Climate change adaptation knowledge for coastal management

What is NCCARF?

The National Climate Change Adaptation Research Facility is a unique venture established by the Australian Government in 2008 to harness and coordinate the capabilities of Australia’s researchers, to generate and communicate the knowledge decision-makers need for successful adaptation to climate change. NCCARF fulfils its mission by:

- Building capacity in research and end user communities, principally through its eight thematic Adaptation Research Networks;
- Generating knowledge for adaptation through its research programs;
- Effectively delivering knowledge through the NCCARF annual conference, workshops and master classes, reports, policy briefs and information sheets, the website and social media.

Projects in NCCARF’s research programs delivering useful results for coastal management

The National Climate Change Adaptation Research Facility manages two research areas, the Adaptation Research Grants Program (ARGP) and the Synthesis and Integrative Research Program (SIRP). Together, these seek to address knowledge gaps and deliver the information decision-makers need to successfully adapt Australia to climate change.

The thematic ARGP, with a $36 million budget (including cash leveraging) and 96 projects, addresses knowledge gaps identified in National Adaptation Research Plans (NARPs). There are programs in terrestrial, marine and freshwater biodiversity, primary industries, human health, emergency management, settlements and infrastructure, the social, institutional and economic dimensions of climate change, and Indigenous communities and adaptation.

The SIRP, with a $6 million budget and 40 projects, builds on existing research to directly address knowledge needs of practitioners. The SIRP synthesises across thematic topics and integrates NCCARF learnings with the wider field of adaptation research to deliver timely and specific information tailored to the needs of practitioners. These practitioners are engaged in projects at all stages of development, implementation and delivery.

Research projects in the ARGP and SIRP can be clustered to address the needs of particular locations and critical adaptation challenges. NCCARF is producing a series of fact sheets to show where information can be found in NCCARF’s research programs to support decision-making and policy development to address critical adaptation challenges.

This fact sheet addresses the challenge of adaptation for management of Australia’s coasts.
# Projects relevant to coastal management in NCCARF’s research portfolio

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## Coastal Ecosystems

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| Estuarine and nearshore ecosystems – Assessing alternative adaptive management strategies for the management of estuarine and coastal ecosystems | Marcus Sheaves                   | James Cook University                | 30-Dec-2013                |

## Recreation and Tourism

| Beach and surf tourism and recreation in Australia – Vulnerability and adaptation   | Mike Raybould                    | Bond University                       | 30-Sep-2012<sup>2</sup>    |
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## Coastal Settlements and Infrastructure

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| Past, present and future landscapes – Understanding alternative futures for climate change adaptation of coastal settlements and communities | Phil Morley                     | University of New England            | 30-Sep-2012                |
| Coastal urban climate futures in SE Australia – From Wollongong to Lakes Entrance | Barbara Norman                  | University of Canberra               | 31-Mar-2013                |
| A climate change adaptation blueprint for coastal regional communities             | Stewart Frusher                 | University of Tasmania               | 30-Jun-2013<sup>3</sup>    |

## Legal and Institutional Frameworks

| Reforming planning processes trial – Rockhampton 2050                             | Penelope Fry                    | Rockhampton Regional Council         | 28-Feb-2013                |
| Every state for themselves? Learning from cross-border regulatory instruments to support and promote climate change adaptation in Australia     | Wendy Steele                    | Griffith University                  | 31-Mar-2013                |
| The legal, institutional and cultural barriers to adaptation to sea-level rise in Australia                                         | Jon Barnett                     | University of Melbourne             | 31-Mar-2013                |
| An assessment of Australia’s existing statutory frameworks, associated institutions, and policy processes – Do they support or impede national adaptation planning and practice? | Karen Hussey                    | Australian National University       | 31-Mar-2013                |
| Costs and coasts – An empirical assessment of physical and institutional climate adaptation pathways                                        | Ryan McAllister                 | CSIRO                               | 31-Mar-2013                |
| Limp, leap or learn? – Developing a legal framework for adaptation planning in Australia                                                  | Jan McDonald                    | University of Tasmania               | 31-Mar-2013                |

## Indigenous Communities in Coastal Regions

| Understanding how the use of intertidal marine resources by Indigenous women in the Northern Territory will be affected by climate change and their referred adaptation options | Ann Fleming                      | NT Government, Darwin Aquaculture Centre | 30-Apr-2013                |

<sup>1</sup> Completed final reports are available for download at [www.nccarf.edu.au](http://www.nccarf.edu.au)<br>
<sup>2</sup> Availability dates are estimated using draft report due dates and time for the review process<br>
<sup>3</sup> These FRDC projects are funded by a partnership between the DCCEE and FRDC to address knowledge gaps identified by the NCCARF National Adaptation Research Plan for Marine Biodiversity and Resources
TOOLS FOR ADAPTATION

A model framework for assessing risk and adaptation to climate change on Australian coasts
Colin Woodroffe, University of Wollongong
Coastal planners and managers urgently need improved methods to forecast how coasts will respond to sea-level rise. This project will develop a modelling framework to provide guidance to the most appropriate adaptation strategies, such as suitable setback lines, more focused dune management, or beach nourishment and/or protection works. The researchers will implement innovative methods incorporating economic cost-benefit analysis with physical probability modelling to derive economically optimal strategies for adapting coastal zones to present or future conditions.

Developing an Excel spreadsheet tool for local governments to compare and prioritise investment in climate adaptation
Stefan Trueck, Macquarie University
This project aims to educate stakeholders by creating a tool to demonstrate the influence of various parameters on the investments they make. Users will be able to enter details regarding extreme events and the tool will show relevant charts and graphs to enhance optimal decision-making. The tool has particular use to local governments, but can also be used to understand the impact of extreme events on sectors such as health, agriculture and the insurance industry.

COASTAL ECOSYSTEMS

Coastal ecosystems response to climate change
Wade Hadwen, Griffith University
This project will synthesise knowledge of climate change impacts on various Australian coastal ecosystems including estuaries, coral reefs, sandy beaches, dunes and headlands, to review and integrate current understanding of potential adaptive pathways, both ecological and human, to identify priorities for future research and management.

Pre-adapting a Tasmania coastal ecosystem to ongoing climate change through reintroduction of a locally extinct species
Nicholas Bax, University of Tasmania
This project will develop and promote a national framework to evaluate the potential to translocate native marine species to increase the climate change resilience of temperate reefs. Using the reintroduction of the blue groper as a test case, researchers will design a monitoring and evaluation program to determine the effects of a trial re-introduction, and reach the critical decision point on whether to re-establish blue groper in Tasmania, or to take an alternative approach. This test case will help determine whether translocating marine species is a viable option to improve resilience to climate change and what processes, knowledge, protocols, safeguards and policy changes are required before attempting this.

Estuarine and near-shore ecosystems – Assessing alternative adaptive management strategies for the management of estuarine and coastal systems
Marcus Sheaves, James Cook University
The project focuses on developing and assessing adaptation strategies for estuaries and other coastal ecosystems to optimise ecosystem functions, fisheries outcomes and biodiversity values in a changing world. The aim is to develop strategies and tools to facilitate management that are sensitive to regional and typological differences, to the complex nature of estuary ecology, the far-reaching implications of estuary adaptation strategies and to the competing needs, influence, impacts, outcomes, consequences and costs across the spectrum of sectors affected by climate change.

RECREATION AND TOURISM

Beach and surf tourism and recreation in Australia – Vulnerability and adaptation
Mike Raybould, Bond University
This project will value existing income streams due to beach-related tourism and recreation in a variety of case study locations. It will assess the vulnerability to climate change of assets that are key drivers of marine and coastal tourism and recreation and apply a valuation tool in identified seachange localities to test transferability of results. It will identify social and behavioural responses to climate change impacts on vulnerable tourism and recreation assets and report on the net vulnerability of the regions to climate change.

Adapt between the flags – Enhancing the capacity of Surf Life Saving Australia to cope with climate change and to leverage adaptation within coastal communities
Marcello Sano, Griffith University
Surf Life Saving Australia has assets and facilities exposed to climatic drivers on the frontline of climate change, including 310 surf life saving clubs and 150,000 trained volunteers, 63% of which are zones of potential instability. This project will identify the adaptive capacity of SLSA at the national level and options to enhance its capacity internally and in collaboration with allied national level organisations, local governments, allied emergency services and community groups.

COASTAL SETTLEMENTS AND INFRASTRUCTURE

Enhancing the resilience of seaports to a changing climate
Darren McEvoy, RMIT University
This project aims to better understand the vulnerability of critical seaport infrastructure (structural and functional), and to develop new knowledge and methodologies for enhancing port resilience to future climate change. The research will address three research objectives: to gain a better understanding of the complex mix of climate and non-climate drivers that are likely to affect port operations; to assess the vulnerability of core port infrastructure and identify appropriate adaptation measures for enhancing resilience; and, to assess the vulnerability of other elements at risk in the wider port environment and identify adaptation measures. Close engagement with policy and practitioner stakeholders will ensure the deliverables will be ‘fit for purpose’.

Past, present and future landscapes: – Understanding alternative futures for climate change adaptation of coastal settlements and communities
Phil Morley, University of New England
A critical gap in many climate change vulnerability and adaptation studies is that predicted climate impacts are being assessed on current landscape, land-use and settlement patterns. This project aims to develop spatial analysis and visualisation tools to examine future trends of settlement and social patterns. It will provide a quantitative understanding of current settlement trends and their future trajectories and design and test several alternative landscape futures as adaptive strategies to reduce the vulnerability of settlements and communities to predicted climate change events. Using northern coastal NSW as a case study, researchers will demonstrate how the tools can be applied and transferred to other contexts, landscapes or regions.

Coastal urban climate futures in SE Australia – From Wollongong to Lakes Entrance
Barbara Norman, University of Canberra
The project aims to identify what a climate-adapted Australian settlement would look like in 2030. It will investigate a range of coastal communities between Wollongong, NSW and Lakes Entrance, Vic, all with different demographics, economies, environments and social circumstances. Researchers will produce a Small coastal towns future scenarios report incorporating descriptions of the desired characteristics of a typical coastal small town in 2030 under a number of climate (and other) change drivers; a Small coastal towns future scenario/outcomes
An assessment of Australia's existing statutory frameworks, associated institutions, and policy processes – Do they support or impede national adaptation planning and practice?

Karen Hussey, Australian National University

Do current Australian laws and policies help or hinder climate adaptation, in practice? There has been little detailed investigation into what specific institutional, governance and policy process reforms might be needed to support adaptation to climate change. This project will investigate existing laws, incentives and governance arrangements and their associated institutions to gauge the extent to which they currently support or hinder adaptation planning and practice.

Costs and coasts: an empirical assessment of physical and institutional climate adaptation pathways

Ryan McAlister, CSIRO

This research will provide an empirical, grounded and context-sensitive analysis of economic, social and institutional requirements for distributing the costs, risks and responsibilities for adapting to future coastal inundation risks under climate change scenarios. It will provide an economic valuation of coastal inundation, identify what changes to existing local policy mechanisms are required to improve the management of inundation risk and assess the economics of a range of adaptation pathways.

Limp, leap or learn? – Developing a legal framework for adaptation planning in Australia

Jan McDonald, University of Tasmania

This project will look at the role of law in driving and enabling urban climate change adaptation. It will compare and contrast the legal frameworks for planning for coastal impacts of climate change and those for the increased risks of bushfire. This analysis will consider formal planning laws, coastal and emergency management laws, property law, liability and insurance regimes.

INDIGENOUS COMMUNITIES IN COASTAL REGIONS

Understanding how the use of intertidal resources by Indigenous women in the Northern Territory will be affected by climate change and their preferred adaptation options

Andrew Campbell, Charles Darwin University and Ann Fleming, Northern Territory Government Department of Resources

Remote Indigenous communities in the Northern Territory are at the end of long, vulnerable food supply chains. This vulnerability is likely to be exacerbated by increased climate variability, more intense extreme weather events, longer periods with roads cut due to flooding, sea level rise in the intertidal zone, and rising energy prices. There is an increasing imperative to grow food close to where people live, and for coastal communities the main options are fishing and aquaculture. Many coastal Indigenous women are highly receptive to aquaculture as a way to supply fresh, affordable food to their families and provide local jobs. This project will build on an understanding of West Arnhem Indigenous women’s preferred adaptation options for improved food security. It will focus on the potential for using open-ocean, intertidal aquaculture enterprises and simple aquaponics for fish and vegetable production. The project will deliver policy recommendations to benefit Indigenous women across Australia’s coasts, who can adopt similar approaches.

Other fact sheets in this series cover:

Local Councils  
Water Resources  
Infrastructure  
Agriculture  
Emergency Management  
Vulnerable Communities  
Business and Industry  
Policy and Regulation for Effective Adaptation  
Decision Support Tools  
Natural Ecosystems  
Research Investment in States and Territories

For more information on NCCARF research, visit: www.nccarf.edu.au