM AND WORKSHOP

Photos courtesy of Michael Taylor

UNIVERSITY
OF
SOUTH AUSTRALIA

26-28 SEPTEMBER 2016



ACCARNSI 12TH NATIONAL ECR FORUM AND WORKSHOP PROGRAM

DAY 1 Monday 26 September 2016
University of South Australia -City East Campus
Bonython Jubilee Building - Room BJ3-03

11.00	<i>MORNING TEA ON ARRIVAL</i>
11.15	ECR FORUM WELCOME: Associate Professor Ron Cox, <i>Network Convenor, ACCARNSI</i>
11.30	GUEST PRESENTATION: Lucy Dodd, <i>Project Manager - Carbon Neutral Adelaide, SA Department of Environment, Water and Natural Resources</i>
12.00	GUEST PRESENTATION: 'Transport Infrastructure and Climate Change Adaptation' Emeritus Professor Michael Taylor, <i>University of South Australia</i>
12.30	<i>LUNCH</i>
1.30	XDI – THE CROSS DEPENDENCY INITIATIVE Jacquelyn Lamb, <i>Climate Risk, NSW</i>
1.50	CLIMATE CHANGE RISKS – APPROACHES TO RESILIENCY AND ADAPTIVE CAPACITY FOR INFRASTRUCTURE Kate Panayotou, <i>GHD, NSW</i>
2.10	PREDICTING CLIMATE CHANGE RISKS FOR PACIFIC COASTAL AND MARITIME SUPPLY CHAIN INFRASTRUCTURE Jack Dyer, <i>University of Tasmania, TAS</i>
2.30	Discussion of key themes led by Associate Professor Ron Cox
2.50	<i>AFTERNOON TEA</i>
3.20	SUSTAINABILITY STARTS WITH CHILDREN: CHILD FRIENDLY PRECINCT DESIGN FOR ACTIVE TRAVEL AND ACTIVE PLAY Hulya Gilbert, <i>University of South Australia, SA</i>
3.40	HOW THE PUBLIC AND POLICY COULD BE BETTER ENGAGED IN CLIMATE CHANGE ADAPTATION Li Meng, <i>University of South Australia, SA</i>
4.00	ADAPTATION OF TRANSPORTATION SYSTEMS TO CLIMATE CHANGE IN GHANA: POTENTIAL RISK, EXISTING POLICIES AND REQUIREMENTS Martin Larbi, <i>University of Adelaide, SA</i>
4.20	Discussion of key themes led by Emeritus Professor Michael Taylor
4.40	DAY 1 WRAP UP - Associate Professor Ron Cox, <i>Network Convenor, ACCARNSI</i>
4.45	DAY 1 CLOSE
7.00	GROUP DINNER: Daniel's Restaurant, 225 Rundle St Adelaide Booking is under Michael Taylor, meet at restaurant

DAY 2 Tuesday 27 September 2016
University of South Australia -City East Campus
Bonython Jubilee Building - Room BJ3-03

9.15	<i>TEA AND COFFEE ON ARRIVAL</i>
9.30	CLIMATE CHANGE ADAPTATION AND NEW MIGRANTS Christina Ting, Swinburne <i>University of Technology, VIC</i>
9.50	PRO-ENVIRONMENTAL 'SPILL-OVERS' IN COMMUNITY SETTINGS THREE YEARS ON Gabriele Fitzgerald, <i>University of South Australia, SA</i>
10.10	Discussion of key themes lead by Associate Professor Ron Cox
10.25	<i>MORNING TEA</i>
10.55	PREDICTING THE IMPACTS OF URBANISATION ON BIODIVERSITY IN CLIMATE CHANGING TIMES James Plummer, <i>University of South Australia, SA</i>
11.15	DRIVERS AND BARRIERS TO HEAT STRESS RESILIENCE IN THE URBAN CONTEXT Gertrud Hatvani-Kovacs, <i>University of South Australia, SA</i>
11.35	CLIMATE CHANGE ADAPTATION THROUGH COMMUNITY ENGAGEMENT IN THE YORKE AND MID NORTH REGION IN SOUTH AUSTRALIA Chandani Panditharatne, <i>University of South Australia, SA</i>
11.55	Discussion of key themes lead by Emeritus Professor Michael Taylor
12.10	<i>LUNCH</i>
12.40	FIELD TRIP: 'Water Recycling in the Willunga Basin' hosted by SA Water's Greg Ingleton and Michelle Irvine Depart University of South Australia for Aldinga
2.00	FIELD TRIP: Arrive Wastewater Treatment Plant, Aldinga
4.00	FIELD TRIP: Coriole Winery, McLaren Vale Arrive Coriole Winery for presentation by Mark Lloyd, Master Winemaker and Owner
6.15	FIELD TRIP: Arrive back at UniSA City East Campus
6.15	DAY 2 CLOSE

DAY 3 Wednesday 28 September 2016
University of South Australia -City East Campus
Bonython Jubilee Building - Room BJ3-03

9.15	<i>TEA AND COFFEE ON ARRIVAL</i>
9.30	GUEST PRESENTATION: Present and future building design considering climate change ¹ Professor John Boland, <i>Program Leader, CRC for Low Carbon Living & UniSA</i>
10.00	GUEST PRESENTATION: Professor Rodger Tomlinson, <i>Director, Griffith Centre for Coastal Management, Griffith University, QLD</i>
10.30	<i>MORNING TEA</i>
11.00	THE ROLE AND RESPONSIBILITIES OF LOCAL, STATE AND FEDERAL GOVERNMENT IN COASTAL MANAGEMENT AND PLANNING FOR CLIMATE CHANGE: THEORY VS PRACTICE Nicole Pelton, <i>University of Adelaide, SA</i>
11.20	COASTAL MANAGEMENT HOTSPOTS ACROSS WA Tim Stead, <i>Department of Transport, WA</i>
11.40	THE PERON NATURALISTE PARTNERSHIP: AN OVERVIEW Joanne Ludbrook, <i>Peron Naturaliste Partnership, WA</i>
12.00	Discussion of key themes lead by Professor Rodger Tomlinson
12.20	<i>LUNCH</i>
13.00	WORKSHOP: Key Issues for Australia's Infrastructure Sector - Coasts & Ports, Energy & Water, Transport & Roads Facilitated by Associate Professor Ron Cox, <i>Network Convenor, ACCARNSI</i>
2.00	<i>AFTERNOON TEA</i>
2.15	WORKSHOP: Group summaries Facilitated by Associate Professor Ron Cox, <i>Network Convenor, ACCARNSI</i>
2.45	ECR WRAP UP & VOTE OF THANKS: Associate Professor Ron Cox, <i>Network Convenor, ACCARNSI</i>
3.00	ECR FORUM CLOSE

Jacquelyn LAMB

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XDI – THE CROSS DEPENDENCY INITIATIVE

Jacquelyn Lamb

Abstract:

Infrastructure is highly interdependent, which means that the ability to contain business disruption and assure climate resilience is quite limited without a system wide view. But taking a system-wide view involves multiple parties across multiple sectors, all-engaging in a single system to develop a cohesive outcome.

Can we integrate future planning across utilities? How can private and public sector share data in a secure way? How can utilities justify spending to the regulator under increased pressure to cut costs? How do we fund infrastructure resilience in the future if our governments don't have the funds? Can adaptation costs be shared across private and public sectors?

In April 2015 an East Coast Low caused Sydney Water to come within hours of an overflow event at the North Head Treatment plant in Manly because it had lost power and access was limited because of major flooding. It is located within a National Park and neighbours a marine reserve. Sydney Water was within hours of creating the largest toxic spill event in the city's history.

The Australian energy regulator is under pressure to reduce energy prices. This means less network redundancy, increasing the probability that similar events will occur in the future.

The Cross Dependency Initiative aims to bring the owners of critical infrastructure together for the purpose of understanding current and future risk and also to initiate collaborative adaptation opportunities. More integrated planning is required between utility managers to understand the interdependencies within their supply chain, to optimise adaptation planning and future investment in infrastructure solutions.

Kate PANAYOTOU

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CLIMATE CHANGE RISKS – APPROACHES TO RESILIENCY AND ADAPTIVE CAPACITY FOR INFRASTRUCTURE

Kate Panayotou

Abstract:

Decisions on how we plan for and develop solutions to the effects of climate change are likely to be some of the most significant that will be made over the coming decades. Like communities throughout the world, major infrastructure will be at risk. We need to be aware of the issues and begin work to plan for and address the impacts of climate change and build more resilient living environments. Addressing climate change risks will be a careful and considered process with the aim of addressing key questions such as where are we now and where would we like to be?

Key considerations are engaging with stakeholders and communities on the challenges and opportunities presented by climate change, balancing current risks with future climate change risks, identifying the current capacity to be resilient and identification of future resiliency to manage the risks and what is required to maintain and build increased capacity to adapt. Climate change resilience will likely be provided through the establishment of an adaptation framework, where by a holistic view of how climate change impacts major infrastructure, while simultaneously aiming to improve lives, livelihoods, and the health of liveable cities and natural environment. Case studies of current climate change adaptation projects with a range of stages and responses will be presented.

Jack DYER

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PREDICTING CLIMATE CHANGE RISKS FOR PACIFIC COASTAL AND MARITIME SUPPLY CHAIN INFRASTRUCTURE

Jack Alban Dyer

Abstract:

Climate change risks present the greatest uncertainty to the future of Pacific coastal communities, ecosystems and maritime infrastructure. What will global climate change really mean for a world increasingly dependent upon seaborne trade, globalisation and supply chains? How much will it cost? Do we retreat; adapt or surrender? How do we predict the risks? For the Pacific, virtually all economic activity and development, key stakeholders and physical survival are vulnerable to this increasingly significant risk affecting the continuance and future of seaports, shipping, coastal ecosystems and communities. For example Australia estimated over 85% of its population and economy is vulnerable, being situated on its coast (Australian Government Department of Climate Change 2014). This thesis presentation provides tools, information and screening criteria aimed at assisting key vulnerable stakeholders with scarce resources/asymmetric information to minimize maladaptation and opportunity costs, to identify, analyse, evaluate and prioritise gradual and sudden climate change risks for Pacific coastal communities and maritime infrastructure. It's innovative, integrated method advocates a risk-vulnerability matrix, risk event impact tree, improvements to risk management techniques including calculating the probability of a climate-change related event and calculating existing/historic conditional probabilities of maritime infrastructure/ asset/ecosystem/system failures based on specific climate change risk events and factors affecting risk probability of occurrence . It identifies criteria on how stakeholders can determine which risks to prioritise, when, where and why to prioritise.

Hulya GILBERT

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SUSTAINABILITY STARTS WITH CHILDREN: CHILD FRIENDLY PRECINCT DESIGN FOR ACTIVE TRAVEL AND ACTIVE PLAY

Hulya Gilbert

Abstract:

Whilst there is an extensive body of research on the role of built environment and urban form in sustainable travel, there is limited research on the car dependent lifestyle of children and the associated carbon emissions. Given car dependence is rapidly increasing amongst families with children across developed countries, this study aims to assess the potential of integrating the separate accounts of compact cities for less car usage and child friendly communities in an attempt to inform policy development for more effective outcomes. Framing low carbon living developments through the lens of children's daily lives and integrating sustainability concerns into the child friendly cities policies, this project will develop planning strategies to create precincts which are conducive to walking, cycling and playing – precincts that are purposely child friendly. Surveys and travel diaries will be completed by children aged 10-12 and 15-17 years, living in high density neighbourhoods with varying child friendly attributes. Survey questions will capture the use of public places, children's travel patterns and children's public place use and non-use along with travel and play habits. The concepts of ecological psychology, namely affordances, behaviour settings and accessibility will provide the framework for analysis. The primary data collection will provide an insight on how built environment influence child related car usage and consequent carbon emissions and the formation of environmentally responsible lifestyles.

LI MENG

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HOW THE PUBLIC AND POLICY COULD BE BETTER ENGAGED IN CLIMATE CHANGE ADAPTATION

Li Meng

Abstract:

The effect of climate change is becoming severe, as evidenced by extreme weather and natural disasters all around the world. Public engagement of climate change is a matter of urgency but seen as being in fairly slow motion, as is recognition in policy making. Investigating solutions to reducing the disparity of public awareness/concern between behavioural changes for low carbon living and developing measurements of behaviour change in the context of social, environmental and economic considerations are of vital importance.

This research focuses on revealing the barriers to engaging behaviour change related to domestic and travel energy consumption including travel choice, housing choice, domestic appliance operation and water usage behaviour. The methodology applied in this study is to combine qualitative and quantitative methods that utilize revealed preference data and stated preference data to develop logit models of discrete choice in order to interpret public perceptions of behaviour change and willingness to pay for a lower carbon consumption lifestyle. The results of the study should help in measuring and evaluating energy conservation behaviour change, and can assist carbon emissions reduction policy-making.

Martin LARBI

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**ADAPTATION OF TRANSPORTATION SYSTEMS TO CLIMATE CHANGE IN GHANA:
POTENTIAL RISK, EXISTING POLICIES AND REQUIREMENTS**

Gerald Atampugre, Martin Larbi & Thomas Ojo Kolawole

Abstract:

The projected trend of climate variability and change in Ghana has the potential of introducing several risks and uncertainties over the future of the transportation sector. However, despite the sector's crucial role in Ghana's development and mobility prospects, scholarly literature and policy documents suggest that governments and stakeholders have not given much primacy to the issue of transportation adaptation to climate change risks. This paper is a qualitative assessment of the potential risks, existing policies, and requirements for the adaptation of Ghana's transportation system to climate change. The study identifies two potential consequences of climate change impact on the transportation sector in Ghana: risks related to physical impacts on infrastructure and services, and risks associated with the resultant climate-induced socio-economic changes. It is also clear that although there are a number of transport-related plans and policies relevant to climate change adaptation, the sector is bereft of numerous essential requirements. The two critical issues in this regard are the stakeholder knowledge-deficiency in the areas of climate change and adaptation and the mainstreaming of climate change documentation in practice. Governments and stakeholders need to employ anticipatory planning approaches that incorporate a range of possible effects into their transportation investment decisions and management strategies. The biggest challenge, in this context, is the projection and quantification of potential impacts of climate change on transportation. Transportation planning must be informed by data-driven information on potential impacts and the probability of the potential risk. Leaning on the Action Theory of Adaptation, we advocate and emphasize the need for more comprehensive empirical research on projections of climate change impacts on Ghana's transportation system and how these could be practically mainstreamed into long-term transportation planning.

Christina YP TING

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CLIMATE CHANGE ADAPTATION AND NEW MIGRANTS

Christina YP Ting

Abstract:

Climate change is a global phenomenon but its impacts such as sea level rises and storm surges are localised. These changes in the physical environment affect the local communities' socio-economic processes. Climate change adaptation is thus community-based and is applied locally. Involving the local community is a way to build the residents' resilience and understanding of climate change and variability. Some researchers (Flint 2012, p.197) put forward that to assist the local community to adapt there is a need to 'reify, re-codify and translate the language of their assistance into meaningful and useful terminology that can be understood, consumed and deployed locally' and to 'transfer the knowledge and information that is desired and not to overload or send signals that may confuse or alarm local people'. However, the question is whether a one-for-all approach can be applied directly to recent migrants. Countries such as Australia have a large migrant population for one in every four (26% in 2011 Census, ABS 2014) Australian residents was born overseas. Migrants adapt to the host culture and carry out everyday activities that are likely to be influenced by their ethnic culture and birth country's environment and societal experiences. How do migrants prioritize their new social experiences within the local community to learning about the new environment, which may be vulnerable to the effects of climate change? Communications on climate change adaptation must therefore be specifically targeted at new migrants especially those residing in areas more vulnerable to climate change impacts.

Gabriele FITZGERALD

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PRO-ENVIRONMENTAL ‘SPILL-OVERS’ IN COMMUNITY SETTINGS THREE YEARS ON

Gabriele B. Fitzgerald & Robert Crocker

Abstract:

The dominant paradigm in organisations and in programs aimed at households has been based on psychosocial behavioural interventions that have evolved from approaches to changing bad habits such as smoking. In contrast, more recent practice-based approaches have emphasised the role of established routines and ‘social practices’ embedded in different social contexts, which become in themselves important determinants of existing behaviour.

This pilot study focuses on the contextual social processes that hinder or foster a ‘spill-over’ from pro-environmental practices established through an intervention in three community clubs three years ago, and then transferred (or not) through a ‘spill-over’ effect into household organic waste practices. The aim of this project was to learn about the long-term effects of such targeted interventions.

These interventions ranged from initiating water, and energy efficient practices to changing waste management systems in a communal kitchen. Overall, the results demonstrate the complexity and highly contextual nature of adaptive processes when implementing pro-environmental behaviours at considering the longevity of these practices. This case study also reveals that communal settings where multiple actors were attempting to implement a set of pro-environmental behaviours agreed to by their managers, their own inadequate knowledge of the requirements could lead to a failure of not only the correct implementation but also of any potential spill-over.

James PLUMMER

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PREDICTING THE IMPACTS OF URBANISATION ON BIODIVERSITY IN CLIMATE CHANGING TIMES

James Plummer, David Bruce, Philip Roetman & John Boland

Abstract:

Currently, just over half of the world's population lives in urban places, but this is expected to increase to two thirds by the year 2050. One outcome of rapid urbanisation is a decline in biodiversity as urban landscapes are altered and become less natural. A case study of the Greater Adelaide Region of South Australia seems typical of many rapidly urbanising cities with official predictions that over the next 30 years an extra 560 000 people will need to be accommodated in 258 000 new dwellings, which will require an additional 14 000 Ha of new land.

This project is developing the relationship between urban development and biodiversity, and asks: what is the actual impact of urbanisation on biodiversity? And, can they both thrive together?

A complex geospatial model is currently being developed that will explain the relationship between the various forms of urban development in the Greater Adelaide Region and the distribution of birds, which are a good indicator for biodiversity. The model will predict the impacts of future urban development scenarios on biodiversity (e.g. ranging from low to high densities of housing) up to 30 years ahead, but also the potential impact of changing environmental variables (e.g. temperature, rainfall and vegetation variations), based on various climate change scenarios. Using the model, a set of tools are being developed that will be useful for planners, developers and governments. The approach is generic and can be applied to any urban landscape.

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DRIVERS AND BARRIERS TO HEAT STRESS RESILIENCE IN THE URBAN CONTEXT

Gertrud Hatvani-Kovacs, Martin Belusko, John Pockett & John Boland

Abstract:

Heatwaves are responsible for more deaths than all other natural hazards combined in Australia. As the frequency and intensity of heatwaves are growing, strategies to improve our resilience are becoming more vital. For example, wellbeing problems can be prevented by adaptation techniques, some of them using additional energy and water and increased building heat stress resistance. Nevertheless, heatwaves have been mainly researched and consequently managed in a fragmented manner across different disciplines.

This research has (1) devised an interdisciplinary framework for the assessment of heat stress resilience, (2) explored the drivers and barriers to resilience, (3) and analysed the differences between heat stress resistant and energy efficient building design.

Firstly, the heat stress resilience of Adelaide and Sydney has been assessed accounting for the intensity and the impacts of heatwaves, such as heatwave-related, excess ambulance-call-outs, electricity demand and water consumption. Secondly, the level of population's vulnerability and adaptation, the heat stress resistance of the built environment were surveyed and their interplay was analysed. Thirdly, the heat stress resistance of a typical dwelling type with different star ratings and design was compared using AccuRate.

A high level of adaptation was reported, though in different ways across social groups. People with pre-existing health conditions and tenants were found the most vulnerable. Although specific heat stress resistant features could decrease wellbeing issues, the average coping capacity of homes was poor. The findings highlight the importance of integrated heatwave management considering both short- and long-term adaptation techniques to increase heat stress resistance.

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CLIMATE CHANGE ADAPTATION THROUGH COMMUNITY ENGAGEMENT IN THE YORKE AND MID NORTH REGION IN SOUTH AUSTRALIA

Chandani Panditharatne

Abstract:

There is legal, policy and institutional support for regional climate change adaptation in South Australia. The South Australian Climate Change Strategy 2015-2050 indicates the commitment of the State Government of SA to play a leadership role in developing a state wide, whole-of-government adaptation action plan to guide and prioritise future adaptation actions on climate change adaptation by the government. The South Australia's Local Government Act of 1999 provides the regulatory basis for facilitating climate change adaptation action at local levels.

While the overall institutional structure for the implementation of climate change adaptation activities is set in place in the York and Mid North region, much more need to be done, especially with relation to engaging stakeholders and communities. South Australia's framework for climate change adaptation, *Prospering in a Changing Climate* (2012) provides the policy support and strongly advocates a regional approach in adapting to climate change. In line with this, the Yorke and Mid North region has already taken the leadership in adapting to adverse climate change impacts. The collaborative approach identified through the *Prospering in a Changing Climate* points out to the need for an effective community engagement strategy that empowers and engages communities and stakeholders. The collective impact model appears to provide an appropriate approach to base an effective community engagement strategy for the region.

Nicole PELTON

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THE ROLE AND RESPONSIBILITIES OF LOCAL, STATE AND FEDERAL GOVERNMENT IN COASTAL MANAGEMENT AND PLANNING FOR CLIMATE CHANGE: THEORY VS PRACTICE

Nicole Pelton

Abstract:

The roles and responsibilities of the three spheres of government – local, state and federal – with regards to coastal zone management in Australia have often been criticized for being unclear. This paper considers the *theoretical* roles and responsibilities of the three spheres based on their constitutional foundations and, based on the results of a case study of South Australian coastal governance, contrasts these with the roles and responsibilities of the three spheres *in practice*. Central to the discussion is Australia's practice of fiscal federalism, which results in a high level of vertical fiscal imbalance (VFI) between the state and federal government spheres: that is, the federal government has a taxation base far in excess of its own expenditure needs, while the states lack the capacity to raise the revenue required to meet their expenditure responsibilities. The paper argues that VFI is a significant obstacle to achieving clearly defined roles and responsibilities in terms of coastal zone management, since the federal government is not theoretically responsible for coastal zone planning or management but due to its high revenue base is expected to provide relevant funding to local and state governments. In addition to this, it is proposed that VFI is damaging to intergovernmental relations and hinders accountability and strong leadership for climate change adaptation in the coastal zone at both the local and state government level.

Tim STEAD

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COASTAL MANAGEMENT HOTSPOTS ACROSS WA

Tim Stead

Abstract:

In 2014, the Director General for the Department of Transport (DoT) requested a list of coastal settlements/localities that may represent a funding priority for future coastal management. A list of 30 sites was created, sourced from local government needs and/or applications for funding, and subsequently helped develop an idea of WA's 'Coastal Management Hotspots' (CMHs). The list of CMHs was initially intended for internal use; however, the WA state Parliament expressed interest to further develop the idea of CMHs and directed State funds to do so. Since then the 30 hotspots, vulnerable to a range of coastal processes such as erosion, sea level rise and coastal inundation have been assessed for available metocean information and knowledge gaps to guide initial project funding. A strategic plan has been developed to consolidate knowledge on coastal vulnerability for a range of hotspots and to identify any new hotspots from further studies. The end goal is to classify the vulnerability and risk of both the wider coastline and assets around each CMH, identify appropriate management strategies, and present conservative adaptation plans for short, medium, and long term. This process is called Coastal Hazard Risk Management and Adaptation Planning (CHRMAP), and represents our ideal management strategy for adapting to coastal management and climate change challenges moving forward.

Joanne LUDBROOK

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THE PERON NATURALISTE PARTNERSHIP: AN OVERVIEW

Joanne Ludbrook

Abstract:

Bunbury, Busselton, Capel, Dardanup, Harvey, Mandurah, Murray, Rockingham, Waroona are a collective group of Local Governments between Cape Peron and Cape Naturaliste in the southwest of Western Australia who recognise the potential vulnerability of this coastline due to current and future climate change impacts.

Through collaboration and partnership the PNP develops regional approaches and responses to the impacts of climate change on coastal communities. The PNP develops tools for others considering coastal adaptation as part of a decision making process.

The Peron Naturaliste Partnership (PNP) was formed in 2011 and was set up to be a driving force for addressing long term coastal risks, becoming incorporated in 2015. The new PNP Strategic Plan 2016-2019 will continue to drive regional efforts for planning and implementing management responses to coastal climate change impacts.

In this presentation the PNP will share a series of success stories and lessons learned over the past 5 years of focused regional coastal adaptation work with others who are dealing with coastal adaptation planning and management.

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