

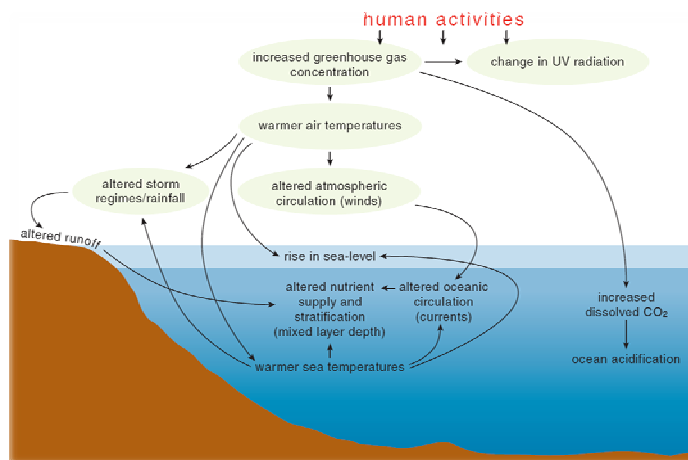
Marine Adaptation Network



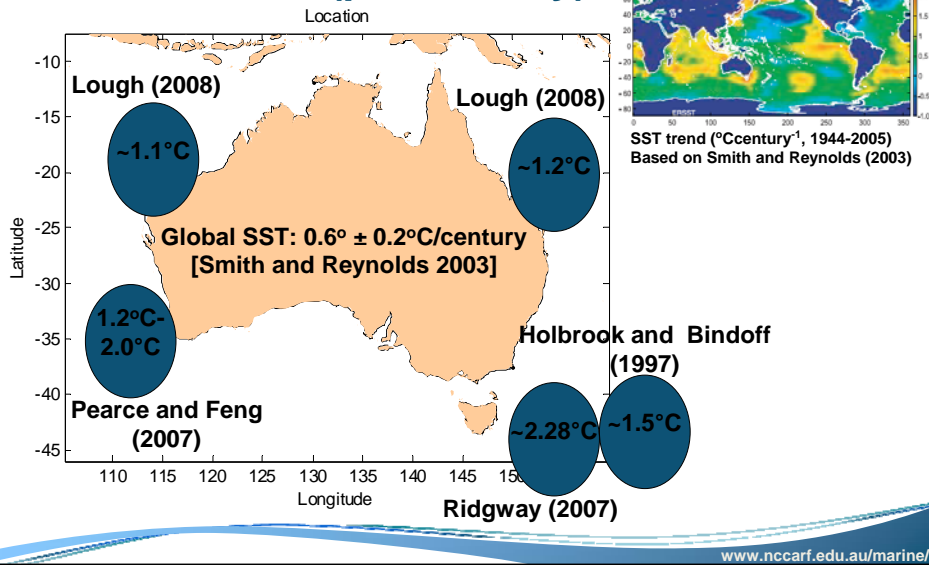
Neil Holbrook
 University of Tasmania

“An interdisciplinary network that will build adaptive capacity and adaptive response strategies for the effective management of marine biodiversity and natural marine resources under climate change.”

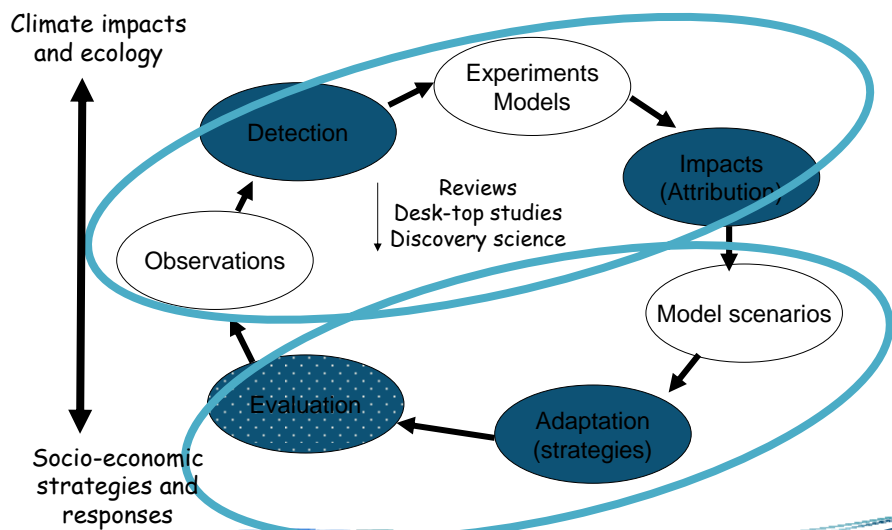
Physical and Chemical Changes in Atmosphere and Oceans due to Climate Change



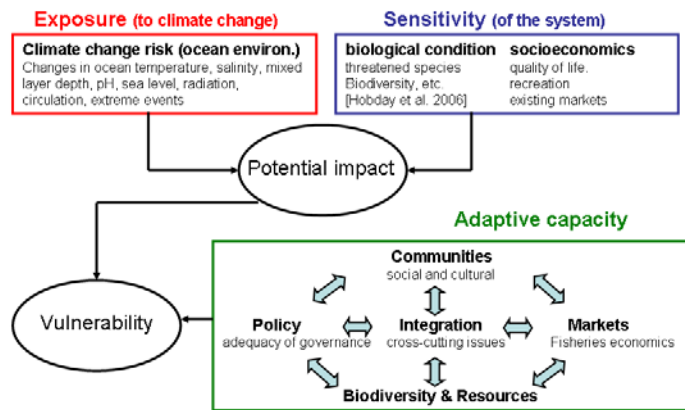
Observed ocean temperature changes (per century)



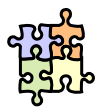
Climate Impacts and Adaptation



Network Organisation



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Marine Adaptation Network key goals by 2012

Effective network:

- connects researchers, stakeholders and end-users
- facilitates and helps resource collaborations
- facilitates National Adaptation Research Plan (NARP) implementation
- connects with key international organisations (e.g. Tyndall Centre, Asia-Pacific Network, GLOBEC)



Web-site: operational, functional, and revised based on stakeholder needs

Interactive tools:

- connections between stakeholders, end-users and researchers mapped and facilitated
- Web-based decision support tools for end-users (MBR, science-policy)



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Marine Adaptation Network key goals by 2012

Data-base and repository:

- Social and cultural meta-database
- Marine biodiversity and resources database
- Integrated science-policy database
- Markets knowledge database

Communication:

- Marine Adaptation Bulletin (quarterly)
- fact sheets (occasional)



Education:

- next generation CC adaptation researchers through summer/winter schools (3)



Protocols: research protocols for participatory research (communities/policy)

Workshop(s): First workshop: 'Principles and guidelines for assessing and reducing vulnerability to climate change in Australia's marine systems: a workshop for stakeholders, managers and researchers'

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NARP Priorities (consultation draft only)

1. Aquaculture
2. Commercial and recreational fishing
3. Conservation management
4. Indigenous and subsistence use
5. Tourism and recreational uses



National Adaptation Research Plan Marine Biodiversity & Resources Consultation Draft

November 2008

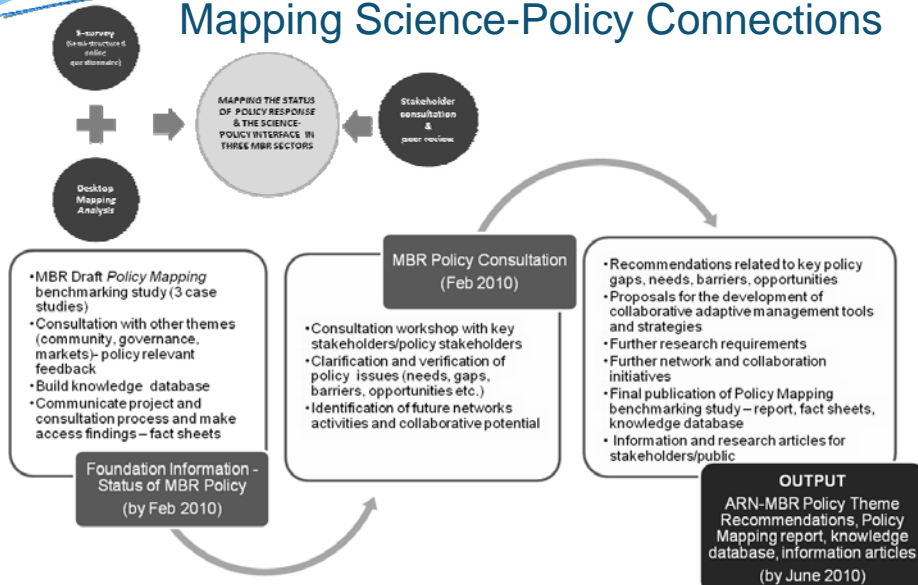


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Mapping Science-Policy Connections



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Other Activities

Summer School: *Resilience in the marine social-ecological system*

- highly motivated researchers
- current condition of the marine system
- measures to enhance adaptive capacity
- practical skills in vulnerability assessment
 - vulnerability indicators

National Workshop: *Building resilience of the marine social-ecological system*

- finalise a draft set of principles and guidelines for vulnerability assessment in marine social-ecological systems
- test findings of desk-top studies on resilience status of the marine social-ecological system
 - first step in deciding the interventions that need to be taken in managing resilience

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The screenshot displays the NCCARF website interface. At the top left is the NCCARF logo and name: National Climate Change Adaptation Research Facility, Adaptation Research Network, MARINE BIODIVERSITY AND RESOURCES. A navigation bar contains tabs for About Us, Events, Themes, Resources, Links, and Contact. The main content area is divided into several sections:

- About Us:** Includes links for About the Network, Climate Change Adaptation, National Adaptation Research Plan, and Network Organisation.
- Membership Benefits:** A text block explaining the benefits of joining the network, with a link to register.
- Search:** A search bar with an "Advanced Search" option and a "submit" button.
- Click to view Google calendar:** A calendar for August 2009, showing dates from 26 to 29.
- Recent Stories:** A section titled "Recent Stories" with a sub-header "Page 1 of 2 pages 1 2 >". It features a featured article: "The Adaptation Research Network for Marine Biodiversity and Resources". The article text states: "The Adaptation Research Network for Marine Biodiversity and Resources (ARN-MDR) is an interdisciplinary network that is building adaptive capacity and adaptive response strategies for the effective management of marine biodiversity and natural marine resources under climate change." It also mentions that the network is hosted by the University of Tasmania and led by Associate Professor Neil Holbrook. Below this is a "Read More" link.
- Key Messages from the International Scientific Congress on Climate Change: Global Risks, Challenges & Decisions:** A section with a sub-header "Copenhagen, Denmark 10-12 March 2009". The text describes the congress and its focus on climate change risks and decisions. It includes a "Read More" link.
- Climate Change Adaptation:** A section with a sub-header "Climate Change Adaptation". The text discusses the need for adaptation in light of IPCC predictions and mentions the importance of marine biodiversity and resources. It includes a "Read More" link.

Marine Adaptation Bulletin (MAB)



Convenor's Spot



Over the next four years, the marine adaptation network will work closely with the National Climate Change Adaptation Research Facility (NCCARF) to advance knowledge about climate change adaptation, and adaptation options for stakeholders of Australia's marine biodiversity and resources and to foster an inclusive collaborative and interdisciplinary research environment that generates outputs relevant for policy makers and managers to develop appropriate climate change adaptation.

Inside this issue:
 Featured Theme - Biodiversity & Resou
 About the Marine Adaptation Network
 National Adaptation Research Plan
 Notes & News
 Key Messages from Climate Change C
 Conferences/Workshops
 Contact Details

Featured Theme: I

The overarching aim of the Biodiversity and Resources theme within the broader network is to better understand the adaptive capacity of marine biodiversity at genetic, species and ecosystem levels in the overall context of vulnerability to climate change risk. This information is vital to enable us to usefully inform policy and management decision-making for the long-term conservation of Australia's marine assets and to enhance the adaptive capacity of Australia's marine biodiversity. There is also a clear need to develop adaptation strategies and industry extensions that optimise the socio-economic benefits and services provided by Australia's marine resources.

Australia's ocean territory covers 14.7 million square kilometres and includes some 36,000 kilometres coastline extending from the tropic north to the cool temperate south. Australia's isolation as an island nation has resulted in a diverse & highly endemic marine fauna and flora and the biodiversity of Australia's vast marine production has been recognised as being



About the I

The Marine Adaptation Network is connecting the following sectors:

- Integration
- Biodiversity & Communities
- Markets
- Policy

The marine adaptation understanding of all sectors within the model (Figure 2) of Challenges and Drivers

The main aim of the synthesis of existing cooperation that on resources, coastal management and g

For further information on <http://www.nccarf.edu.au>

Notes & Ne

NCCARF has recently formed New Zealand and the first conference in NZ to focus on climate change adaptation.

While this event will focus on New Zealand issues, through regional panel discussions, it is expected to extend beyond its borders.

Australian colleagues will be invited to the current research effort.

For more information visit www.nccarf.edu.au

Key Message International Congress or Global Risks Decisions

The University of Cop International Society under the heading 'CI Challenges and Drivers

The congress aimed science, technology in order to make use of the current and com

The findings of the co supplementary to the Panel on Climate Cha

The six preliminary for the Congress 'Secret International Scientific' report by June 2009.

The Danish Government Change Conference over the conclusions 1 the Conference.

For further information visit www.nccarf.edu.au



Conferences/Workshops

Climate Change Adaptation 'Managing the Unavoidable' Conference
 30-21 May 2009, Wellington, New Zealand
www.cca2009.org.nz

The 8th Indo Pacific Fish Conference (IPFC) and the 2009 Australian Society for Fish Biology (ASFB) Workshop & Conference
 31 May-6 June 2009, Fremantle, Western Australia, Australia
www.asfb.org.au

AMBA2009 International Conference
 9-11 July 2009, Adelaide, South Australia, Australia
www.amba2009.org.au

18th International Interdisciplinary Conference on the Environment
 9-11 July 2009, Daytona Beach, Florida, USA
www.ice2009.org

20th International Climate Change Adaptation Conference 'Climate Change Adaptation Futures: preparing for the unprecedented impacts of climate change'
 20 June-1 July 2010, Gold Coast, Queensland, Australia
www.cca2010.org

For further information visit www.nccarf.edu.au

Marine Adaptation Network Partners:



The Adaptation Research Network for Marine Biodiversity & Resources is an initiative of the Australian Government's National Climate Change Adaptation Research Facility www.nccarf.edu.au

Contact us

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This issue of the Marine Adaptation Bulletin has been compiled by convenors for that

Featured Theme: Biodiversity & Resources edition was written by Dr Terry Hughes

Design was provided by Dr Quentin Grafton and Alison Hickey

Fact Sheets

FACT SHEET 1

Species response to climate change in the ocean

Climate change is modifying the temperature and chemistry of our oceans, with direct and indirect consequences on the oceanography and functioning of marine ecosystems. Below are some of the expected and/or observed responses of marine species to climate change.

Physiological responses
 All marine organisms live within a limited range of temperature and pH corresponding to the range where cellular exchanges and whole-organism processes are optimized for the species. Acidification and/or increases in ocean temperature can push some species towards their physiological limits (i.e. the edges of their thermal or pH range), resulting in negative effects on the organisms' growth, reproduction, foraging, immunity, behaviour and competitiveness. A well known example is the bleaching of tropical coral reefs caused by the dissociation of corals and their symbiotic zooxanthellae. Laboratory studies have also demonstrated negative physiological responses in other species under predicted climate change conditions, including compromised fertilisation and early development in the purple sea urchin, and impaired oxygen transport in squids.

Changes in distribution
 Marine species have a particular habitat preference which reflects the most suitable environment for them to thrive and defines their distribution. Suitable habitats

Changes in phenology

Phenology corresponds to the timing of life history events, e.g. timing of egg-laying, migration, growth in abundance. Changes in phenology are important because species' life cycles are

Changes in abundance

Through impacts on oceanography, ocean productivity, species' physiology and phenology, climate change is responsible for changes in species' abundance throughout the oceans. Examples in Australia include regional changes in phytoplankton abundance (i.e. increase in blooms) and decline in mackerel along the east coast of Tasmania, with many more changes expected in the years to come.

interconnected and changes in the life-history of one species can affect many others, potentially resulting in an asynchrony between dependent species (i.e. decoupling of phenological relationships).

Phenological changes are not easily observable in marine systems and long term datasets are lacking in Australia. Nevertheless, changes in phenology have been observed in seabirds (i.e. earlier laying) and are expected to affect other taxa (e.g. plankton, sea urchins) in the North Sea where substantial temporal modifications in seasonal succession periods have been observed in the last few decades).

About the Marine Adaptation Network

The Adaptation Research Network for Marine Biodiversity and Resources is hosted by the University of Tasmania and convened by Alastair Hickey. The Marine Adaptation Network is supported by 18 partners nationwide. This interdisciplinary network aims to build adaptive capacity and adaptive responses strategies for the effective management of marine biodiversity and habitat marine resources under climate change. For more information on the Marine Adaptation Network, or to subscribe to become a member of the Network, please email marinere@utas.edu.au.

Thankyou!

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We welcome new members, please register via the website at www.nccarf.edu.au/marine/ or send queries to arnmbr@arnmbr.org



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