National Environmental Research Program

TROPICAL ECOSYSTEMS *hub*

Informing Natural Resource Management and Regional Development Australia planning in North Queensland

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Australian Government

Department of the Environment

JAMES COOK UNIVERSITY AUSTRALIA

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Informing Natural Resource Management and Regional Development Australia planning in North Queensland

NERP TE Hub Project CF2 Final report

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Cover photographs: Gabriel Crowley: Coastal erosion, Siam Weed, Cyclone-damaged timber plantation, Fire

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Acronyms Used In This Report

GBR	Great Barrier Reef
NERP	National Environmental Research Program
NERP NA	National Environmental Research Program – North Australia Hub
NERP TE	National Environmental Research Program – Tropical Ecosystem Hub
RDA	Regional Development Australia
RDA FNQ&TS	Regional Development Australia Far North Queensland and Torres Strait

Abbreviations Used In This Report

BDT	Burdekin Dry Tropics
BM	Burnett Mary
CC	Climate Change
CSIRO	Commonwealth Scientific & Industrial Research Organisation
CYP	Cape York Peninsula
FB	Fitzroy Basin
MW	Mackay Whitsundays
NCCIS	National Climate Change Information Service
NCCP	National Climate Change Projections
NG	Northern Gulf
NQ	North Queensland
NRM	Natural Resource Management
QLUMP	Queensland Land Use Mapping and Planning
TS	Torres Strait
WT	Wet Tropics

Acknowledgements

Introduction

The NERP TE Hub Program has been designed to inform environmental management, planning and policy relating to key tropical environments: the Great Barrier Reef, Torres Straight and tropical rainforests of North and Far North Queensland. While high level decisions about management for these environments is the domain of State and Federal Governments, at the local and regional scale, environmental management, planning and policy is also the preserve of Natural Resource Management (NRM) groups and Regional Development Australia (RDA). These organisations support environmental management through regional plans and road maps that integrate national and state-level priorities into a regional context. Both are currently engaged in planning processes that will guide environmental management over the next decade.

NRM groups are non-statutory bodies chartered with facilitating improvement in sustainable environmental management across Australia (*http://www.nrm.gov.au/about/nrm/index.html*). NRM plans provide a regional framework for the sustainable management and development of biodiversity, land, sea, water and atmospheric resources. Increasingly, these plans are also focusing on eco-social systems as a basis for building community resilience and capacity for effective environmental management. NRM groups are currently updating and revising their plans, with an emphasis on integrating Climate Change (CC) adaptation and mitigation into existing priorities.

RDAs are regional groups formed through partnership between all levels of government community to enhance regional economic, social and environmental sustainability (*http://rda.gov.au/rda-national-charter*). RDA's charter is to drive and support the development of sustainable regional economies through diversification of industries across agriculture, tourism, mining and fisheries, underpinned by robust education and health services sectors and fit-for-purpose infrastructure. The RDA planning process is currently producing road maps that contain key initiatives relating to CC adaptation, knowledge and governance systems, agriculture, tourism and livelihoods. Hence, RDA's area of interest overlaps with that of NRM groups, and stronger linkages between the two sectors will help to advance environmental management priorities.

The linkages developing between RDAs and NRM groups will ensure that relevant scientific information about natural environments can be effectively delivered to RDAs through the NRM planning process. However, as RDAs have a stronger emphasis on community wellbeing and economic development than do NRM groups, NERP TE Hub projects addressing industry economic, livelihoods, community planning or resilience would better inform regional development through direct linkages with RDAs.

The interests of both NRM groups and RDAs have strong alignment with the focal areas of NERP TE Hub. NRM plans and RDA road maps, and their implementation, will both draw on the knowledge generated in the NERP TE Hub Program and help define priorities and directions for future environmental research in the region. This project was therefore designed to directly inform the two most relevant planning and decision making processes currently underway in north Queensland, resulting in a purpose-built bridge between NERP TE Hub science and real-world planning and decision making in the NRM and regional development fields.

The project facilitated integration of NERP TE Hub research into NRM and RDA planning by:
1. Identifying knowledge needs to meet NRM and RDA planning
2. Synthesising information on other research programs addressing these needs
3. Developing a framework for knowledge incorporation into NRM and RDA planning

In addition, the project produced a number of products synthesising information from other environmental research programs relevant to the North Queensland.

While both research and planning have an ongoing role in environmental decision-making, the short lifespan of programs and funding cycles in both domains leads to high staff turnover, often with periods of inactivity. NRM groups and RDAs also generally have a small workforce relative to their large scope of work, restricting their capacity to engage with researchers. Moreover, they find that the traditional model of research delivery, in which predesigned projects are delivered through research publications or reports, does not always deliver the science they need to meet their regional priorities. Science integration into NRM and RDA business is more likely to be maximised when the stakeholders have ongoing input into the design of research questions, methodologies and outputs; and even more so when they engage in the research itself. So, increasingly, NRM groups now commission their own science, prioritising their engagement to a few core areas, and working only with scientists with a track record of delivering applied co-research projects. However, research with such high levels of stakeholders engagement can be more difficult, complex and time-consuming for researcher, and hence more expensive to undertake; and there can be resistance to research agendas being externally driven.

These issues create difficulties in building and maintaining relationships between researchers and stakeholders, and inflate the transaction costs on both sides. The role of knowledge-brokering in this arena is therefore to facilitate stakeholders to articulate their science needs and to facilitate researchers to understand and meet these needs. Therefore, rather than just building linkages between individual NERP TE Hub projects and NRM/RDA stakeholders, this project aimed to contribute to the development of a robust knowledge-brokering system to facilitate science integration into the future, and with the aim of reducing transaction costs to both researchers and NRM/RDA planners.

This project therefore focused on facilitating existing relationships or building new relationships at four levels:
1. cross-regional collaboration between NRM planners
2. cross-sectoral collaboration between NRM planners and RDA planners
3. cross-program collaboration between NERP TE Hub researchers and other environmental research programs
4. cross-sectoral collaboration between NRM/RDA planners and researchers

The overall aim of the project was thus to develop lasting relationships in which, not only current NERP TE Hub research can be better integrated into NRM and RDA planning, but to engender relationships and a framework through which future NRM/RDA knowledge needs can be met through the co-design of future environmental research programs.

Methodology

This project involved direct liaison with NRM groups and RDAs to determine their planning priorities and processes, information needs and science integration processes. This included:
- Meeting with NRM and RDA organisations individually
- Follow-up discussions and email correspondence
- Cross-regional meetings to assess aligning planning activities and science integration

The information collected in these meetings was then classified to provide a framework for assessing the application of NERP TE Hub and other regional science, and to identify pathways for incorporating this science into regional planning. As both sectors are engaged in planning to address Climate Change, Climate Change planning was also the focus of this project.

The project teams also worked closely with the three other main providers of regional NRM science in northern Australia: NERP North Australia and Stream 2 Wet Tropics and Monsoon North Cluster Clusters to identify alignment opportunities, and assisted in the design of the latter two programs. In addition, to provide a context for NERP TE Hub and Stream 2 research, all research funding programs were audited for CC relevant research.

Engagement with NRM groups

There are 14 NRM groups in Queensland, eight falling within NERP TE Hub's area of project activity (Figure 1). Each of the NRM groups across northern Australia is currently addressing the challenges of Climate Change. Most NRM groups are doing this through revision of their NRM plans. This process is largely being driven by the Federal Government's *Regional Natural Resource Management Planning for Climate Change Fund*. The project took advantage of the timing of this Fund to identify NRM science needs and begin the conversation about how NERP TE Hub and other regional science could be useful to meeting these needs.
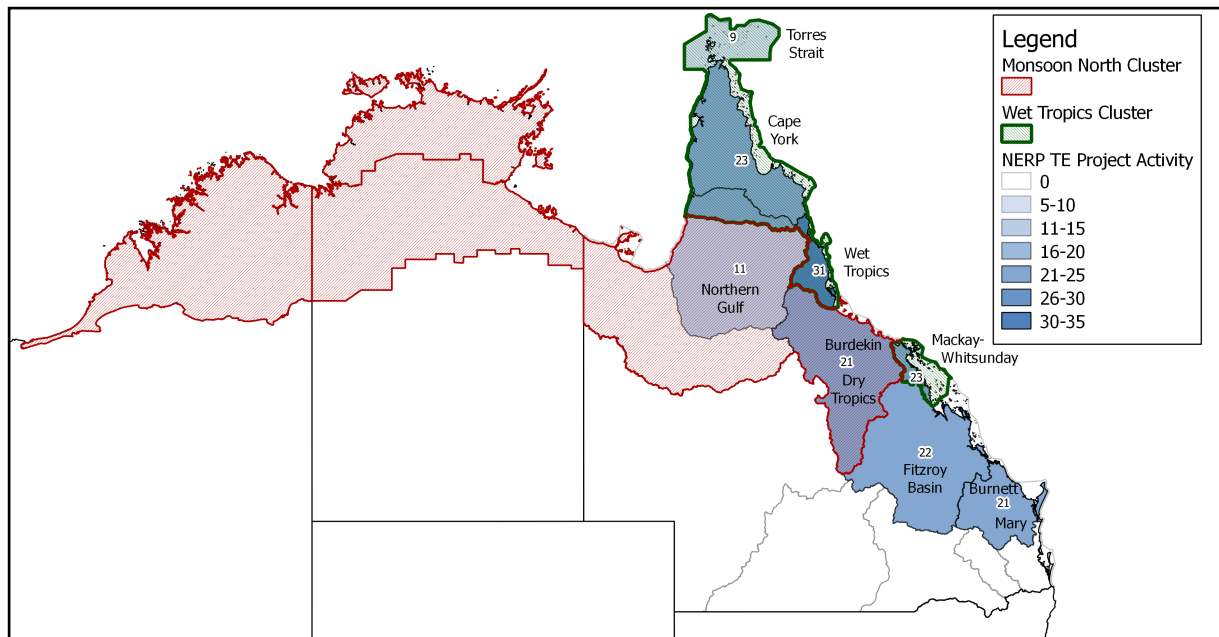
Figure 1:   NERP TE Hub project activity in relation to NRM regions and NRM Clusters

The *Regional Natural Resource Management Planning for Climate Change Fund* is being delivered in two streams. Stream 1 aims to support NRM groups to update their plans to (*http://www.environment.gov.au/cleanenergyfuture/regional-fund/faqs.html#stream1*):

- Become living documents with an adaptive management approach that promotes continual improvement of strategic planning
- Identify priority landscapes for carbon plantings and strategies to build landscape integrity and guide adaptation and mitigation actions to address CC impacts on natural ecosystems
- Use logical, comprehensive and transparent planning processes
- Use the best available information to develop actions and are based on collaboration with government, community and other stakeholders

Stream 2 funding supports research programs to provide regional level climate change information and guidance on the integration of that information into regional NRM and land use planning (*http://www.climatechange.gov.au/reducing-carbon/land-sector-measures/nrm-fund/stream-2*). Stream 2 Climate Change research programs will thus be an important vehicle for integrating NERP TE Hub research into NRM planning.

Along with nation-wide programs to develop climate projections and coordinated monitoring and evaluation programs, Stream 2 funding is organised around NRM Clusters, with two Clusters (Wet Tropics and Monsoon North) covering the bulk of NERP TE Hub's area of project activity (Figure 1). It was a requirement of Stream 2 funding that the Cluster programs be driven by NRM groups and their identified needs. The closing date for Stream 2 applications fell within the early stages of this project. Therefore, the first element of this project was to convene a meeting of each NRM cluster to identify their information priorities.

Engagement with NRM groups continued through ongoing discussions and emails and two workshops. Two workshops sessions were then held in which the NRM planning process of NRM groups was mapped, and alignment opportunities were identified. The first session was in a workshop held as part of NERP TE Hub Project 12.4 to prepare for Regional Aggregation under the Carbon Farming Initiative on 4 March 2012. The second was a workshop dedicated to the task of mapping planning processes and science needs. This workshop was organised collaboratively by this NERP TE Hub project (CF2) and the Wet Tropics Cluster Research Program. It also included representatives from the NERP Northern Australia Hub and Stream 2 Monsoon North Cluster Research Program, as well as a range of NERP and Stream 2 researchers. RDAs were also invited, and two planners from RDA FNQTS attended. One of the project team also attended a third workshop held in the same vein, which was organised by the NRM groups themselves to pursue planning alignment opportunities. The nature of engagement and the people engaged changed throughout the course of the project depending on availability and the tasks being addressed (Appendix 1). NRM groups were also supplied with documents produced describing NERP TE Hub Projects relevant to their regions.

Engagement with RDAs

There are 12 RDAs in Queensland, five of which lie within NERP TE Hub's area of project activity (**Figure 2**). **RDAs are also undertaking planning at present with the development of regional road maps (***http://rda.gov.au/rda-region-maps***). While these road maps address a number of regional priorities, CC-related activities feature in the road maps of four of the five RDAs in this area.**

Liaison with RDAs was less formal than that with NRM groups, and involved email and phone communications and attendance at workshops (Appendix 1). RDAs were also supplied with documents produced describing NERP TE Hub Projects relevant to their regions.
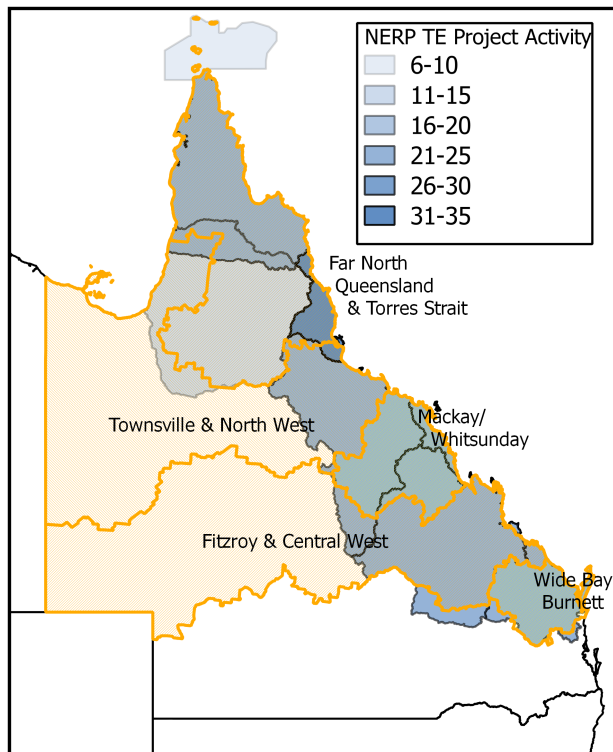
Figure 2: NERP TE Hub project activity in relation to RDA regions

Analysis

Planning processes proposed by NRM groups were described and mapped to identify common elements, and entry points for science integration.

Information needs were identified and classified according to the following categories:
- NRM region(s)
- environmental domain (s)
- knowledge sources and systems
- content
- relevant planning stage

These information needs were used to inform the development of Stream 2 CC research programs for the Wet Tropics Cluster and the Monsoon North Cluster.

A project profile of each NERP project was produced in which the projects were classified according to the above categories, and describing the relevance of each project to each NRM region. The profiles were then sent to NERP TE Hub project leaders for confirmation or correction. Corrected profiles were compiled into portfolios relevant to each NRM region.

Recommendations were extracted from conversations and workshops with regard to how NERP Projects can interact effectively with regional planning, and the next steps required to ensure NERP TE Hub science is integrated into NRM and RDA business.

Results and Discussion

Next generation NRM planning

Most NRM groups in the NERP area of project activity are addressing the challenges of Climate Change mitigation and adaptation through revision of their NRM plans. Six groups have NRM plans that are due for renewal. All are using adaptive planning process that includes resilience thinking. Planning elements that shared across one or more regions are presented graphically in Figure 3. There is a strong emphasis on governance and engagement processes, documentation, monitoring and evaluation, spatial information as both a planning and communication tool, and developing a shared evidence base.

There are two exceptions to the planning process. Torres Strait Regional Authority is already actively addressing Climate Change – including through several NERP TE Hub projects – and will be not producing a new plan. Cape York NRM does not have an endorsed NRM plan and is not committed to producing one. However, many of their activities are consistent with those described.
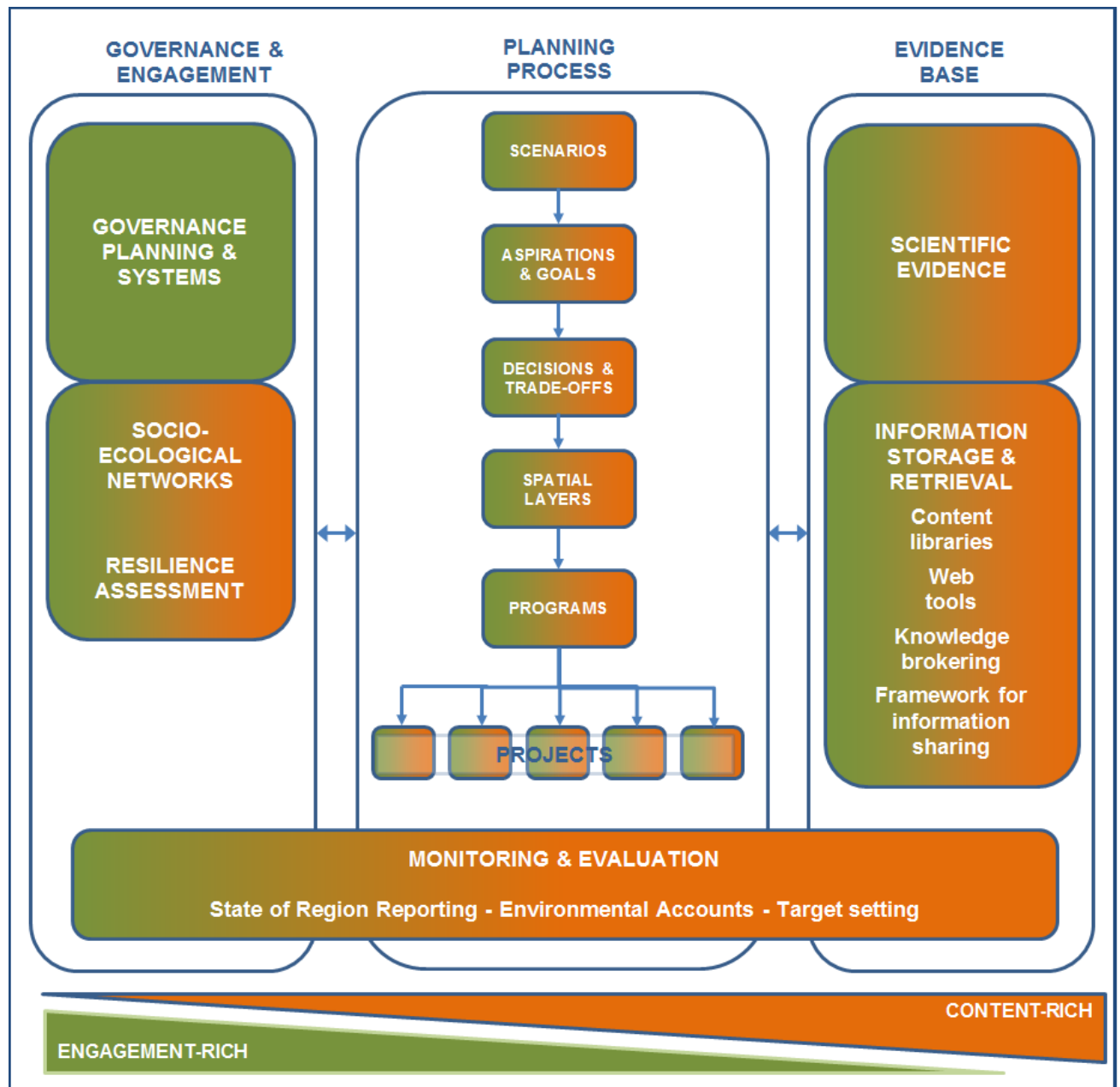
Figure 3: Map of common planning elements identified across NRM regions

RDA Road Maps

Most RDAs in the NERP area of project activity are addressing the challenges of Climate Change mitigation and adaptation through the development of regional road maps. Proposed actions include raising awareness, improving disaster response, building resilience, mitigation and adaptation, including incorporating innovative Carbon Farming practices into regional economies (Table 1).

Table 1:   Climate Change priorities and actions in RDA road maps

REGIONAL ROAD MAP FOR FAR NORTH QUEENSLAND AND TORRES STRAIT REGION
Regional Priority: Regional adaptation for a changing climate
Key Package Initiative – Progress development of a significant Regional Climate Change Adaptation Package addressing the specific priorities of the Torres Strait, Gulf, Cape York Peninsula and Wet Tropics communities
Key Package Initiative – Secure and adaptively manage the effective roll out of the Carbon Farming Initiative to maximize landscape scale co-benefits and economic opportunities across the Far North Queensland and Torres Strait Landscape
Key Package Initiative – Greater regional devolution in prioritizing disaster recovery priorities, better integrating response, recovery and making sure these efforts build longer term resilience in the face of natural disasters
http://www.rdafnqts.org.au/index.php/rda-initiatives/regional-road-map
REGIONAL ROAD MAP FOR TOWNSVILLE AND NORTH WEST REGION
Regional Priority: Developing a Robust, Sustainable Economy
Regional Priority: Enhancing a Great Lifestyle
Regional Priority: Nurturing Strong Leadership
Regional Priority: Valuing, Managing and Caring for our Environment and Natural Assets
Strategy – Raise awareness of Climate Change and promote opportunities for adaption to Climate Change
http://www.rdatanwq.org.au/regional-roadmap
REGIONAL ROAD MAP FOR MACKAY-ISAAC-WHITSUNDAY
Strategic Focus Area: Protecting and valuing our region's natural assets
Key action – Support the development of a regional climate ready plan
Key action – Increase access to renewable energy options and low emission technology i.e. eco-friendly urban infrastructure
Key action – Vulnerability to natural hazards is minimised through adaptive landscape planning and building responses
http://www.rdamackaywhitsunday.org.au/projects/regional-roadmap.html
REGIONAL ROAD MAP FOR FITZROY AND CENTRAL WEST
Regional Priority: Optimising regional environmental outcomes
Action – Encourage a proactive regional response to climate change
http://www.rdafcw.com.au/regional-plans
REGIONAL ROAD MAP FOR WIDE BAY BURNETT
No Climate change priorities or actions listed
http://www.rdawidebayburnett.org.au/rda-wide-bay-burnett-roadmap

Information needs for climate change planning

Characterisation of information needs

The main planning focus of NRM groups is on CC adaptation and mitigation. RDAs are also concerned with CC planning. The information required for CC planning can be classified thin three ways, by content (Table 3), planning stage (Table 4) and source and resource type (Table 2). The content required covers numerous topics, ranging from biophysical information to information on communities, governance, resource access and infrastructure. Planning stages range from basic understanding of the resource through impact assessment to formulating responses. Source spans the number of perspectives that need to be taken into account and resource types describes the way planners will interact with the information.

Table 2:   Classification of CC information needs on the basis of source and resource type

KNOWLEDGE SOURCES
Indigenous knowledge
Other community knowledge & experience (e.g. pastoral)
Science & social science
DATA, RESOURCES & TOOLS
Bibliographic search & display
Mapping & regional planning
Scenario modelling
Prioritisation
Monitoring & evaluation
SYNTHESIS & ASSESSMENT
Knowledge synthesis
Availability & access
Adequacy & gap analysis

Table 3:   Classification of CC information needs on the basis of content

CLIMATIC & ENVIRONMENTAL CONDITIONS
At-risk areas
Rainfall &/or temperature
Climate variability
Extreme events (cyclones, storms, droughts, floods, bleaching)
Fire (frequency, intensity & extent)
Sea-level rise
Hydrological cycles
Water quality (pH, salinity, sediment, nutrients, pesticides)
BIODIVERSITY
At risk areas/ecosystems
At risk species
Corridors, connectivity & refugia
Distribution & abundance of species & communities
Ecological function, processes, critical thresholds (resilience)
Ecosystem health (condition monitoring)
Disease and disease vectors
Invasive species and emergent risks
COMMUNITIES & ORGANISATIONAL ARRANGEMENTS
At risk social systems & communities
Indigenous people, communities & cultural sites
Well-being & resilience
Livelihoods and culture
Capacities, capabilities, interests & aspirations
Motivations & barriers to adaptation
Governance systems
INDUSTRIES & LIVELIHOODS
Rural and primary industries
Carbon and ecosystem services (terrestrial & marine)
Indigenous land & sea management
Tourism
Other industries
INFRASTRUCTURE
General infrastructure
Coastal infrastructure
Urban centres
Population growth and distribution
RESOURCE ACCESS & COST
General resources
Land (tenure & use)
Water
Energy
Food security
Indigenous traditional resource base

Table 4:   Classification of CC information needs on the basis of stage of planning

PLANNING STAGE
Baseline information
CC impact assessment
Adaptation planning
Management options
Interactions with CC

Alignment of NERP TE Hub with NRM information needs

NERP TE Hub projects cover marine and terrestrial domains of eight NRM regions (Table 5). The majority of projects examine marine environments. Greatest project activity is in the Wet Tropics. While only nine projects are based in the Torres Strait, most of these focus solely on that region. The CC relevance of each NERP TE Hub project is summarised in Appendix 2.

Table 5:   Assessment of NERP TE Hub projects (as indicated by project code number) in relation to information content needs and the planning stage addressed

Environmental domain	NRM Region								
	TS	CYP	WT	NG	BDT	MW	FB	BM	Total
General (planning)	1	1	1	1	1	1	1	1	1
Mainland		3		10	2	4	2	2	11
Islands	5	2	3		2	3	3	2	7
Coastal / Inshore marine	6	19	20		18	18	19	19	26
Offshore marine	4	13	14		12	13	13	13	17
Terrestrial impacts on marine	4	9	9		8	8	8	8	13
Total	9	22	31	11	20	23	22	21	39

Of the 39 science or social science projects in the NERP TE Hub program, five also draw on Indigenous knowledge and four incorporate other forms of community knowledge (Table 6). Three projects include bibliographic searches or display of bibliographic material, 26 include some form of mapping and/or regional planning. Eight projects use scenario modelling and 11 projects develop or employ prioritisation tools. Monitoring and evaluation will be undertaken in 15 projects. Twelve projects provide synthesis of existing knowledge, seven projects assess information availability and access, and seven projects will undertake information adequacy & gap analysis.

Table 6:   Characterisation of knowledge sources and systems of NERP TE Hub projects

KNOWLEDGE SOURCES & SYSTEMS	NO. PROJECTS
KNOWLEDGE SOURCES	
Indigenous knowledge	5
Other community knowledge & experience (e.g. pastoral)	4
Science & social science	39
DATA, RESOURCES & TOOLS	
Bibliographic search & display	3
Mapping & regional planning	26
Scenario modelling	8
Prioritisation	11
Monitoring & evaluation	15
SYNTHESIS & ASSESSMENT	
Knowledge synthesis	12
Availability & access	7
Adequacy & gap analysis	7

NERP TE Hub projects address the more biophysical content needs for CC planning, with a focus on providing baselines information and assessment of CC impacts on the regions unique biodiversity (Table 7). Sixteen projects will provide information on climatic and environmental conditions, 34 on biodiversity, 10 on communities and organisational arrangements, five on infrastructure and five on resource access and/or cost. Baseline information will be provided by 34 projects, 16 projects will include information on climate change impacts and seven on interactions with them, nine will contribute to climate change adaptation planning and 13 will develop management options that might be applicable under climate change conditions.
More detailed analysis is provided in Appendix 3.

Table 7: Assessment of NERP TE Hub projects (as indicated by project code number) in relation to information content needs and the planning stage addressed

NERP Project	PROJECT FOCUS	Baseline information	CC impact assessment	Adaptation planning	Management options	Interactions with CC
	CLIMATIC & ENVIRONMENTAL CONDITIONS					
1.3	GBR water quality & CC	Yes	Yes			Yes
2.2	Mangroves & freshwater habitats	Yes	Yes	Yes	Yes	
2.3	Coral health		Yes			
3.1	Rainforest biodiversity	Yes	Yes	Yes	Yes	Yes
4.1	End-of-catchment water clarity	Yes				Yes
4.2	Pesticide impacts	Yes				Yes
4.3	GBR pollutions risks	Yes				
4.4	Marine water quality	Yes			Yes	
5.1	GBR diversity		Yes			
5.2	Water quality & CC impacts		Yes		Yes	Yes
5.3	Seagrasses		Yes			
7.1	Fire and rainforests		Yes			
8.2	Assessing inshore GBR zonation		Yes			
9.3	GBR island planning			Yes		
10.2	GBR socioeconomic values	Yes				
11.1	Community planning		Yes			
	BIODIVERSITY					
1.1	Coral status & trends	Yes	Yes			
1.2	Marine turtles, dugong & dolphins	Yes				
1.3	GBR water quality & CC	Yes	Yes			Yes
2.1	Marine turtles & dugong	Yes				
2.2	Mangroves & freshwater habitats	Yes	Yes	Yes	Yes	
2.3	Coral health	Yes	Yes			
3.1	Rainforest biodiversity	Yes	Yes	Yes	Yes	Yes
3.2	Rainforest genetics	Yes				
3.3	Rainforest frogs &mahogany glider	Yes				
3.4	Cassowary & flying foxes	Yes	Yes			
4.2	Pesticide impacts	Yes				
5.1	GBR diversity	Yes	Yes	Yes		
5.2	Water quality & CC impacts	Yes	Yes		Yes	
5.3	Seagrasses	Yes				
6.1	Large marine predators	Yes				
6.2	Shark nurseries	Yes			Yes	
6.3	Seabird foraging	Yes				
7.1	Fire and rainforests	Yes	Yes			
7.2	WT weeds & pests	Yes	Yes		Yes	
7.3	Rainforest species	Yes	Yes			
8.1	Assessing offshore GBR zonation	Yes			Yes	
8.2	Assessing inshore GBR zonation	Yes	Yes		Yes	
8.3	Assessing no-take zones	Yes			Yes	
9.1	GBR vulnerability mapping	Yes	Yes	Yes	Yes	

NERP Project	PROJECT FOCUS	Baseline information	CC impact assessment	Adaptation planning	Management options	Interactions with CC
9.2	GBR planning				Yes	
9.3	GBR island planning			Yes		Yes
9.4	Coastal planning			Yes	Yes	
10.2	GBR socioeconomic values	Yes				
11.1	TS community planning		Yes			
11.2	Disease vectors	Yes				
12.2	Regrowth & carbon				Yes	
12.3	WT socioeconomic values	Yes				
12.4	Adaptation planning & governance			Yes		
13.1	Map tools	Yes				
COMMUNITIES & ORGANISATIONAL ARRANGEMENTS						
9.1	GBR vulnerability mapping				Yes	
9.2	GBR planning	Yes				
9.4	Coastal planning			Yes	Yes	
10.1	Socioeconomic data	Yes				
10.2	GBR socioeconomic values	Yes	Yes			
11.1	TS community planning		Yes	Yes		
12.1	Co-management	Yes		Yes		
12.2	Regrowth & carbon				Yes	
12.3	WT socioeconomic values	Yes	Yes			
12.4	Adaptation planning & governance			Yes		
INDUSTRIES & LIVELIHOODS						
1.2	Marine turtles, dugong & dolphins	Yes				
2.2	Mangroves & freshwater habitats	Yes				Yes
8.3	Assessing no-take zones					
9.1	GBR vulnerability mapping				Yes	
9.3	GBR island planning					Yes
10.1	Socioeconomic data	Yes				
10.2	GBR socioeconomic values		Yes			
11.1	TS community planning		Yes	Yes		
12.2	Regrowth & carbon				Yes	
12.3	WT socioeconomic values		Yes			
12.4	Adaptation planning & governance			Yes		
INFRASTRUCTURE						
9.3	GBR island planning					Yes
9.4	Coastal planning			Yes		
10.2	GBR socioeconomic values	Yes				
11.1	TS community planning		Yes	Yes		
12.3	WT socioeconomic values	Yes				
RESOURCE ACCESS & COST						
1.2	Marine turtles, dugong & dolphins	Yes				
2.2	Mangroves & freshwater habitats	Yes				
8.3	Assessing no-take zones					
9.4	Coastal planning			Yes		
11.1	Community planning		Yes	Yes	Yes	Yes
12.2	Regrowth & carbon				Yes	

Integration of science into NRM business

All NERP TE Hub and Stream 2 projects address one or more aspects of CC planning needs (Figure 4). The following sections describe how these best fit into the planning process. Most projects will contribute content that should be included when CC science is synthesized for NRM planners. However, some projects also contribute to planning processes, with engagement with NRM groups being constructive to both project outcomes and NRM planning.

Governance and engagement

One of the key area issues raised through this project has been the role of NRM plans. Each NRM group has produced one or more plans in the last decade, but few were seen as guiding the activities of the NRM groups in a significant or strategic way. Many plans had low levels of community commitment; targets were either not measure or achieved; and few management actions pursued or completed. NRM groups are now wrestling with the issues of reframing the planning process to be more reflective of community concerns and to have more influence on environmental management and outcomes. They are asking questions such as: who is the community; how does it organise itself; how does it interact with the environment; how do we capture its concerns; and how do we use the planning process to build community capacity – in essence, how do we make NRM planning a two-way process that benefits the community? In some cases the "plan" is seen as marginal to this process, and in others as superfluous.

NRM groups are doing this in absence of a body of research assessing the role NRM plans play; how much they have achieved; why they fail: or how they can be better designed to have influence. NRM groups are thus breaking new ground trying to identify and address these issues at the same developing new plans. An NRM working groups has been established to align governance and engagement arrangements across regions, and another to explore how non-statutory groups can influence policy and environmental management. Assessment of these new planning processes would be fertile ground for the next round of environmental research funding.

Nevertheless, NRM planning will most likely benefit from fertile interaction with key NERP TE Hub projects that have an emphasis on governance and engagement in the Torres Strait; GBR islands and coasts; Indigenous co-management; and adaptation planning & governance. These projects provide models for engaging with communities to ensure priorities reflect the community's values. In many cases, this interaction is already operating, with the projects engaging with the same stakeholders, and with NRM groups acting as intermediaries. Alignment between these NERP projects will be strengthened through the Wet Tropics Stream 2 Planning and prioritisation node, which is being coordinated by Bob Pressey, who is also a NERP TE Hub program leader.

Science synthesis

Cross-regional and regional-scale knowledge synthesis lies at the heart of regional NRM planning. Synthesis of research findings relevant to CC planning is being undertaken by the Wet Tropics Stream 2 Science Synthesis node. Most NERP TE Hub projects will generate scientific information that will be useful for in this synthesis. Collaboration between NERP TE Hub project leaders and the Stream 2 program is essential to ensuring all relevant information is captured. As the CC content of NERP TE Hub projects was characterised in the preceding sections of this report, the following section will be confined to overall comments on contribution to each information theme.
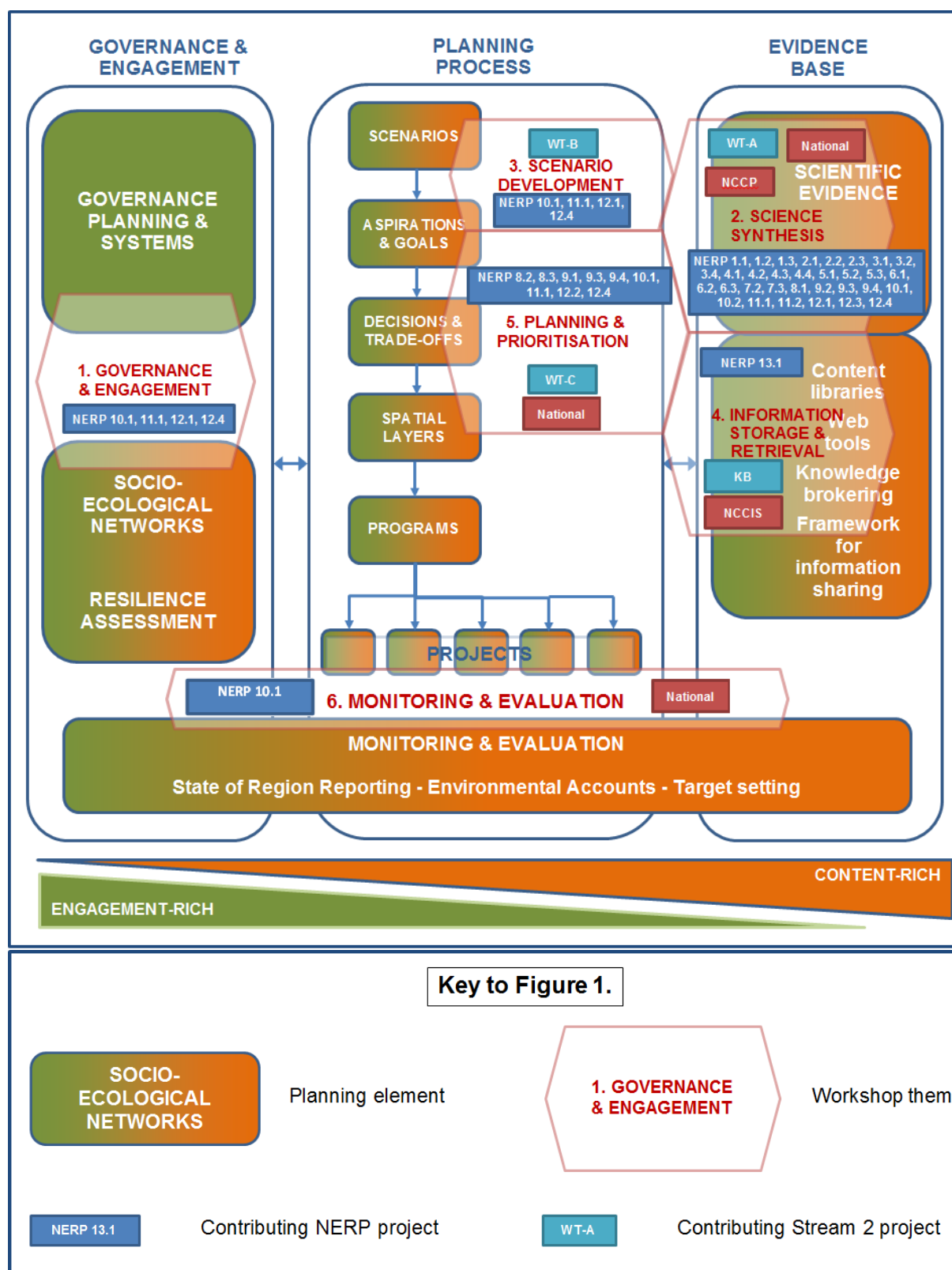
Figure 4: Map of common planning elements from Figure 3, identifying planning themes and contributing NERP TE Hub and Stream 2 projects

Table 8: Contribution of NERP TE Hub and Stream 2 projects to CC planning

		Governance & engagement	Scientific evidence	Scenario development	Information storage & retrieval	Planning & prioritisation	Monitoring & evaluation
NERP TE Hub Projects							
1.1	Monitoring status and trends of coral reefs of the GBR		Yes				
1.2	Marine wildlife management in the GBR World Heritage Area		Yes				
1.3	Characterising the cumulative impacts of global, regional and local stressors on the present and past biodiversity of the GBR		Yes				
2.1	Marine turtles and dugongs of the Torres Strait		Yes				
2.2	Mangrove and freshwater habitat status of Torres Strait Islands		Yes				
2.3	Monitoring the health of Torres Strait coral reefs		Yes				
3.1	Rainforest Biodiversity		Yes				
3.2	Rainforest refugia and hotspots of plant genetic diversity in the Wet Tropics and Cape York Peninsula		Yes				
3.3	Targeted surveys for missing and critically endangered rainforest frogs in ecotonal areas, and assessment of whether populations are recovering from disease		Yes				
3.4	Monitoring of key vertebrate species		Yes				
4.1	Tracking coastal turbidity over time and demonstrating the effects of river discharge events on regional turbidity		Yes				
4.2	The chronic effects of pesticides and their persistence in tropical waters		Yes				
4.3	Ecological risk assessment for water quality of the GBR		Yes				
4.4	Hazard assessment for water quality threats to Torres Strait marine waters, ecosystems and public health		Yes				
5.1	Understanding GBR diversity: spatial and temporal dynamics and environmental drivers		Yes				
5.2	Combined water quality–climate effects on coral and other reef organisms		Yes				
5.3	Vulnerability of seagrass habitats in the GBR to changing coastal environments		Yes				
6.1	Maximising the benefits of mobile predators to GBR ecosystems: the importance of movement, habitat and environment		Yes				
6.2	Drivers of juvenile shark biodiversity and abundance in inshore ecosystems of the GBR		Yes				
6.3	Critical seabird foraging locations and trophic relationships for the GBR		Yes				
7.1	Fire & rainforests		Yes				
7.2	Invasive species risks and responses in the Wet Tropics		Yes				
7.3	Climate change and the impacts of extreme events on Australia's Wet Tropics biodiversity		Yes				
8.1	Monitoring the ecological effects of GBR zoning plan on mid and outer shelf reefs		Yes				
8.2	Assessing the long–term effects of management zoning on inshore reef of the GBR					Yes	
8.3	Significance of no–take marine protected areas to regional recruitment and population persistence on the GBR					Yes	
9.1	Dynamic vulnerability maps and decision support tools for the GBR					Yes	

		Governance & engagement	Scientific evidence	Scenario development	Information storage & retrieval	Planning & prioritisation	Monitoring & evaluation
9.2	Design and implementation of management strategy evaluation for the GBR		Yes				
9.3	Prioritising management actions for GBR islands		Yes			Yes	
9.4	Conservation planning for a changing coastal zone		Yes			Yes	
10.1	Social and economic long–term monitoring program	Yes	Yes	Yes		Yes	Yes
10.2	Socio-economic system and reef resilience		Yes				
11.1	Building resilient communities for Torres Strait futures	Yes	Yes	Yes		Yes	
11.2	Improved approaches for the detection and prevention of wildlife diseases in the Torres Strait		Yes				
12.1	Indigenous peoples and protected areas	Yes	Yes	Yes			
12.2	Harnessing natural regeneration for cost-effective rainforest restoration		Yes			Yes	
12.3	Relative social and economic values of residents and tourists in the WTWHA		Yes				
12.4	Governance, planning and the effective application of emerging ecosystem service markets: climate change adaptation and landscape resilience	Yes	Yes	Yes		Yes	
13.1	e-Atlas				Yes		
Climate Change Stream 2 Projects							
Element 1 – National activities							
National	National – themes Decision making; Invasive species; Biodiversity; Monitoring & Evaluation		Yes				Yes
NCCP	National Climate Change Projections		Yes				
NCCIS	National Climate Change Information Service				Yes		
Element 2 - Wet Tropics Cluster activities							
WT-A	Science synthesis node: Themes: Climate; Biodiversity, Socio-economic, Cultural/social		Yes				
WT-B	Participatory scenarios node			Yes			
WT-C	Planning and prioritisation node		Yes				
KB	Knowledge Brokering hub				Yes		

Climatic and environmental conditions

While several NERP TE Hub projects contribute significant knowledge about CC impacts, fewer quantify the extent of CC itself or how this will be expressed in environmental conditions. Individual NERP TE Hub projects (e.g. 10.2) are generating their own climate information from first principles as a basis for change scenarios. This information will be useful for broader CC planning, but there is a need to coordinate and align outputs for them to be useful for NRM planning. There are major knowledge gaps with respect to sea level change; cyclone intensity and frequency; evapotranspiration and associated water stress; and groundwater dynamics and associated soil salinity.

While CC conditions will be characterised by the Stream 2 CC projections project, further research will be required to improve understanding of how CC will be expressed at the regional scale. Moreover these projections will be based on existing science only, and mapped a broad scale (e.g. 5 km grid). Knowledge of current and projected climates and associated environmental conditions are hence significant research gaps that could be progressed within any post-NERP/Stream 2 landscape-scale science investment bid.

Biodiversity

The greatest strength of the NERP TE Hub is its focus on key, iconic species (dugong, turtle, shark, cassowary and flying fox) and ecosystems (rainforests, reefs, seagrass; mangroves), as well as current stressors and appropriate management responses. However, there is a lack of consistency in the extent to which these studies include CC impacts. Moreover, the selection of species and ecosystems appears to have taken an *a priori* approach, rather through use of a prioritisation process bases on key attributes. Hence, while NRM groups can readily be provided with information on the CC impacts on these key species and systems, there is also room for research that compares species and ecosystems to identify which will be the most vulnerable across north Queensland, and hence deserving of the greatest management effort.

Projects on known stressors (fire, pests, diseases and extreme climatic events) affecting Wet Tropics biota are well-represented in the NERP TE Hub program. Major stressors to marine species and ecosystems (water quality (including sediment and pesticide) as well as interactions between stressors are similarly well-represented. Most of these projects should also inform how these stressors will interact with CC conditions.

The selection of marine projects is well-integrated, allowing assessment of which stressors are most likely to intensify under CC conditions. The terrestrial projects appear more fragmented. Although they focus on significant known threats, there is room for a project that sett threats into an integrated framework.

Determining key thresholds of resilience will need to be a key feature within the next generation of regional NRM Planning. The concept of resilience thresholds are well advanced in the context of GBR wide management (e.g. 5.2) but are less advanced in the context of the terrestrial landscape. Resolution of additional research gaps in this area should be progressed within any post-NERP/Stream 2 landscape scale science investment bid. Good partnerships with key managers are in place with respect to these projects, but effort is needed to draw out implications for the next generation of planning and action.

Communities and organisational arrangements

The NERP TE Hub has a small but important investment into institutional and social aspects of NRM across a few themes. A larger investment in this area would have allowed a more strategic and integrated program design. Again, it is the projects that directly engage communities as a basis for prioritise management that are strongest in this field. Current NRM and RDA plans are likely to prioritise knowledge gaps in understanding and building community resilience to adapt to changes in climate, disasters or other pressures and drivers, which should offer the opportunity to craft a clearer longer term research frame.

Community resilience and wellbeing is likely to be affected by the impact of CC on vectors of human disease. Through developing a monitoring system for animal-borne disease vectors in Torres Strait, Laurance's project (11.2) provides an early-warning of changes in disease vectors as a result of climate change, which may also have relevance elsewhere in north Queensland. Expansion of environmental envelopes conducive to disease vectors, not only adds community stress, but will pose environmental challenges as control measures are considered (e.g. swamp drainage, pesticides spraying). NRM planning may thus be extended to include integrated pest management to maintain both human and environmental health. This highlights only one of the many areas of environmental management and planning where community and biodiversity considerations intersect. NRM planners are increasingly interested in this area of intersection, which would be a fertile area for future research.

The next generation of NRM planning will revisit the concept of developing regional Indigenous plans, retaining these plans as integral documents, while incorporating their issues and priorities into the broader planning framework. Any post NERP investment could significantly inform such an approach and underpin the partnerships required between Traditional Owners and science. Hill (12.1) does set some broader frameworks for thinking about Indigenous governance issues, but specifically then focusses down on protected area estate in a single biome. In future research programs, this work could be applied more broadly.

NERP TE Hub invests limited resources into traditional knowledge recording, or assessment of other cultural values to inform landscape management. Recent National listing of the Wet Tropics for its cultural values and emerging World Heritage listing of parts of Cape York Peninsula suggest this was a significant research gap in the design of the NERP program. This significant research gaps could be progressed within any post-NERP landscape scale science investment bid. The design of such a program would need to appropriately engage the Indigenous community and other stakeholders.

Industries and livelihoods

NRM groups and RDAs are both concerned with diversifying economic opportunities to improve regional environmental and economic sustainability. CC is but one of the drivers that will influence how industries will be affected or will need to adapt over coming decades. Others include changing commodity markets and consumer demands; exchange rates; taxation regimes; population pressures and the shift to lower carbon-generating energy sources. Such conditions will favour some forms of agriculture and economic activity and disadvantage others.

Each land and resource use will pose different NRM opportunities and challenges. A recent example of this is the expansion of forestry schemes that were unsustainable once taxation concession were removed, which resulted in large areas of poorly managed land in which weeds ran rampant. Remediation of such area may only be economic under intensive land uses with high returns. Hence, as drivers change and interact agriculture will face challenges in maintaining environmental integrity (maintain or improving water and air quality, soil condition and biodiversity values) while keeping stressors (weeds, pests diseases) in check.

A significant concern to NRM groups is the expansion of coal-seam gas and other coal mining projects. There is no clarity about the remit of NRM groups with regard to the mining industry. While coal and other mineral deposits are not natural resources, their extraction, processing and transport impacts on the natural environment. The role of NRM groups in the mining industry hence needs clarification. NERP TE Hub does not come close to providing guidance in this area.

CC and other changing pressures and drivers will also require adaptation of existing industries and sources of livelihoods and the development of new ones. NERP TE Hub projects with a strong emphasis in this field examine ecosystem services; carbon from regrowth; Indigenous use of marine mammals, mangrove and freshwater habitats; and the value of the environment to tourism in the Wet Tropics and Great Barrier Reef. While these act as "case studies" in a broader industry and livelihood context, there is scope for a more integrated approach that assesses the range of existing and potential land and resource uses, including the climatic and envelopes in which these are both environmentally appropriate and economically viable. This significant research gap could be progressed within any post-NERP landscape scale science investment bid.

The Carbon Farming Initiative aims to improve regional livelihoods through carbon sequestration and abatement. While the program's future is likely to be affected by policy change if the current Federal Government loses office, international interest in such projects is likely to grow. NERP sets few foundations for the (regionally-focused) broad-scale estimation of potential abatement across methodologies and consequent potential for project development across multiple land/sea-holders. National approaches via the National Carbon Accounting Toolbox and

CSIRO do provide an overview of the opportunities in the terrestrial environment, but these need to be further refined at regional scale. Caterall's project (12.2) is a notable exception, but needs to be better linked to a current ARC-based research project evaluating more cost effective approaches to landscape rehabilitation.

Infrastructure

NERP projects have very little activity in this field. Notable exceptions include GBR island planning and coastal planning and Torres Strait community planning. With the exception of some linkages to Pressey's (9.3) with regard to GBR islands, this research priority was a strategic gap in the design of the NERP. This significant research gap could be progressed within any post-NERP landscape scale science investment bid. This priority will also be significant to RDA, (State) regional land and local government planning activities.

Resource access and cost

NRM planning needs information on resource access and costs for any investment decisions made. CC is likely to have profound effects in this field, particularly where freshwater environments become saline, declining water tables result in changes to water allocation, or species of significance to Indigenous people lose habitat. NERP TE Hub barely addresses projected changes in land use patterns or their economic and social implications. Decision-making in this area will particularly benefit from decision support tools being developed in the Stream 2 Planning and prioritisation hub. Further investment could be made in extending the Queensland Government's Land Use Mapping and Planning (QLUMP) program for classifying land use and monitoring land use change. Economic and social implications, however, remain under-developed and poorly understood.

Scenario development

NRM groups wish to use scenario modelling to engage with stakeholders to provide understanding of CC conditions, and to develop preferred options. A number of NERP TE Hub project propose scenario modelling to assess what would happen under different CC conditions. These include studies of rainforest biodiversity (3.1), fire and rainforests (7.1), Wet Tropics weeds and pests (7.2), GBR vulnerability mapping (9.1), island planning (9.3), coastal planning (9.4) GBR socioeconomic values (10.2), community planning (11.1) and Wet Tropics socioeconomic value (12.3). Scenario modelling specifically to address CC planning will be undertaken in the Wet Tropics CC Participatory scenarios node. Communication to ensure alignment between these projects, with ongoing liaison with NRM groups would be of benefit to the NRM CC planning process. In this area, the NRM planning process should thus be well-served. Assessment of the utility of CC planning and how it contributes to the engagement and decision making process would be worthy of future investment in environmental research programs.

Information storage and retrieval

As yet there is no clarity in the types of information tools and resources required by NRM groups for the preparation or delivery of their plans. An NRM working group has been establish to consider the role of the tools in the planning, and whether these will be for information storage, communication or capture; and the audience they are to be designed for.

However, key functions that will eventually need to be met by tools include:
- Regular State and Region reporting
- Communication oriented-knowledge synthesis products
- Integrated spatial information hubs
- Data-hubs and/ or web-linked knowledge brokerage systems (e.g. e-atlas)
- Cross-regional and regional but socially-oriented knowledge brokerage services
- Active decision support systems

e-atlas will be a useful vehicle for visualising and presenting some higher level messages concerning land use change, climate risks and the impact of management actions. It will be a significant and interactive knowledge repository for NERP research, which next generation NRM plans can draw on. However, NRM awareness of this tool is low, and there is uncertainty of the extent to which it will meet their needs at this stage.

Prioritisation and planning

There is a strong emphasis on planning and prioritisation in the NERP TE Hub, with a focus on the Torres Strait, GBR islands and coastal communities. Dale's adaptation planning and governance project is also providing guidance on linking these projects to the NRM arena. Butler's project (11.1) presents a real opportunity to explore broader strategic processes for adaptation in the Torres Strait and this work is now tactically linked to regional planning, underpinning the application of community resilience concepts in regional and sub-regional adaptation. Collectively, this model could be expanded into other Far North Queensland sub-regions into the future. Pressey's coastal and island planning projects (9.3, 9.4) present an opportunity for solid spatial implications for NERP research being integrated into a consistent spatial platform suitable for enabling trade-off analysis at landscape-scale. Again fertile interaction between these NERP TE Hub projects and NRM groups and stakeholders will be strengthened through the Wet Tropics Stream 2 Planning and prioritisation node, which is being coordinated by Bob Pressey, who is also a NERP TE Hub program leader.

NERP's decision support tools for GBR zoning are not directly relevant to regional NRM planning. However, they should assist prioritisation of water quality actions in the catchments, as should the relative risk assessment for GBR pollution sources.

Stream 1 and 2 funds present an opportunity to rescope how these sorts of products and services could be re-integrated through a cross regional researcher-manager alliance. This could also be then progressed within any post-NERP landscape scale science investment bid.

Monitoring and Evaluation

Two types of Monitoring and Evaluation (M&E) are required for NRM planning. First, NRM groups wish to assess their planning process, by monitoring and evaluating how successful they have been in engaging the community; reflecting its concerns in the plans; and support stakeholders to reach their goals. An NRM working group has been established to develop a consistent cross-regional approach to designing the M&E process.

Secondly, NRM groups wish to establish a means of assessing how effective their plans have been at meeting their objectives through M&E of community and environmental indicators. A number of NERP projects develop condition biological indicators (e.g. the health of coral reefs and their fish stocks, sea-grass beds, rainforests, mangrove and freshwater habitats, water quality, disease vectors). In addition NERP TE Hub projects will provide a range of socio-economic indicators, particularly in relation to community resilience and the tourist industry. Marshall's project (10.1) specifically identifies and provides access to a number of socio-economic indicators. The focus of the Stream 2 National project is to provide M&E tools, and this project should be made aware of the indicators being developed in the NERP TE Hub.

Conclusions

NERP TE Hub projects provide a wealth of research that is relevant to NRM bodies and RDAs and should assist in their planning and delivery. The extent to which this occurs will depend on (1) relationships between project leaders and NRM groups, and (2) the effective use of the Stream 2 program as a conduit for process-oriented projects and for synthesis of scientific findings.

While the NERP TE Hub program focuses on three key environmental realms (Torres Strait, GBR and rainforest), the marine program appears to be more cohesive than does the terrestrial program. Every terrestrial species, ecosystem, community or threat studied is of high priority to NRM planners. However, there is a lack of clarity about how these were selected among the myriad of projects that could have been undertaken. There are some clear gaps in the program. Notably the needs of the Cape York and Gulf regions, which lie outside the current area of research focus, are poorly addressed. Moreover, Reef and rainforest research is heavily biased towards the north of the region, whereas rainforests are also important biomes in the Mackay-Whitsundays and South-east Queensland; and the Great Barrier Reef extends south to the Burnett Mary region, which is poorly represented by project investment.

A strong NERP TE Hub focus on biodiversity fills an important gap, but there are also significant needs for socio-economic research and for research that investigates intersection between social resilience and well-being and biodiversity. With the exception of the Torres Strait, limited Indigenous partnership in NERP design under-prepared the region for the National listing of the Wet Tropics for its cultural values and the potential World Heritage listing of Cape York Peninsula. This is also out of step with NRM planning, which is increasingly integrating Indigenous values into broader NRM prioritisation.

NRM bodies have no statutory role or remit. State and Federal Governments have ultimate responsibility for threatened species and ecosystems, and while NRM groups can facilitate their preservation, they perhaps have a greater capacity to influence sustainable management by individuals and industries. Hence they are also likely to be significant players in the development of ecosystem service market. While the NERP TE Hub has invested research in this area, research need is likely to grow.

Clearly a single NERP hub cannot hope to fund all areas of research relevant to regional NRM or RDA planning. However, a process of prioritisation could be undertaken that maps existing research by all research institutions (Universities, CSIRO Industry Research and Development Corporations etc.), as has been done in Appendix 4 for climate change research. Stakeholders can then be directed to existing research; and future research investment can be focused on significant remaining gaps. Similar, processes should be undertaken within both the National NERP and individual NERP hubs. Where investment decisions actively exclude significant fields because of lack of funds or capacity, this should be enunciated, so that these areas can be included in future funding rounds. To do otherwise would be to perpetuate research into fields and environments that are well-researched at the expense of those that have been traditionally overlooked.

Appendix 1. Engagement schedule

Name	Position	Email	Phone	Face-to-face meetings	Regional planning workshops	WT Cluster Meetings	Workshops attended CFI Preparation 4 Mar 2013	NERP/Stream 2 4 Jun 2013	NRM Planning 17 Jul 2013	Reports sent NERP NRM Profiles	4 Jun 2013 Workshop report
Torres Strait Regional Authority		✓		✓	✓	✓	✓	✓		✓	✓
Damian Miley	Manager, Land and Sea Management Unit	✓								Torres Strait	✓
John Rainbird	Climate Change and Coastal Coordinator	✓						✓		Torres Strait	✓
Terrain NRM		✓		✓	✓	✓	✓	✓	✓	✓	
Carole Sweatman	Chief Executive Officer	✓								Wet Tropics	✓
David Hinchley	Land and Water Program Manager	✓	✓	✓		✓	✓	✓	✓	Wet Tropics	✓
Gavin Kay	Degree Celsius / Re-vegnet project manager	✓				✓	✓	✓		Wet Tropics	✓
Sharlene Blakeney	GIS Coordinator	✓					✓	✓	✓		✓
Cape York NRM		✓		✓	✓	✓				✓	
Bob Frazer	Chief Executive Officer	✓		✓						Cape York	✓
Peta-Marie Standley	Program Manager	✓						✓	✓	Cape York	✓
Luke Preece	Project Support Officer	✓					✓			Cape York	
Northern Gulf Resource Management Group		✓		✓	✓		✓			✓	
Noeline Ikin/ Grant Fawcett	Chief Executive Officer	✓		✓							✓
Tim Hoogwerf	Operations Manager	✓		✓			✓			Northern Gulf	✓
Sarah Connor	Planning and Partnerships Manager	✓		✓				✓	✓	Northern Gulf	✓
Sarah Rizvi	Projects Coordinator	✓		✓			✓		✓	Northern Gulf	✓
Carly Starr	Biodiversity Project Manager	✓		✓						Northern Gulf	
NQ Dry Tropics					✓					✓	
Scott Crawford	Chief Executive Officer	✓								Burdekin Dry Tropics	✓
Tricia Gowdie	Land and Water Programs Manager	✓			✓		✓			Burdekin Dry Tropics	
Alistair Buchan	NRM Planning Coordinator	✓	✓		✓		✓	✓		Burdekin Dry Tropics	✓
Lea Scherl	Community Engagement Manager	✓						✓	✓		✓
Reef Catchments					✓	✓				✓	

Name	Position	Email	Phone	Face-to-face meetings	workshops	WT Cluster Meetings	Workshops attended			Reports sent	
							CFI Preparation 4 Mar 2013	NERP/Stream 2 4 Jun 2013	NRM Planning 17 Jul 2013	NERP NRM Profiles	4 Jun 2013 Workshop report
Rob Cocco	Chief Executive Officer	✓								Mackay - Whitsunday	✓
Robyn Bell	Special Projects Manager	✓				✓	✓	✓		Mackay - Whitsunday	✓
Derek Ball	Biodiversity Operations Manager	✓									
Alice Spencer	Senior Project Officer	✓					✓	✓			✓
Shirley Zheng	GIS & Knowledge Management Officer							✓			✓
Southern Gulf Catchments		✓			✓	✓					
Bob Wilson	Chief Executive officer	✓									
Charles Curry	Project Coordinator	✓									
Simone Parker	Operations Manager	✓		✓			✓				✓
Donald Pollock	Consultant	✓	✓	✓			✓				✓
Territory NRM					✓						
Kate Andrews	Chair	✓									
Karen May	Executive Officer	✓									
Paul Gribben	NRM Program Manager	✓									
Fitzroy Basin Association										✓	
Paul Birch	Chief Executive Officer	✓								Fitzroy	
Piers Harper	Operations Manager	✓								Fitzroy	
Burnett Mary Regional Group										✓	
Penny Hall	General Manager	✓								Burnett Mary	
Queensland Regional NRM Groups Collective											
Andrew Drysdale	Chief Executive Officer	✓									
RDA Far North Queensland & Torres Strait											
Sonja Johnson	Chief Executive Officer	✓		✓				✓			✓
Jann Crase	Policy & Projects Officer	✓		✓				✓			✓
RDA Townsville and North West Queensland Inc.										✓	
Glenys Schuntner	Chief Executive Officer	✓								Burdekin Dry Tropics	✓
RDA Fitzroy and Central West Inc.										✓	
Rees Banks	Executive Officer	✓								Fitzroy	
RDA Mackay Whitsunday										✓	
Nicole Duguid	Chief Executive Officer	✓								Mackay - Whitsunday	

Appendix 2. Summaries of climate change planning relevance of NERP TE Hub projects

1.1 Monitoring status and trends of coral reefs of the Great Barrier Reef
Project Leader(s)
Dr Hugh Sweatman, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline condition assessment of the GBR, and analysis of trends and threats. It will provide information on the impacts of climate change factors (coral bleaching, cyclonic damage), and their interaction other stressors (crown-of-thorns).

1.2 Marine wildlife management in the Great Barrier Reef World Heritage Area
Project Leader(s)
Dr Mark Hamann, James Cook University
Prof Helene Marsh, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline data on marine turtle, dolphin & dugong populations & identify key areas of habitat, as well as Indigenous use of these species. While not specifically addressing climate change issues, the information will be important for prioritising actions to maintain populations under climate change conditions.

1.3 Characterising the cumulative impacts of global, regional and local stressors on the present and past biodiversity of the Great Barrier Reef
Project Leader(s)
Prof Jian-xin Zhao, University of Queensland
Prof John Pandolfi, University of Queensland

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline information on climate variability and how it has affected the condition of the GBR in combination with other stressors. It will provide information on the likely impacts of climate change on reef health, and the interactions with other factors (e.g. water quality). It will therefore inform action on water quality management under climate change conditions.

2.1 Marine turtles and dugongs of the Torres Strait
Project Leader(s)
Dr Mark Hamann, James Cook University
Prof Helene Marsh, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	No	No	No	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline data on marine turtle and dugong population sizes and distributions and identify key areas of habitat. While not specifically addressing climate change planning, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

2.2 Mangrove and freshwater habitat status of Torres Strait Islands
Project Leader(s)
Dr Norm Duke, James Cook University
Dr Damien Burrows, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	No	No	No	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		Yes		Yes		No		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline data on mangrove distribution and condition. While not specifically addressing climate change planning, the baseline information will be important for prioritising actions to maintain habitat condition under climate change conditions.

2.3 Monitoring the health of Torres Strait coral reefs
Project Leader(s)
Dr Ray Berkelmans, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	No	No	No	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		No

Relevance of project for Climate Change (CC) planning & management
This project will synthesise information about the coral reefs of Torres Strait. It will establish a long-term monitoring program to assess impacts of climate change on environmental conditions and reef health, initially providing a baseline information. The monitoring program, undertaken by AIMS and the Torres Strait community, should provide an early warning of climate change impacts and declines in coral communities and large fishes from other disturbances.

3.1 Rainforest Biodiversity
Project Leader(s)
Prof Steve Williams, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline information on the distribution and condition of Wet Tropics rainforests, and identify likely climate change impacts.

3.2 Rainforest refugia and hotspots of plant genetic diversity in the Wet Tropics and Cape York Peninsula

Project Leader(s)
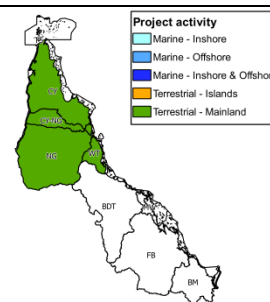
Prof Darren Crayn, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management

This project will provide baseline information on the genetic diversity of Wet Tropics rainforest plants and will assist in prioritising climate change adaptation planning by identifying areas and species that are most at risk from climate change.

3.3 Targeted surveys for missing and critically endangered rainforest frogs in ecotonal areas, and assessment of whether populations are recovering from disease

Project Leader(s)

Dr Robert Puschendorf, James Cook University

Dr Conrad Hoskin, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	Yes	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management

This project will identify the current status of cortically endangered and possibly extinct rainforest frogs, as well as refuge areas that currently support any surviving species. This information will assist in the prioritisation of areas with high values for biodiversity protection under climate change planning. It will also provide information on the distribution of chytrid fungus, which will assist in identifying the climatic envelope in which this threat to endangered frog is active.
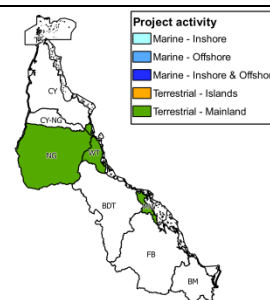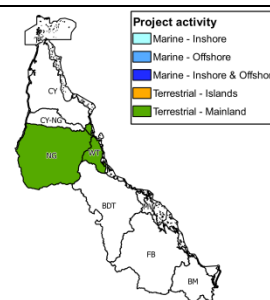

3.4 Monitoring of key vertebrate species

Project Leader(s)

Dr David Westcott, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management

This project will provide baseline information, and likely climate change impacts, on the distribution and populations cassowaries and flying-foxes, as well as providing management options for these species.

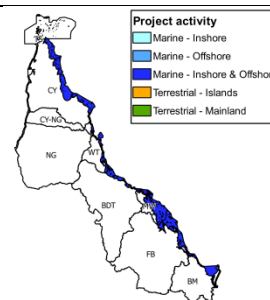**4.1 Tracking coastal turbidity over time and demonstrating the effects of river discharge events on regional turbidity**

Project Leader(s)

Dr Katharina Fabricius, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management

This project will provide baseline information on the effects of river discharges on GBR water clarity. It will assist in climate change adaptation planning by identifying areas where poor water quality may be particularly exacerbated by extreme flood events.
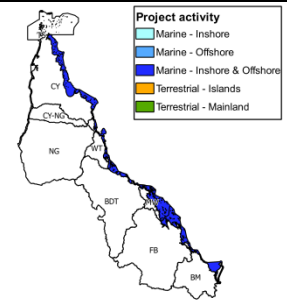
4.2 The chronic effects of pesticides and their persistence in tropical waters
Project Leader(s)
Dr Andrew Negri, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline information on the effect of agricultural pesticides on water quality and seagrass and reef health, and their resilience under climate change conditions. It will help prioritise climate change adaptation planning by highlighting threats to ecosystem health that may interact with climate stressors.

4.3 Ecological risk assessment for water quality of the Great Barrier Reef
Project Leader(s)
Dr Jon Brodie, James Cook University
 Dr Rai Kookana, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	No	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management
This project will develop a tool for identifying the most significant sources of pesticide, nutrient & sediment pollution to the GBR and where they are coming from. This tool will help prioritise climate change adaptation planning by highlighting threats to ecosystem health that may interact with climate stressors. NB. This project will not provide information needed for climate change adaptation planning. This will be done in a separately-funded Stage 2 project which will run the risk assessment tool.
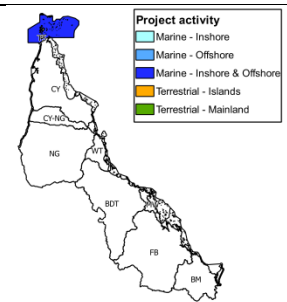

4.4 Hazard assessment for water quality threats to Torres Strait marine waters, ecosystems and public health
Project Leader(s)
Dr Jon Brodie, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	No	No	No	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

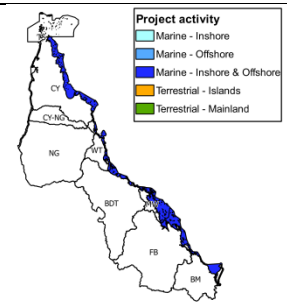**Relevance of project for Climate Change (CC) planning & management**
This project will provide baseline information on existing and potential sources of pollution to the Torres Strait marine environment and the areas likely to be most affected. It will help prioritise climate change adaptation planning by highlighting pollution threats to marine ecosystem and human health that may interact with climate stressors.

5.1 Understanding Great Barrier Reef diversity: spatial and temporal dynamics and environmental drivers
Project Leader(s)
Dr Glenn De'ath, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline maps of Great Barrier Reef diversity and condition. It will provide understanding of the environmental factors and threats (including climatic events) affecting diversity and condition. This information will help identify likely climate change impacts on GBR condition and to prioritise marine areas to be considered in climate change adaptation planning.

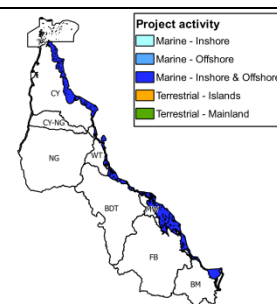### 5.2 Combined water quality–climate effects on coral and other reef organisms

Project Leader(s)

Dr Sven Uthicke, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		Yes

Relevance of project for Climate Change (CC) planning & management

This project will assess individual and interactive effects of water quality (increased nutrients & sediments; reduced light & salinity) and climate change variables (increasing sea temperatures; ocean acidification) on the health of GBR species.

5.3 Vulnerability of seagrass habitats in the Great Barrier Reef to changing coastal environments

Project Leader(s)

Dr Catherine Collier, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		Yes

Relevance of project for Climate Change (CC) planning & management

This project will assess the impact of flood events on water quality in seagrass meadows. It will assess individual and interactive effects of water quality on the health of seagrass meadows, and identify critical tolerance thresholds. It will develop indicators to be used in assessing the health of seagrass communities. This work will provide information on stressors that may interact with climate change stressors and should be taken into account in climate change adaptation planning.

6.1 Maximising the benefits of mobile predators to Great Barrier Reef ecosystems: the importance of movement, habitat and environment
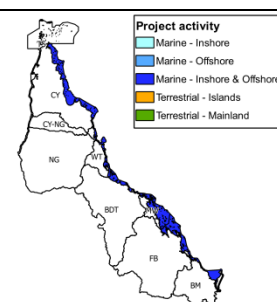
Project Leader(s)

Dr Michelle Heupel, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		No

Relevance of project for Climate Change (CC) planning & management

This project will provide baseline information on the distribution and abundance of large marine predators of the Great Barrier Reef, and of the factors affecting these species. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

6.2 Drivers of juvenile shark biodiversity and abundance in inshore ecosystems of the Great Barrier Reef
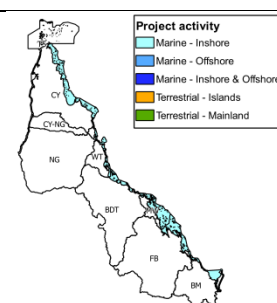
Project Leader(s)

Prof Colin Simpfendorfer, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		No

Relevance of project for Climate Change (CC) planning & management

This project will provide baseline information on the distribution and abundance of sharks in inshore areas of the Great Barrier Reef, and of the factors affecting these species, and provide management recommendations. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

6.3 Critical seabird foraging locations and trophic relationships for the Great Barrier Reef

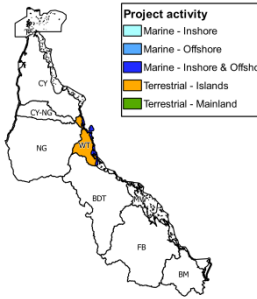Project Leader(s)

Dr Brad Congdon, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	No	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		Yes		Yes		Yes		No

Relevance of project for Climate Change (CC) planning & management

This project will provide baseline information on the distribution and importance of seabird foraging areas off north-east Queensland, and of the intersection of these areas with commercial fishing activity. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

7.1 Fire & rainforests

Project Leader(s)

Dr Dan Metcalfe, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	Yes	Yes	No	Yes	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management

This project will provide information on the impacts of cyclones and fire regimes on rainforest margins, key rainforest and mahogany glider habitat, and identify areas requiring fire management to maintain key environmental values. It will assist in prioritising areas for fire management or exclusion under climate change conditions.

7.2 Invasive species risks and responses in the Wet Tropics

Project Leader(s)

Dr Helen Murphy, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management

This project will provide information on the potential current and future distributions of existing and emerging weed species in the Wet Tropics, and identify management strategies to reduce future weed impacts and the future cost of weed management. The project will also identify potential high-risk source areas for future weed threats to the Wet Tropics. NB: Although focused on the Wet tropics, bioclimatic modelling of weed species will apply Australia-wide.

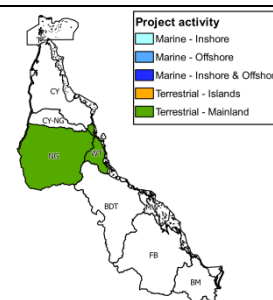**7.3 Climate change and the impacts of extreme events on Australia's Wet Tropics biodiversity**
Project Leader(s)
Dr Justin Welbergen, Australian National University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environmental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline information on climatic conditions of the Wet Tropics, and an assessment of the impact of extreme climatic events on Wet Tropics plants and animals. It will identify areas where species are most and least at risk from climate change and developing a tool for assessing climate change risks.

8.1 Monitoring the ecological effects of Great Barrier Reef zoning plan on mid and outer shelf reefs
Project Leader(s)
Dr Hugh Sweatman, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environmental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		No

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline data on the health of marine fish communities, and the effectiveness of current management arrangements. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

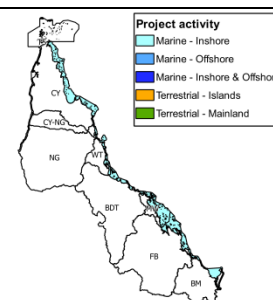**8.2 Assessing the long–term effects of management zoning on inshore reef of the Great Barrier Reef**
Project Leader(s)
Prof Garry Russ, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environmental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		No

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline data on factors affecting the distribution and abundance of marine fish communities, and the effectiveness of current management arrangements. It also provides and assessment of reef health and factors affecting health, including coral bleaching.

8.3 Significance of no–take marine protected areas to regional recruitment and population persistence on the Great Barrier Reef
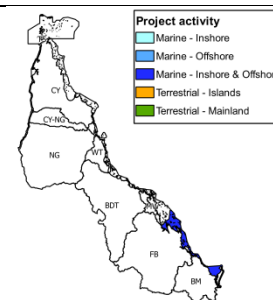Project Leader(s)
Prof Geoff Jones, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	No	No	No	No	Yes	Yes	
Environmental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		No

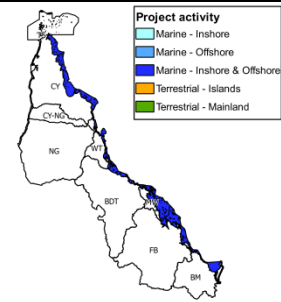**Relevance of project for Climate Change (CC) planning & management**
This project will provide baseline data on the distribution and abundance of coral trout, and the effectiveness of current management arrangements. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

9.1 Dynamic vulnerability maps and decision support tools for the Great Barrier Reef

Project Leader(s)

Dr Ken Anthony, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		Yes		No

Relevance of project for Climate Change (CC) planning & management

This project will develop a tool for identifying the most vulnerable, as well as the most resilient, areas of the GBR under combinations of climate change scenarios and local/regional scale stressors and impacts. The project will be critical for (1) identifying areas of the GBR that need priority management action, (2) for identifying key management levers that have the best chance of maintaining reef resilience in priority areas, (3) identifying critical threshold levels for cumulative stress that could push the reef ecosystem beyond a tipping point, and (4) for providing information on the relative importance of climate change action and local scale management practices as we move into a high CO_2 era.

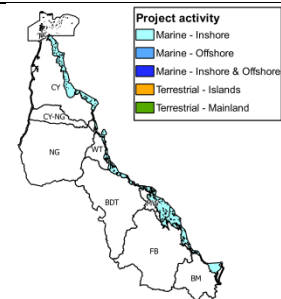### 9.2 Design and implementation of management strategy evaluation for the Great Barrier Reef

Project Leader(s)

Dr Cathy Dichmont, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		No

Relevance of project for Climate Change (CC) planning & management

This project will use stakeholder input to develop and assess management options for the inshore GBR. While not specifically addressing climate change the options will be able to be tested under climate change scenarios.
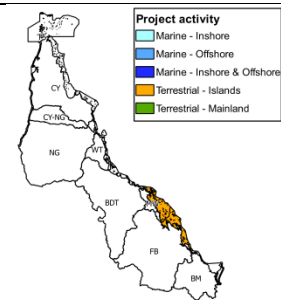

9.3 Prioritising management actions for Great Barrier Reef islands

Project Leader(s)

Prof Bob Pressey, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	No	No	No	Yes	Yes	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		Yes		No		No		No

Relevance of project for Climate Change (CC) planning & management

This project will develop a tool for prioritising conservation management to address climate change, development pressures and other issues affecting Great Barrier Reef islands off the central Queensland coast.
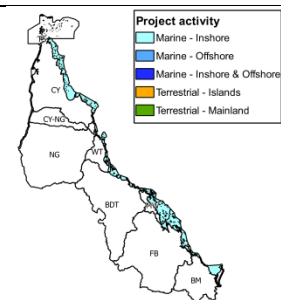

9.4 Conservation planning for a changing coastal zone

Project Leader(s)

Prof Bob Pressey, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		No		Yes		No		No

Relevance of project for Climate Change (CC) planning & management

This project sets out to identify key priorities for protecting and restoring coastal ecosystems in the Great Barrier Reef World Heritage Area (GBRWHA). The work will take into account changing land use, expanding infrastructure and climate change.

10.1 Social and economic long–term monitoring program
Project Leader(s)
Dr Nadine Marshall, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		No
	No		No		Yes		Yes		

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline datasets for socioeconomic monitoring and evaluation to underpin resource use planning, which will be a useful resource for climate change adaptation planning.

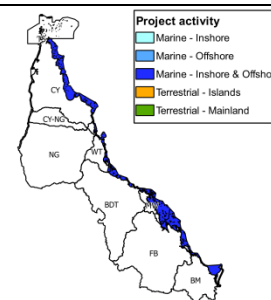**10.2 Socio-economic system and reef resilience**
Project Leader(s)
Dr Natalie Stoeckl, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		No
	Yes		Yes		Yes		Yes		

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline information on community values of, and income generated by, the Great Barrier Reef. It assesses how locals and visitors to the region value environmental features (e.g. key species, wetlands, mangroves & reefs) as well as how these contribute to land and sea based tourism and fishing operations. It establish baseline information about the region's climate and water quality based on historical records, and elicits community perception of changes, their responses to predicted changes, their capacity to cope with change, and the financial implication of change. It uses these responses to identify community priorities for conservation efforts.

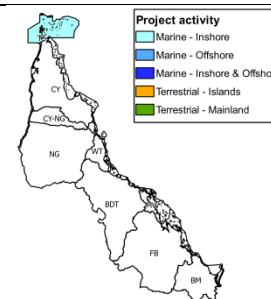**11.1 Building resilient communities for Torres Strait futures**
Project Leader(s)
Dr James Butler, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	No	No	No	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		Yes
	No		Yes		Yes		Yes		

Relevance of project for Climate Change (CC) planning & management
This project will develop scenarios to meet the aspirations of the Torres Strait communities taking climate change into account.

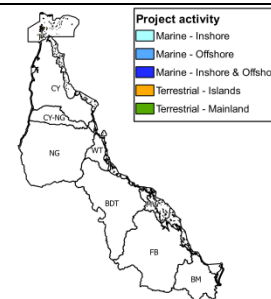**11.2 Improved approaches for the detection and prevention of wildlife diseases in the Torres Strait**
Project Leader(s)
Dr Sue Laurance, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	No	No	No	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		No
	No		Yes		No		No		

Relevance of project for Climate Change (CC) planning & management
This project will provide a monitoring program to detect animal-borne disease arriving in the Torres Strait and identify factors contributing to their spread. While not specifically addressing climate change, the monitoring system will provide an early warning of changes in disease vectors as a result of climate change.

12.1 Indigenous peoples and protected areas
Project Leader(s)
Dr Ro Hill, CSIRO

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management
This collaborative project will identify effective governance arrangements for co-management of natural and cultural resources in the Wet Tropics. While not specifically addressing climate change, it will provide a useful collaborative forum in which climate change adaptation can be planned.

12.2 Harnessing natural regeneration for cost-effective rainforest restoration
Project Leader(s)
Prof Carla Catterall, Griffith University
Dr Luke Shoo, University of Queensland

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management
This project evaluates active vs passive options for re-establishing rainforest on post-agricultural land, with biodiversity and carbon benefits. The project is part or a broader research program and practical on-ground adaptation concerned with restoring and connecting habitat within priority climate change refugia.

12.3 Relative social and economic values of residents and tourists in the WTWHA
Project Leader(s)
Dr Natalie Stoeckl, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	No	No	Yes	Yes	No	No	No	No	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management
This project will provide baseline information on community values of, and income generated by, the Wet Tropics World Heritage Area based on surveys of residents and tourists. It assesses how they value environmental features (e.g. key species, habitats) and perceive threats (e.g. weeds) as well as how these contribute to tourism and fishing operations. It elicits community perception of changes, their responses to possible population, environmental and climate changes, their capacity to cope with change, and the financial implication of change. It uses these responses to identify community priorities for conservation efforts.

12.4 Governance, planning and the effective application of emerging ecosystem service markets: climate change adaptation and landscape resilience
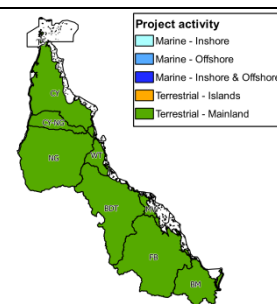
Project Leader(s)

Dr Allan Dale, James Cook University

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	Yes		No		No		No		No

Relevance of project for Climate Change (CC) planning & management

This collaborative project will identify effective governance arrangements to plan for climate change adaptation to ensure social and ecosystem resilience. It will assist NRM groups to incorporate climate change considerations in NRM plans, specifically by supporting regions to negotiate national policy on this front. This will also include the identification of opportunities for ecosystem service delivery, including carbon farming, and working towards regional progression of these markets.

13.1 e-Atlas
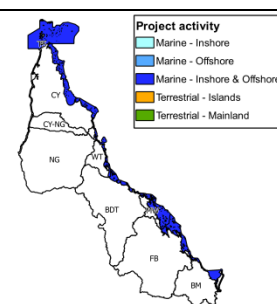
Project Leader(s)

Dr Eric Lawrey, Australian Institute of Marine Science

NRM Region	TS	CYP	NG	WT	BDT	MW	FB	BM	Terrestrial impacts on marine
	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	
Environ-mental domain	Mainland		Islands		Coast/inshore		Offshore		
	No		Yes		Yes		Yes		No

Relevance of project for Climate Change (CC) planning & management

This project will develop and populate a website for accessing spatial data about the Great Barrier Reef and Torres Strait. It will be a useful tool for climate change adaptation planning.

Appendix 3. Classification of NERP TE Hub projects

The projects were classified according to the knowledge sources and tools they will use or develop, and syntheses or assessments they will undertake (Table 9). Of the 39 science or social science projects in the NERP TE Hub program, five also draw on Indigenous knowledge and four incorporate other forms of community knowledge. Three projects include bibliographic searches or display of bibliographic material, 26 include some form of mapping and/or regional planning. Eight projects use scenario modelling and 11 projects develop or employ prioritisation tools. Monitoring and evaluation will be undertaken in 15 projects. Twelve projects provide synthesis of existing knowledge, seven projects assess information availability and access, and seven projects will undertake information adequacy & gap analysis.

Table 9:   Knowledge sources and systems
This table presents *Knowledge sources and systems* used or developed in each of the NERP TE Hub projects as classified on the basis of consultation with northern NRM clusters.

Priorities indicated by shading:	Wet Tropics Cluster	Monsoonal North Cluster	Both Clusters

KNOWLEDGE SOURCES	**NERP TE Hub projects drawing on:**
Indigenous knowledge	2.2, 3.1, 7.1, 11.1, 12.1
Other community knowledge & experience (e.g. pastoral)	10.2, 11.1, 12.3, 12.4
Science & social science	1.1, 1.2, 1.3, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 4.1, 4.2, 4.3, 4.4, 5.1, 5.2, 5.3, 6.1, 6.2, 6.3, 7.1, 7.2, 7.3, 8.1, 8.2, 8.3, 9.1, 9.2, 9.3, 9.4, 10.1, 10.2, 11.1, 11.2, 12.1, 12.2, 12.3, 12.4, 13.1
DATA, RESOURCES & TOOLS	**NERP TE Hub projects developing or applying:**
Bibliographic search & display	2.3, 3.1, 9.4
Mapping & regional planning	1.1, 1.2, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 4.1, 4.3, 4.4, 5.1, 6.1, 6.2, 6.3, 7.1, 7.2, 7.3, 9.1, 9.3, 9.4, 10.1, 11.1, 12.4, 13.1
Scenario modelling	3.1, 7.1, 7.2, 9.1, 9.4, 10.2, 11.1, 12.3
Prioritisation	3.1, 4.3, 7.3, 9.1, 9.2, 9.4, 10.2, 11.1, 12.1, 12.2, 12.3
Monitoring & evaluation	1.1, 1.3, 2.2, 2.3, 3.1, 4.1, 4.4, 5.3, 7.1, 8.3, 10.2, 11.1, 11.2, 12.2, 12.3
SYNTHESIS & ASSESSMENT	**NERP TE Hub projects producing or applying:**
Knowledge synthesis	1.3, 2.3, 3.1, 7.2, 9.1, 9.3, 9.4, 10.2, 11.1, 12.2, 12.3, 12.4
Availability & access	2.3, 3.1, 10.1, 12.2, 12.4, 13.1, 13.2
Adequacy & gap analysis	2.2, 3.1, 9.1, 9.3, 11.1, 12.2, 12.4

Projects were also classified according to topics identified as a priority by NRM groups (Table 10). Sixteen projects will provide information on climatic and environmental conditions, 34 on biodiversity, 10 on communities and organisational arrangements, five on infrastructure and five on resource access and/or cost. Baseline information will be provided by 34 projects, 16 projects will include information on climate change impacts and seven on interactions with them, nine will contribute to climate change adaptation planning and 13 will develop management options that might be applicable under climate change conditions.

Table 10: Assessment of NERP TE Hub projects (as indicated by project code number) in relation to information content needs and the planning stage addressed

This table presents NERP TE Hub projects relevant to the knowledge needed for CC planning and management as identified in consultation with northern NRM clusters.

Knowledge priorities indicated by shading:	Wet Tropics Cluster	Monsoonal North Cluster	Both Clusters

TOPICS	Baseline information	CC impact assessment	Adaptation planning	Management options	Interactions with CC
CLIMATIC & ENVIRONMENTAL CONDITIONS					
At-risk areas	3.1	3.1	3.1	3.1	3.1
Rainfall &/or temperature	1.3, 3.1, 10.2	1.3, 3.1, 5.2	3.1	3.1	3.1, 5.2
Climate variability	1.3, 3.1, 10.2	1.3, 3.1	3.1	3.1	3.1
Extreme events (cyclones, storms, droughts, floods, bleaching)	1.3, 3.1, 10.2	1.3, 3.1, 5.1, 5.2, 5.3, 7.1, 8.2	3.1	3.1	3.1, 5.2
Fire (frequency, intensity & extent)		7.1			
Sea-level rise	1.3	1.3			
Hydrological cycles	4.1				
Water quality (pH, salinity, sediment, nutrients, pesticides)	1.3, 4.1, 4.2, 10.2	1.3, 5.2, 5.3		5.2	1.3, 4.1, 4.2, 5.2

TOPICS	Baseline information	CC impact assessment	Adaptation planning	Management options	Interactions with CC
BIODIVERSITY					
At risk areas/ecosystems	3.1, 3.2, 4.2, 7.2, 7.3, 8.2, 9.1, 10.2, 12.3	3.1, 7.1, 7.3, 8.2	3.1, 9.4	3.1, 9.1, 9.2	3.1
At risk species	1.2, 3.1, 3.2, 3.3, 3.4, 6.1, 6.2, 7.3, 8.2, 9.1, 10.2, 12.3	3.1, 3.4, 7.1, 7.3, 8.2	3.1, 9.4	3.1, 6.2, 8.2, 9.1	3.1
Corridors, connectivity & refugia	1.2, 3.1, 3.2, 3.3, 7.3, 9.1	3.1, 8.2	3.1, 9.4	3.1, 12.2	3.1
Distribution & abundance of species & communities	1.2, 1.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2, 6.1, 6.2, 7.1, 9.1, 10.2, 12.3	1.3, 3.1, 3.4, 5.1, 5.2, 7.1	3.1	3.1, 9.1	3.1
Ecological function, processes, critical thresholds (resilience)	1.1, 1.3, 3.1, 4.2, 5.3, 6.1, 9.1	1.1, 1.3, 3.1, 5.2, 7.1, 7.3, 8.2, 9.1	9.1, 9.4, 12.4	5.2, 9.1, 9.2, 9.4, 12.2	1.3, 3.1
Ecosystem health (condition monitoring)	1.1, 1.3, 3.1, 3.1, 5.1, 5.2, 5.3, 7.2, 8.2, 9.1	1.1, 1.3, 5.1, 5.2		9.1	3.1
Disease and disease vectors	3.1, 3.3	3.1			3.1
Invasive species and emergent risks	7.1, 7.2			7.2	7.2
COMMUNITIES & ORGANISATIONAL ARRANGEMENTS					
At risk social systems & communities		10.2, 12.3			
Indigenous people, communities & cultural sites	12.1				
Well-being & resilience	10.2, 12.3	10.2, 12.3	12.1, 12.4	9.1	
Livelihoods and culture	10.2	10.2			
Capacities, capabilities, interests & aspirations	9.2, 10.2, 12.1, 12.3			12.2	
Motivations & barriers to adaptation					
Governance systems			9.4, 12.1, 12.4	9.4	
INDUSTRIES & LIVELIHOODS					
Rural and primary industries		10.2, 12.3			
Carbon and ecosystem services (terrestrial & marine)			12.4	9.1, 12.2	
Indigenous land & sea management	1.2				
Tourism		10.2, 12.3			
Other industries					

TOPICS	Baseline information	CC impact assessment	Adaptation planning	Management options	Interactions with CC
INFRASTRUCTURE					
General infrastructure					
Coastal infrastructure			9.4		
Urban centres			9.4		
Population growth and distribution	10.2, 12.3				
RESOURCE ACCESS & COST					
General resources					
Land (tenure & use)			9.4	12.2	
Water			9.4		
Energy					
Food security					
Indigenous traditional resource base	1.2				

Appendix 4. Current & recent Climate Change research projects relevant to north Queensland

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *Consistent Climate Scenarios*

Project leader(s): Department of Science, Information Technology, Innovation & the Arts
Project period: 2009 - 2012
Description: A comprehensive set of model-ready projections of climate variables have been delivered as inputs to biophysical models used in adaptation projects. Variables were: rainfall, evaporation, minimum and maximum temperature, solar radiation, and vapour pressure deficit, with projections based on the following: • 19 global climate models • eight emissions scenarios • three climate warming sensitivities (low, medium and high) • two projections years (2030 and 2050). For any location on a 0.05 degree (approximately five kilometre) grid across Australia, or for individual observation stations, the projections data can be provided as daily (weather-like) time series of climate variables. Projections have also been formatted to suit most biophysical models, for example, GRASP and APSIM, and are being made accessible to the public via an automated web portal. The scenarios developed can be used in localised climate change impact assessment modelling for periods out to 2030 and 2050, and to inform research investigating different adaptation strategies. A User Guide to help interpret results from the time series of climate data, as well as appropriate meta-data and selected diagnostics, has also been developed. These resources have been made available with the climate data sets for education and quality assurance purposes.
www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/adaptation_research_program

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Marine Climate Change in Australia Impacts and Adaptation Responses*

Project leader(s): CSIRO
Project period: - 2012
Description: This report card summarises our current knowledge of marine climate change impacts for Australia, highlighting key knowledge gaps and adaptation responses
www.oceanclimatechange.org.au/content/images/uploads/Marine_Report_Card_Australia_2012.pdf

R&D Program: NCCARF, FRDC

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *IClimate Project – a searchable database on climate change impacts and adaptation in Australia*

Project leader(s): Elvira Poloczanska; CSIRO
Project period: 2012 -
Description: This project reviews and synthesises climate change literature, both published and unpublished, to develop a database of 'facts' in a user-friendly, succinct and efficient form. It will focus on material produced since the completion of the Fourth IPCC Assessment Report, and form a useful reference for authors preparing the Australia and New Zealand chapter for Working Group II of the IPCC Fifth Assessment Report. The finished project will be made available online through a searchable web database, providing a valuable resource to underpin adaptation planning and decision making in Australia.
www.nccarf.edu.au/content/iclimate-project-%E2%80%93-searchable-database-climate-change-impacts-and-adaptation-australia

R&D Program: NCCARF

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Indirect

Project Title: *Integrating remote sensing, landscape flux measurements, and phenology to understand the impacts of climate change on Australian landscapes*

Project leader(s): Alfredo Huete; University of Technology, Sydney
Project period: 2011 - 2013
Description: This project aims to combine satellite data with field tower measurements to more accurately map the water and carbon status of Australian landscapes. This will provide valuable information on land surface changes and improve model predictions of water balance, productivity, and health in response to climate change and land use impacts.
R&D Program: ARC - Discovery **– Project code:** DP110105479

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *On-farm impacts of an Australian ETS – economic analysis*

Project leader(s): Tingsong Jiang; Centre for International Economics
Project period: 2008 - 2009
Description: Objectives: To analyse the on-farm financial impacts of an ETS under various scenarios on the following: 1. Input price impacts e.g. fuel, fertiliser, electricity, freight, crop contracting etc; 2. Output price impacts e.g. drop in value of cattle as consumers move to lower emitting forms of protein; 3. Farm profit impacts by sector. Possible scenarios include: - Agriculture as a covered sector within an ETS; - Agriculture as an uncovered sector within an ETS; - No free allocation of permits for agriculture; and - 90% free allocation of permits for agriculture. - Align scenarios with the CPRS Green Paper options where possible.
www.rirdc.gov.au/research-project-details/custr10_GC/PRJ-003383
R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-003383

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Multi-week forecasting products*

Project leader(s): Andrew Watkins; Bureau of Meteorology
Project period: 2010 - 2013
Description: Develop new multi-week rainfall forecasting tools and make them available on the Bureau of Meteorology's Water and The Land website.
www.managingclimate.gov.au/research/current-projects/multi-week-forecasting-products/
R&D Program: MCV

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Forecasting & risk assessment
REGION: Northern Australia **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Indirect

Project Title: *Northern Australia—monsoon prediction*

Project leader(s): Matthew Wheeler; Bureau of Meteorology
Project period: 2011 - 2013
Description: Objectives: (1) To investigate agriculturally relevant climate variability and predictability in tropical/northern Australia within the framework of the Predictive Ocean Atmosphere Model for Australia (POAMA); (2) To improve the simulation and prediction of climate variability as part of the transition to dynamical forecasting for Australia; (3) To deliver monsoon related climate prediction products for agriculture and other users; and (4) To provide guidance for future POAMA improvements.
http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-11-00125.1?journalCode=clim
R&D Program: MCV, DA, GRDC, HAL, MLA, RIRDC, SRDC **– Project code:** MCV00032

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Indirect

Project Title: *Predictions of Heat Extremes on the Multi-Week Timescale*

Project leader(s): Debra Hudson; Bureau of Meteorology
Project period: 2011 - 2013
Description: Objectives: (1) To understand the large-scale climatic processes (e.g. state of El Nino) that lead to episodes of extreme heat over Australia; (2) To examine the ability of the Predictive Ocean Atmosphere Model for Australia (POAMA) to simulate and predict these large-scale processes; (3) To explore and define the ability, or skill, of POAMA for making predictions of heat extremes for forecast timescales of less than one month; and (4) To identify potentially skilful products, to help guide the development of intra-seasonal products for use by farmers.
www.theccrspiconference.com.au/inewsfiles/presentations3/Debbie_Hudson_C11.pdf
R&D Program: MCV **– Project code:** MCV00031

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Mechanisms and attribution of past and future ocean circulation change*

Project leader(s): Nathaniel Bindoff; University of Tasmania; Andrew Hogg; Australian National University
Project period: 2011 -
Description: This project aims to investigate ocean processes, revealing how wind stress, heat content and salinity affect ocean currents and how the ocean in turn couples with atmospheric processes to form our climate. The project will also examine biogeochemical processes and how these interact with ocean currents to control the carbon cycle in the ocean.
www.climatescience.org.au/content/research-program-mechanisms-and-attribution-past-and-future-ocean-circulation-change
R&D Program: ARC - Climate System Science Research

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Mechanisms explaining changes in Australian climate extremes*

Project leader(s): David Karoly; University of Melbourne; Lisa Alexander; University of New South Wales
Project period: 2011 -
Description: This project will examine the key processes that effect long- and short-term weather and climate events, including determining the likely role that climate change plays as well as exploring how extremes may change in the future. As part of this research, the Centre will explore whether individual extreme weather events can be directly attributed to climate change. It will also explore the ways that year-to-year climate variations, such as El Niño, affect Australian weather extremes.
www.climatescience.org.au/content/research-program-mechanisms-explaining-changes-australian-climate-extremes
R&D Program: ARC - Climate System Science Research

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Climate Analyser decision-support system tools*

Project leader(s): David Freebairn; RPS
Project period: 2010 - 2012
Description: A set of next-generation user-friendly climate risk management tools that farmers can easily access to query weather data. A prototype smartphone app, CliMate, has been developed for iPhone and is being tested. An iPad version will then be developed. Some analyses will also be made available on the web. A version for Android may be developed.
www.managingclimate.gov.au/research/current-projects/climate-analyser-decision-support-system-tools/
R&D Program: MCV **– Project code:** MCV00028

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Climate forecasting to improve sugarcane nitrogen management in the wet tropics*

Project leader(s): Danielle Skocaj; James Cook University
Project period: 2011 - 2014
Description: This PhD project will be aimed at investigating cane production variability associated with climatic variability in a rainfed farming system and developing improved nitrogen management guidelines to ensure that the sugarcane production system remains environmentally sustainable and profitable.
R&D Program: SRDC **– Project code:** STU073

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Developing targeted, seamless weather/climate forecasting systems for critical early season harvest periods*

Project leader(s): Roger Stone; University of Southern Queensland
Project period: 2013 -
Description: This three year project, led by Australian Centre for Sustainable Catchments at University of Southern Queensland, aims to develop a pilot system offering greatly improved weather and seasonal climate forecasts for critical harvest periods for the sugar industry and will target important sugar production regions.
R&D Program: SRDC **– Project code:** JCU033

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Drivers of spatial and temporal climate variability in extra-tropical Australia*

Project leader(s): Dietmar Dommenget; Monash University; Michael Reeder; Monash University
Project period: 2011 -
Description: Australia's climate is profoundly affected by the interaction of the oceans with the atmosphere as seen by the effects of the El Nino Southern Oscillation and the Indian Ocean Dipole. Through exploring the slow-moving oceanic drivers of climate change, the Centre's researchers can reveal long-term changes. This will allow researchers to estimate rainfall variability over the coming decades, determine the global climate phenomena that will impact Australia and uncover feedback mechanisms between the ocean and atmosphere that may affect weather patterns years ahead.

www.climatescience.org.au/content/research-program-drivers-spatial-and-temporal-climate-variability-extra-tropical-australia

R&D Program: ARC - Climate System Science Research

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Cyclones, storm tracks and precipitation over the globe, and their sensitivity to climate change*

Project leader(s): Ian Simmonds; University of Melbourne
Project period: 2011 - 2013
Description: The project will explore in detail the intimate connection across the globe between storms, storm tracks and precipitation and the changes in these key aspects of weather and climate. Expected outcomes are an improved understanding of trends and outlooks for southern Australian and European weather and precipitation.
R&D Program: ARC - Discovery **– Project code:** DP110101388

TOPIC: Climatic & environmental conditions **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: East Coast Catchments **FORMAT:** Case studies **PLANNING RELEVANCE:** Marginal

Project Title: *Seasonal climate forecasting to improve industry competitiveness*

Project leader(s): Yvette Everingham; CSIRO
Project period: 1999 - 2002
Description: A participatory action research project, in which grower groups identified how seasonal climate forecasts could be used to improve decision making capability across the farming, harvesting and milling sectors of the industry; how climate forecasts could help improve irrigation management; and if and how seasonal climate forecasts could be used to better manage shipping and storage constraints and the forward selling of sugar.

www.srdc.gov.au/page/Research/Search_SRDC_Reports/Autoimported/Seasonal_climate_forecasting_to_improve_industry_competitiveness/

R&D Program: SRDC **– Project code:** CTA036

TOPIC: Climatic & environmental conditions **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Specifying Australia's climate variability in the context of a changing climate*

Project leader(s): Anthony Kiem; University of Newcastle
Project period: 2011 - 2012
Description: Objectives: (1) To demonstrate the importance of climate risk management taking into account the impacts of both natural climate variability and anthropogenic climate change.; (2) To demonstrate across Australia the variability that has is already experienced and needs to be taken into account as part of climate risk management.; (x) To put the changing nature of Australia's climate for each station into context.; (3) To highlight the need for climate forecasts that are physically-based, regionally-specific and practically useful (e.g. with respect to lead-time, accuracy and preciseness).

www.theccrspiconference.com.au/inewsfiles/presentations3/Anthony_Kiem_C11.pdf

R&D Program: MCV, DA, GRDC, HAL, MLA, RIRDC, SRDC **– Project code:** MCV00029

TOPIC: Climatic & environmental conditions **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Teleconnections between climate drivers and regional climate, and model representation of these links*

Project leader(s): Peter McIntosh; Centre for Australian Weather & Climate Research, CSIRO
Project period: 2010 - 2013
Description: Improve Australia's dynamical forecasting by investigating the connection between several weather systems, including the Southern Oscillation Index, Indian Ocean Dipole, Madden-Julian Oscillation, subtropical ridge and Southern Annular Mode.

www.managingclimate.gov.au/research/current-projects/teleconnections-between-climate-drivers-and-regional-climate-and-model-representation-of-these-links/

R&D Program: MCV **– Project code:** MCV00007

TOPIC: Climatic & environmental conditions **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Tropical Savannas **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Coupling tropical cyclone and climate physics with ocean waves*

Project leader(s): Alexander Babanin; Swinburne University of Technology
Project period: 2013 - 2015
Description: It is argued that without accounting for the wave effects directly, the physics of large-scale air-sea interactions is inaccurate and incomplete. The project will introduce explicit coupling of large-scale atmospheric and oceanic phenomena with the physics of surface waves which should lead to improved predictions of tropical cyclones and climate.

R&D Program: ARC - Discovery **– Project code:** DP130100227

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Tropical Savannas **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The effects of tropical convection on Australia's climate*

Project leader(s): Steven Sherwood; University of New South Wales; Christian Jakob; Monash University
Project period: 2011 -
Description: The Centre will conduct a fundamental re-examination of convection processes that when completed should substantially improve the physical foundation of climate models. This has the potential to lead to significant improvements in the ability of climate models to reliably simulate rainfall over key regions in Australia over a variety of time scales. This will help us predict changes to precipitation in important regions and put in place infrastructure to adapt to changes in the frequency and intensity of extreme rainfall events.
www.climatescience.org.au/research/program-tropical-convection
R&D Program: ARC - Climate System Science Research

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The role of land surface forcing and feedbacks for regional climate*

Project leader(s): Michael Roderick; Australian National University; Andrew Pitman; University of New South Wales
Project period: 2011 -
Description: The Centre's researchers will explore the processes and feedbacks associated with different land types over Australia. They will examine regional energy and water budgets and how land types affect climate – particularly irrigated areas, urban spaces and fire affected regions. More broadly our researchers will examine the processes, which explain how energy, water and carbon vary in Australian soils and vegetation.
www.climatescience.org.au/content/research-program-role-land-surface-forcing-and-feedbacks-regional-climate
R&D Program: ARC - Climate System Science Research

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *A new energy budget for the global circulation of the oceans*

Project leader(s): Graham Hughes; Australian National University
Project period: 2012 - 2014
Description: The energy sources and sinks that govern the global circulation of the oceans will be re-evaluated, building a new picture of the energy budget of the oceans. This will lead to new knowledge of the circulation of the deep oceans, to better ocean and climate-prediction models, and ultimately to more reliable estimates of future climate change.
R&D Program: ARC - Discovery **– Project code:** DP120102744

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Atmospheric composition and climate change: a southern hemisphere perspective*

Project leader(s): David Griffith; University of Wollongong
Project period: 2011 - 2013
Description: This project addresses the science of greenhouse gases and climate change through extensive high accuracy measurements of atmospheric composition, the calibration of a new generation of satellite sensors, and the assimilation of the measured data in models of the atmosphere to elucidate the sources and sinks of greenhouse gases.
R&D Program: ARC - Discovery **– Project code:** DP110103118

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Australian dust: its response to, and role in, climate change*

Project leader(s): Andrew Roberts; Australian National University
Project period: 2011 - 2013
Description: Atmospheric dust plumes can affect global climate, but the impact of Australian dust on climate is poorly known even though it is a major dust source. This project will study the magnetism of dust deposits in marine sediments to understand how Australian dust influences climate in order to better predict the influence of humans on future climate.
R&D Program: ARC - Discovery **– Project code:** DP110105419

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Dissipation and relaxation in statistical mechanics*

Project leader(s): Debra Bernhardt; Griffith University
Project period: 2011 - 2013
Description: This project studies the mathematical conditions for relaxation either to equilibrium or to steady states, which is important in predicting behaviour in diverse fields including climate modelling, materials science, nanotechnology and biology. Early career researchers will be involved in the project, gaining valuable skills in theory and simulation.
R&D Program: ARC - Discovery **– Project code:** DP110100761

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Global trends in oceanic wind speed and wave height*

Project leader(s): Ian Young; Australian National University
Project period: 2013 - 2015
Description: This project will determine whether winds and waves over the world's oceans have changed over the past 30 years. Such information is critically important in understanding global climate change, evaporation, air-sea interaction and to safely design and operate coastal and offshore facilities.
R&D Program: ARC - Discovery **– Project code:** DP130100215

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Methodologies for resolving high Rayleigh number transitions in convection and elucidating instabilities in polar vortices*

Project leader(s): Gregory Sheard; Monash University
Project period: 2012 - 2014
Description: This project will develop new methods for modelling complex rotating convection flows such as polar vortices found in the Antarctic atmosphere. This work has the potential to provide insight into important physical processes impacting Australian and global weather patterns, which is crucial for understanding the evolution of our climate.
R&D Program: ARC - Discovery **– Project code:** DP120100153

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Weekly cycles of atmospheric parameters over Australia and the quantification of human influences on climate*

Project leader(s): Ian Simmonds; University of Melbourne
Project period: 2013 - 2015
Description: Many human activities are organised on a seven-day cycle. The consequences of this might be expected to appear in the average variations of meteorological parameters across the week. This research will investigate these intra-week variations at many locations across Australia and will provide a critical insight into the human impact on climate.
R&D Program: ARC - Discovery **– Project code:** DP130103562

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Beyond the linear dynamics of the El Nino Southern Oscillation*

Project leader(s): Dietmar Dommenget; Monash University
Project period: 2012 - 2014
Description: This project will pioneer new climate models of the El Nino natural mode of climate variability, which will ultimately enable us to better predict seasonal weather fluctuation for Australia and improve our understanding of climate change in the tropical regions.
R&D Program: ARC - Discovery **– Project code:** DP120101442

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Carbon sequestration by mineral surface area as a feedback to climate warming in a greenhouse ocean*

Project leader(s): Martin Kennedy; University of Adelaide
Project period: 2011 - 2013
Description: The project will investigate a previously unrecognised negative feedback to global warming resulting from sequestration of carbon to marine sediments by soil formed clay minerals. By studying the past transitions to greenhouse periods, this project will assess the likely influence of this feedback in the present transition to a warmer climate.
R&D Program: ARC - Discovery **– Project code:** DP110104367

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Forecasting & risk assessment
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Climate model validation and generation of probabilistic climate projections using data from Phase 5 of the Climate Model Intercomparison Project*

Project leader(s): Tom Wigley; University of Adelaide
Project period: 2013 - 2015
Description: New climate model results will be compared with observations to test model skill. Probabilistic projections of regional- scale climate change will be developed and used to investigate a number of ecosystem impact case studies.
R&D Program: ARC - Discovery **– Project code:** DP130103261

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: At-risk areas
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Bed shear stress on beach sediment and coastal structures under wave run-up*

Project leader(s): Chris Blenkinsopp; University of New South Wales
Project period: 2011 - 2013
Description: The aim of this work is to obtain critical new information about the way waves interact with the coast and the damage they can cause to beaches and coastal protection structures. This new data will provide the basis for improved predictions of coastal erosion and better coastal engineering design in the face of sea level rise and climate change.
R&D Program: ARC - Discovery **– Project code:** DP110101176

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Extreme events
REGION: Elsewhere in Australia **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Links between bushfires in Victoria and floods in Queensland*

Project leader(s): Alexandre Pezza; University of Melbourne
Project period: 2012 - 2014
Description: This project will investigate connections between bushfires in Victoria and floods in Queensland under the framework that atmospheric blocking can be thought of as a common link. High resolution runs using the Intergovernmental Panel on Climate Change future projections of the energetics of high impact weather will improve climate forecasts in sensitive coastal areas of the country.
R&D Program: ARC - Discovery **– Project code:** DP120103950

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Extreme events
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *A new strategy for design flood estimation in a nonstationary climate*

Project leader(s): Ashish Sharma; University of New South Wales
Project period: 2012 - 2014
Description: Evidence suggests that global warming will result in an increase in the frequency and/or magnitude of heavy rainfall, leading to flooding with potentially devastating consequences. This study provides a renewed focus on design flood estimation that takes into account a changing climate where assumptions of stationarity are no longer tenable.
R&D Program: ARC - Discovery **– Project code:** DP120100338

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Extreme events
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Development and validation of an innovative wind stress model to obtain robust storm surge forecasts*

Project leader(s): Tom Baldock; University of Queensland
Project period: 2013 - 2015
Description: Storm surges represent a major ocean flood hazard to coastal communities but present models have large errors, which are often dangerously low. Through international collaboration, this project will collect new field data and develop a new storm surge model which will enhance community safety by ensuring accurate forecasts of ocean flood levels.
R&D Program: ARC - Discovery **– Project code:** DP130101122

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Fire
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *How has bushfire activity varied around the Southern Hemisphere over the last 10,000 years?*

Project leader(s): David Bowman; University of Tasmania
Project period: 2011 - 2013
Description: We will determine the relative contribution of climate and human ignitions in driving bushfire activity around the Southern Hemisphere over the last 10,000 years. Such knowledge is crucial for ecologically sustainable fire management, resolving debates about past Aboriginal environmental impacts and understanding the risk posed by climate change.
R&D Program: ARC - Discovery **– Project code:** DP110101950

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Fire
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Numerical prediction of bushfire behaviour and bushfire weather*

Project leader(s): Todd Lane; University of Melbourne
Project period: 2013 - 2015
Description: Bushfires are a threat to Australia's population and infrastructure, but there are many aspects of fire behaviour that are poorly understood. This project will examine how bushfires interact with the atmosphere and how these interactions influence fire spread. This research will underpin the development of new systems for fire weather prediction.
R&D Program: ARC - Discovery **– Project code:** DP130101866

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Sea-level rise
REGION: Northern Australia **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Ecogenomic approaches to monitor Kakadu estuaries*

Project leader(s): Anthony Chariton; CSIRO
Project period: 2011 - 2014
Description: Past techniques could only identify few species at a time and were too expensive to use in routine monitoring programs. This project will use a new and cost-effective approach to using DNA to examine the extent of bacteria and animals in Kakadu's floodplain sediments. The knowledge gathered will be used to develop an inexpensive, routine and robust monitoring program which can identify environmental changes from saltwater intrusion, before they can be detected above the surface. This will be useful for planning and conservation objectives and importantly will provide early warning to Kakadu Park managers and Traditional Owners about approaching environmental changes.
www.nerpnorthern.edu.au/research/projects/54
R&D Program: NERP Northern Australia **– Project code:** NERP NA 5.4

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Sea-level rise
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Melting and circulation in Antarctic ice shelf cavities*

Project leader(s): Ross Kerr; Australian National University
Project period: 2012 - 2014
Description: This project will explore and model the mechanisms causing the observed increased rate of melting of Antarctica's ice shelves. This understanding is essential for accurate predictions of sea level rise and global thermohaline circulation over the next century, so that their impact on society can be planned for and mitigated.
R&D Program: ARC - Discovery **– Project code:** DP120102772

TOPIC: Climatic & environmental conditions   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Water quality
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Hazard assessment for water quality threats to Torres Strait marine waters, ecosystems and public health*

Project leader(s): Jon Brodie; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on existing and potential sources of pollution to the Torres Strait marine environment and the areas likely to be most affected. It will help prioritise climate change adaptation planning by highlighting pollution threats to marine ecosystem and human health that may interact with climate stressors.
www.nerptropical.edu.au/project/hazard-assessment-water-quality-threats-torres-strait-marine-waters-ecosystems
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 4.4

TOPIC: Climatic & environmental conditions
SUBTOPIC: Water quality
REGION: East Coast Catchments **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★★★★☆

Project Title: *Ecological risk assessment for water quality of the Great Barrier Reef*

Project leader(s): Jon Brodie; James Cook University; Rai Kookana; CSIRO
Project period: 2011 - 2014
Description: This project will develop a tool for identifying the most significant sources of pesticide, nutrient & sediment pollution to the GBR and where they are coming from. This tool will help prioritise climate change adaptation planning by highlighting threats to ecosystem health that may interact with climate stressors. NB. This project will not provide information needed for climate change adaptation planning. This will be done in a separately-funded Stage 2 project which will run the risk assessment tool.
www.nerptropical.edu.au/project/ecological-risk-assessment-pesticides-nutrients-and-sediments
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 4.3

TOPIC: Climatic & environmental conditions
SUBTOPIC: Water quality
REGION: North Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

NRM RELEVANCE SCORE: ★★★☆☆

Project Title: *The chronic effects of pesticides and their persistence in tropical waters*

Project leader(s): Andrew Negri; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will provide baseline information on the effect of agricultural pesticides on water quality and seagrass and reef health, and their resilience under climate change conditions. It will help prioritise climate change adaptation planning by highlighting threats to ecosystem health that may interact with climate stressors.
www.nerptropical.edu.au/project/chronic-effects-pesticides-and-their-persistence-tropical-waters
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 4.2

TOPIC: Climatic & environmental conditions
SUBTOPIC: Water quality
REGION: North Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

NRM RELEVANCE SCORE: ★★★☆☆

Project Title: *Tracking coastal turbidity over time and demonstrating the effects of river discharge events on regional turbidity*

Project leader(s): Katharina Fabricius; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will provide baseline information on the effects of river discharges on GBR water clarity. It will assist in climate change adaptation planning by identifying areas where poor water quality may be particularly exacerbated by extreme flood events.
www.nerptropical.edu.au/project/tracking-coastal-turbidity-over-time-and-demonstrating-effects-river-discharge
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 4.1

TOPIC: Climatic & environmental conditions
SUBTOPIC: Water quality
REGION: East Coast Catchments **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

NRM RELEVANCE SCORE: ★★★☆☆

Project Title: *Remote sensing methods to map & monitor coastal habitats and water quality*

Project leader(s): Thomas Schroeder; CSIRO
Project period: 2011 - 2014
Description: Recent advances in satellite technologies offer improved spectral and spatial resolution, so it's now possible to produce quantitative vegetation maps that show far more detail than was previously possible using satellite imagery. By overlaying multiple sources of satellite and airborne imagery including ground measurements such as reflected light, texture, and ground elevation, our researchers are able to identify vegetation communities much more accurately. A second aspect of the project is estimating water quality using remote sensing of water colour in the coastal zone. Advanced mapping techniques are being used to derive information about turbidity, chlorophyll, dissolved organic materials and light availability at the sea bed on a daily basis. A time series (2002-2012) of this data will be created to make inferences about seasonal changes, ecological health and biodiversity.
www.nerpnorthern.edu.au/research/projects/53
R&D Program: NERP Northern Australia **– Project code:** NERP NA 5.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Monitoring the health of Torres Strait coral reefs*

Project leader(s): Ray Berkelmans; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will synthesise information about the coral reefs of Torres Strait. It will establish a long-term monitoring program to assess impacts of climate change on environmental conditions and reef health, initially providing a baseline information. The monitoring program, undertaken by AIMS and the Torres Strait community, should provide an early warning of climate change impacts and declines in coral communities and large fishes from other disturbances.

www.nerptropical.edu.au/project/monitoring-health-torres-strait-coral-reefs

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 2.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Rainforest Biodiversity*

Project leader(s): Steve Williams; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on the distribution and condition of Wet Tropics rainforests, and identify likely climate change impacts.

www.nerptropical.edu.au/project/rainforest-biodiversity

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 3.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Fire & rainforests*

Project leader(s): Dan Metcalfe; CSIRO
Project period: 2011 - 2014
Description: This project will provide information on the impacts of cyclones and fire regimes on rainforest margins, key rainforest and mahogany glider habitat, and identify areas requiring fire management to maintain key environmental values. It will assist in prioritising areas for fire management or exclusion under climate change conditions.

www.nerptropical.edu.au/project/fire-and-rainforests

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 7.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Mangrove and freshwater habitat status of Torres Strait Islands*

Project leader(s): Norm Duke; James Cook University; Damien Burrows; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline data on mangrove distribution and condition. While not specifically addressing climate change planning, the baseline information will be important for prioritising actions to maintain habitat condition under climate change conditions.

www.nerptropical.edu.au/project/mangrove-and-freshwater-habitat-status-torres-strait-islands

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 2.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Estuarine and nearshore ecosystems – assessing alternative adaptive management strategies for the management of estuarine and coastal ecosystems*

Project leader(s): Marcus Sheaves; James Cook University
Project period: 2013 -
Description: 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.
www.nccarf.edu.au/content/estuarine-and-near-shore-ecosystems

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Conservation planning for a changing coastal zone*

Project leader(s): Bob Pressey; James Cook University
Project period: 2011 - 2014
Description: This project sets out to identify key priorities for protecting and restoring coastal ecosystems in the Great Barrier Reef World Heritage Area (GBRWHA). The work will take into account changing land use, expanding infrastructure and climate change.
www.nerptropical.edu.au/project/conservation-planning-for-a-changing-coastal-zone

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 9.4

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Prioritising management actions for Great Barrier Reef islands*

Project leader(s): Bob Pressey; James Cook University
Project period: 2011 - 2014
Description: This project will develop a tool for prioritising conservation management to address climate change, development pressures and other issues affecting Great Barrier Reef islands off the central Queensland coast.
www.nerptropical.edu.au/project/prioritising-management-actions-great-barrier-reef-islands

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 9.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *Dynamic vulnerability maps and decision support tools for the Great Barrier Reef*

Project leader(s): Ken Anthony; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will develop a tool for identifying the most vulnerable, as well as the most resilient, areas of the GBR under combinations of climate change scenarios and local/regional scale stressors and impacts. The project will be critical for (1) identifying areas of the GBR that need priority management action, (2) for identifying key management levers that have the best chance of maintaining reef resilience in priority areas, (3) identifying critical threshold levels for cumulative stress that could push the reef ecosystem beyond a tipping point, and (4) for providing information on the relative importance of climate change action and local scale management practices as we move into a high CO2 era.
www.nerptropical.edu.au/project/dynamic-vulnerability-maps-and-decision-support-tools-great-barrier-reef

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 9.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk areas/ecosystems
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Managing threats to floodplain biodiversity and indigenous values*

Project leader(s): Samantha Setterfield; Charles Darwin University
Project period: 2011 - 2014
Description: This research will help predict which Kakadu floodplain areas are at most risk from saltwater intrusion and weed invasion due to sea level rise. The research team will also predict key ways that sea level rise will affect Traditional Owners, such as sea level rise affecting the habitat of important floodplain plants and animals like Magpie Geese. Knowing the areas that are most at risk from sea level rise and weed invasion will improve the capacity of Traditional Owners and Park managers to respond to these threats within Kakadu. In addition the project is investigating management options available to respond to these risks. Finally a decision support tool will be developed that will help managers to plan strategies to protect key values within Kakadu floodplains.
www.nerpnorthern.edu.au/research/projects/32

R&D Program: NERP Northern Australia **– Project code:** NERP NA 3.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk areas/ecosystems
REGION: Australia-wide **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *Contributing to a sustainable future for Australia's biodiversity under climate change: conservation goals for dynamic management of ecosystems*

Project leader(s): Michael Dunlop; CSIRO Climate Adaptation Flagship
Project period: -
Description: Likely changes in climate and ecological processes due to climate change mean it may not be possible to retain biodiversity and ecosystems in the same form or place. This project seeks to establish a broadened set of goals and objectives for NRM management that will accommodate these inevitable changes of biodiversity in response to climate change and other pressures.
www.nccarf.edu.au/content/contributing-sustainable-future-australias-biodiversity-under-climate-change-conservation

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Monitoring status and trends of coral reefs of the Great Barrier Reef*

Project leader(s): Hugh Sweatman; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will provide baseline condition assessment of the GBR, and analysis of trends and threats. It will provide information on the impacts of climate change factors (coral bleaching, cyclonic damage), and their interaction other stressors (crown-of-thorns).
www.nerptropical.edu.au/project/monitoring-status-and-trends-coral-reefs-great-barrier-reef

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 1.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Monitoring the ecological effects of Great Barrier Reef zoning plan on mid and outer shelf reefs*

Project leader(s): Hugh Sweatman; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will provide baseline data on the health of marine fish communities, and the effectiveness of current management arrangements. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.
www.nerptropical.edu.au/project/monitoring-ecological-effects-great-barrier-reef-zoning-plan

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 8.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Vulnerability of seagrass habitats in the Great Barrier Reef to changing coastal environments*

Project leader(s): Catherine Collier; James Cook University
Project period: 2011 - 2014
Description: This project will assess the impact of flood events on water quality in seagrass meadows. It will assess individual and interactive effects of water quality on the health of seagrass meadows, and identify critical tolerance thresholds. It will develop indicators to be used in assessing the health of seagrass communities. This work will provide information on stressors that may interact with climate change stressors and should be taken into account in climate change adaptation planning.
www.nerptropical.edu.au/project/vulnerability-seagrass-habitats-to-flood-plume-impacts
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 5.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Assessing the long–term effects of management zoning on inshore reef of the Great Barrier Reef*

Project leader(s): Garry Russ; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline data on factors affecting the distribution and abundance of marine fish communities, and the effectiveness of current management arrangements. It also provides and assessment of reef health and factors affecting health, including coral bleaching.
www.nerptropical.edu.au/project/marine-reserves-contribute-biodiversity-and-fishery-sustainability
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 8.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Characterising the cumulative impacts of global, regional and local stressors on the present and past biodiversity of the Great Barrier Reef*

Project leader(s): Jian-xin Zhao; University of Queensland; John Pandolfi; University of Queensland
Project period: 2011 - 2014
Description: This project will provide baseline information on climate variability and how it has affected the condition of the GBR in combination with other stressors. It will provide information on the likely impacts of climate change on reef health, and the interactions with other factors (e.g. water quality). It will therefore inform action on water quality management under climate change conditions.
www.nerptropical.edu.au/project/characterising-cumulative-impacts-global-regional-and-local-stressors-present-and-past
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 1.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: At-risk areas/ecosystems
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Coastal Ecosystems responses to climate change – adapting to climate change in the coast zone*

Project leader(s): Wade Hadwen; Griffith University
Project period: 2010 -
Description: 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.
www.nccarf.edu.au/content/coastal-ecosystems-responses-climate-change-%E2%80%93-adapting-climate-change-coast-zone
R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *Design and implementation of management strategy evaluation for the Great Barrier Reef*

Project leader(s): Cathy Dichmont; CSIRO
Project period: 2011 - 2014
Description: This project will use stakeholder input to develop and assess management options for the inshore GBR. While not specifically addressing climate change the options will be able to be tested under climate change scenarios.
www.nerptropical.edu.au/project/mse-gbr
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 9.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Climate change impacts on latitudinal diversity gradients in reef corals*

Project leader(s): John Pandolfi; University of Queensland
Project period: 2013 - 2015
Description: This project will investigate the consequences of a warmer ocean that occurred during past intervals of global climate change on the latitudinal distribution of reef-building corals. This work will provide managers and industry with critical insight into the effects of ongoing climate change on the biodiversity and biogeography of living coral reefs.
R&D Program: ARC - Discovery **– Project code:** DP130100250

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Geomorphological development of coral reefs, southern Great Barrier Reef: an integrated record of Holocene palaeoecology and palaeoclimate from cores*

Project leader(s): Gregory Webb; University of Queensland
Project period: 2012 - 2014
Description: Very little is known about how the Great Barrier Reef (GBR) has responded or may respond to predicted environmental change and/or degradation. The project will reconstruct the recent biological and physical history of reefs in the southern GBR in order to better understand how they may react to future environmental changes.
R&D Program: ARC - Discovery **– Project code:** DP120101793

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Understanding the mechanisms of thermal acclimation in the symbiotic algae (Symbiodinium) within cnidarian corals*

Project leader(s): Dr Shunichi Takahashi; Australian National University
Project period: 2011 - 2013
Description: Global warming is a major threat to coral reefs, contributing to devastating coral bleaching. This project will provide new insight into how coral reefs can respond to rising global temperature through clarifying the thermal acclimation mechanisms in corals using molecular techniques.
R&D Program: ARC - Discovery **– Project code:** DP110102364

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: North Queensland **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Advancing knowledge of microbial symbioses underpinning coral health and reef resilience and predicting their responses to climate change*

Project leader(s): William Leggat; James Cook University
Project period: 2013 - 2015
Description: Coral reefs are complex, diverse ecosystems in which microbial communities form associations with host corals. However, the roles these associations play in coral stress responses are unknown. This project unlocks the black-box of coral microbial complexity and determines how the reef's smallest members have the greatest influence on reef health.
R&D Program: ARC - Discovery **– Project code:** DP130101421

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: Elsewhere in Australia **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Adapting to the effects of climate change on Australia's deep marine reserves*

Project leader(s): Ronald Thresher; CSIRO
Project period: 2010 -
Description: The aims of this project are to develop practical options to manage the impacts of climate change on the South east Commonwealth Marine Reserve; and develop a generic model that can be applied to forecasting the impacts of climate change on other deep sea biota.

www.nccarf.edu.au/content/adapting-effects-climate-change-australia%E2%80%99s-deep-marine-reserves

R&D Program: NCCARF, FRDC, DCCEE **– Project code:** FRDC 2010/510

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk areas/ecosystems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Global climate change and the impacts of temperature extremes on terrestrial biodiversity*

Project leader(s): Justin Welbergen; James Cook University
Project period: 2011 - 2013
Description: Increasing severity of climate extremes is a disturbing implication of global climate change; yet little is known about the effects of such extremes on the natural world. This project aims to understand the vulnerability of biodiversity to current and future extremes, and to inform conservation efforts and minimise future impacts.
R&D Program: ARC - Discovery **– Project code:** DP110104186

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk species
REGION: Australia-wide **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Adaptation strategies for Australian birds*

Project leader(s): Stephen Garnett; Charles Darwin University
Project period: 2011 - 2013
Description: Climate is likely to change so much that many birds may need human help to survive. For some, dispersal corridors may be needed. Others may need help to cross barriers as their favoured habitat shifts across the landscape. Some may even need to be taken into captivity. This project will identify what needs to be done in the next 20-50 years to enable our children to appreciate the same birds that we inherited.

www.nccarf.edu.au/content/adaptation-strategies-australian-birds

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk species
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Evaluating the environmental drivers of mud crab catches in Australia*

Project leader(s): Jan-Olaf Meynecke; Griffith University
Project period: 2008 - 2010
Description: This work documents the links between environmental drivers (particularly temperature and rainfall) and mud crab catches in representative areas throughout Australia. A conceptual model was developed to improve our understanding of the relationship between mud crab catches and environmental drivers. Time lags related to the mud crab's life cycle were described and predictive models for domestic mud crab fisheries developed. Regional differences between river systems have been identified and rivers of similar catch and environmental characteristics grouped. The information presented here enables the prediction of 30-50% of annual mud crab catches. The findings can assist fishery managers in developing regional management plans for mud crabs and apply protective measures to the resource when necessary. The mud crab industry, and in particular mud crab fishers, can use the information herein to predict and then adjust catches to influence the market price of mud crabs and reduce their operational costs.

http://frdc.com.au/research/Documents/Final_reports/2008-012-DLD.pdf

R&D Program: FRDC

TOPIC: Biodiversity   NRM RELEVANCE SCORE: ★ ★ ★ ★ ☆
SUBTOPIC: At-risk species
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Research and management to reverse decline of native mammal fauna*

Project leader(s): Graeme Gillespie; Northern Territory Department of Land Resource Management
Project period: 2011 - 2014
Description: The project aims to determine and quantify the role of feral cats in the current decline of small and medium sized native mammals.   The project will also assess the relative impacts of fire regimes and introduced herbivores (buffalo, cattle, horses, donkeys). One other components of the study will consider the extent to which the current decline may be due to disease; and a further component will consider options for mitigating the impacts of cane toads. Land managers can be unaware of feral cats on their land. Directly involving the land managers in each study area will help them to see and understand the problem.   Knowledge transfer to land managers is considered essential to maximising the potential long term benefits of the research in conserving mammal species.
www.nerpnorthern.edu.au/research/projects/41

R&D Program: NERP Northern Australia **– Project code:** NERP NA 4.1

TOPIC: Biodiversity   NRM RELEVANCE SCORE: ★ ★ ★ ★ ☆
SUBTOPIC: At-risk species
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Critical seabird foraging locations and trophic relationships for the Great Barrier Reef*

Project leader(s): Brad Congdon; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on the distribution and importance of seabird foraging areas off north-east Queensland, and of the intersection of these areas with commercial fishing activity. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.
www.nerptropical.edu.au/project/critical-seabird-foraging-locations-and-trophic-relationships

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 6.3

TOPIC: Biodiversity   NRM RELEVANCE SCORE: ★ ★ ★ ★ ☆
SUBTOPIC: At-risk species
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Marine turtles and dugongs of the Torres Strait*

Project leader(s): Mark Hamann; James Cook University; Helene Marsh; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline data on marine turtle and dugong population sizes and distributions and identify key areas of habitat. While not specifically addressing climate change planning, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.
www.nerptropical.edu.au/project/marine-turtles-and-dugongs-torres-strait

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 2.1

TOPIC: Biodiversity   NRM RELEVANCE SCORE: ★ ★ ★ ★ ☆
SUBTOPIC: At-risk species
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Monitoring of key vertebrate species*

Project leader(s): David Westcott; CSIRO
Project period: 2011 - 2014
Description: This project will provide baseline information, and likely climate change impacts, on the distribution and populations cassowaries and flying-foxes, as well as providing management options for these species.
www.nerptropical.edu.au/project/monitoring-key-vertebrate-species

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 3.4

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk species
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

> **Project Title:** *Targeted surveys for missing and critically endangered rainforest frogs in ecotonal areas, and assessment of whether populations are recovering from disease*

Project leader(s): Robert Puschendorf; James Cook University; Conrad Hoskin; James Cook University
Project period: 2011 - 2014
Description: This project will identify the current status of critically endangered and possibly extinct rainforest frogs, as well as refuge areas that currently support any surviving species. This information will assist in the prioritisation of areas with high values for biodiversity protection under climate change planning. It will also provide information on the distribution of chytrid fungus, which will assist in identifying the climatic envelope in which this threat to endangered frog is active.
www.nerptropical.edu.au/project/targeted-surveys-missing-and-critically-endangered-rainforest-frogs

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 3.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk species
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

> **Project Title:** *Drivers of juvenile shark biodiversity and abundance in inshore ecosystems of the Great Barrier Reef*

Project leader(s): Colin Simpfendorfer; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on the distribution and abundance of sharks in inshore areas of the Great Barrier Reef, and of the factors affecting these species, and provide management recommendations. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.
www.nerptropical.edu.au/project/drivers-juvenile-shark-biodiversity-and-abundance-inshore-GBR-ecosystems

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 6.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk species
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

> **Project Title:** *Effects of climate change on reproduction, larval development and population growth of coral trout*

Project leader(s): Morgan Pratchett; James Cook University
Project period: 2010 -
Description: Coral trout are the number-one commercial and recreational fisheries species caught in coral reef waters, and account for 41% of wild-caught fish in Queensland waters. This project will assess the sensitivity of coral trout to climate related changes in temperature and seawater acidity, test for spatial variation in sensitivity in three sectors along the Great Barrier Reef, and measure coral dependence to test whether coral trout will be adversely affected by climate induced bleaching and coral loss.
www.nccarf.edu.au/content/effects-climate-change-reproduction-larval-development-and-population-growth-coral-trout

R&D Program: NCCARF, FRDC **– Project code:** FRDC 2010/554

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk species
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

> **Project Title:** *Marine wildlife management in the Great Barrier Reef World Heritage Area*

Project leader(s): Mark Hamann; James Cook University; Helene Marsh; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline data on marine turtle, dolphin & dugong populations & identify key areas of habitat, as well as Indigenous use of these species. While not specifically addressing climate change issues, the information will be important for prioritising actions to maintain populations under climate change conditions.
www.nerptropical.edu.au/project/marine-wildlife-management-great-barrier-reef-world-heritage-area

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 1.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk species
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Maximising the benefits of mobile predators to Great Barrier Reef ecosystems: the importance of movement, habitat and environment*

Project leader(s): Michelle Heupel; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will provide baseline information on the distribution and abundance of large marine predators of the Great Barrier Reef, and of the factors affecting these species. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

www.nerptropical.edu.au/project/maximising-benefits-mobile-predators-great-barrier-reef-ecosystems

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 6.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk species
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Significance of no–take marine protected areas to regional recruitment and population persistence on the Great Barrier Reef*

Project leader(s): Geoff Jones; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline data on the distribution and abundance of coral trout, and the effectiveness of current management arrangements. While not specifically addressing climate change, the baseline information will be important for prioritising actions to maintain populations under climate change conditions.

www.nerptropical.edu.au/project/significance-no-take-marine-protected-areas-regional-recruitment-and-population

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 8.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk species
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Vulnerability of an iconic Australian finfish (Barramundi, Lates calcarifer) and related industries to altered climate across tropical Australia*

Project leader(s): Dean Jerry; James Cook University
Project period: 2010 -
Description: This project aims to develop predictive models incorporating new physiological and genetic data with available population genetic, environmental and fisheries data to identify vulnerable wild stocks and stakeholders under climate change predictions. Researchers will establish a genetic basis of thermal tolerance differences by identifying thermal tolerance- related genes that can be used as biomarkers for the aquaculture industry to identify fish tolerant to thermal stress. It will develop adaptive management strategies to minimise impacts under altered climate scenarios and determine opportunities for expansion of fisheries and aquaculture.

www.nccarf.edu.au/content/vulnerability-iconic-australian-finfish-barramundi-lates-calcarifer-and-related-industries

R&D Program: NCCARF, FRDC **– Project code:** FRDC 2010/521

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Indicators **PLANNING RELEVANCE:** Indirect

Project Title: *Developing management strategies to mitigate increased co-extinction rates of plant dwelling insects through global climate change*

Project leader(s): Melinda Moir; University of Melbourne
Project period: 2011 - 2013
Description: Co-extinction occurs when a species goes extinct as a result of the extinction of the species it depends on. As 30-40% of plant-dwelling insects and other species depend on a host, losses to biodiversity may be extremely high if host species are extinguished. Climate change is predicted to reduce the population size and range of many plants, so there is the potential for climate–induced co-extinction to threaten Australia's biodiversity. This project will develop indicators of the degree to which insect species might be prone to co-extinction across Australia and identify cost-effective conservation strategies to combat this.

www.nccarf.edu.au/content/developing-management-strategies-combat-increased-coextinction-rates-plant-dwelling-insects

R&D Program: NCCARF

TOPIC: Biodiversity　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: At-risk species
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

> **Project Title:** *Impact of climate change stressors on calcifying and non‑calcifying marine life stages: predicting tipping points for persistence in a changing ocean.*

Project leader(s): Maria Byrne; University of Sydney
Project period: 2011 - 2013
Description: Australia generates considerable prosperity from its oceans with marine invertebrate resources playing a key role. These resources are at risk due to climate change. This project will study early life stages of key marine species to determine sensitivities to ocean warming and acidification and inform assessment of risk in a changing ocean.
R&D Program: ARC - Discovery **– Project code:** DP110105298

TOPIC: Biodiversity　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: At-risk species
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

> **Project Title:** *Reconstructing the impact of climate change on Australian native species*

Project leader(s): Jeremy Austin; University of Adelaide
Project period: 2013 - 2015
Description: This project will explore the impact of past climate change on Australian native animals to identify species and ecosystems at greatest potential risk, and to help predict and minimise the effects of future change.
R&D Program: ARC - Discovery **– Project code:** DP130104055

TOPIC: Biodiversity　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

> **Project Title:** *An integrated mechanistic model of species' responses to environmental change: from individual responses to range shifts and beyond*

Project leader(s): Michael Kearney; University of Melbourne
Project period: 2011 - 2013
Description: To effectively adapt to future environmental change, reliable forecasts are needed of how human alterations to climate and habitat will affect species. This project integrates cutting‑edge methods in nutritional, physiological and spatial ecology to develop new tools for predicting and understanding how species will respond to environmental change.
R&D Program: ARC - Discovery **– Project code:** DP110102813

TOPIC: Biodiversity　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: At-risk species
REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

> **Project Title:** *Fiddling while home burns: climate change and fiddler crabs*

Project leader(s): Patricia Blackwell; Australian National University
Project period: 2012 - 2014
Description: Climate change is already affecting many Australian animals, including fiddler crabs. This project will use extensive knowledge of fiddler crab biology to determine whether they can behaviourally compensate for the rapid changes that are occurring by using experiments and observations conducted under natural conditions in the mangroves of Darwin harbour.
R&D Program: ARC - Discovery **– Project code:** DP120101427

TOPIC: Biodiversity　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: At-risk species
REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

> **Project Title:** *The danger within: assessing the threats to an endangered finch from genetic incompatibility, limited dispersal and effective population size*

Project leader(s): Simon Griffith; Macquarie University
Project period: 2013 - 2015
Description: The Gouldian finch has declined dramatically over the past half century and remains one of Australia's most threatened birds. This project will use some cutting edge genetic techniques to understand some of the processes that undermine the species' recovery and our ability to monitor current populations.
R&D Program: ARC - Discovery **– Project code:** DP130100418

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Human adaptation options to increase resilience of conservation dependent seabirds and marine mammals impacted by climate change*

Project leader(s): Alistair Hobday; CSIRO; Lynda Chambers; Bureau of Meteorology
Project period: 2011 -
Description: Climate change impacts and adaptation options for marine birds (seabirds and shorebirds) and mammals have not being widely or consistently considered. This is a major impediment to ongoing conservation management and planning in the face of climate variability and change. Monitoring approaches for some of these species may also need to be reassessed and modified in order to better detect the impacts of climate change. Efficient ongoing monitoring is also required to allow adaptation responses to be validated. This project will connect researchers, managers and policy makers, to focus on climate-ready monitoring and adaptation options for conservation-dependent seabirds and marine mammals, link ongoing monitoring programs around Australia, and develop practical adaptation guidelines for science and management, including on-ground monitoring protocols
www.nccarf.edu.au/content/human-adaptation-options-increase-resilience-conservation-dependent-seabirds-and-marine
R&D Program: NCCARF, FRDC **– Project code:** FRDC 2011/533

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Can consistent individual differences in metabolic rate explain animal personality? Implications for fish and aquaculture in a warming climate*

Project leader(s): Peter Biro; University of New South Wales
Project period: 2011 - 2013
Description: This project will determine if consistent individual differences in metabolic rate affect behaviour, growth, and reproduction in fish. If so, then we need to prepare for the fact that a warming climate will lead to reductions in fish growth and reproduction, because rising temperature directly increases metabolism and therefore maintenance costs.
R&D Program: ARC - Discovery **– Project code:** DP110104750

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Cuckoo □ host coevolution: a model system for investigating the impact of climate change on interspecific interactions and biodiversity*

Project leader(s): Naomi Langmore; Australian National University
Project period: 2011 - 2013
Description: Climate change is causing alterations to the timing of breeding and migration in Australian birds, resulting in mismatches in timing between closely interacting species. This project will assess the impact of climate change on interactions between parasitic cuckoos, hosts and prey and formulate predictions about the long□term viability of these species.
R&D Program: ARC - Discovery **– Project code:** DP110101966

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Frayed at the edges? Integrating evolutionary genetics into the study of species distributional limits*

Project leader(s): Carla Sgro; Monash University
Project period: 2011 - 2013
Description: Restricted species, like those in rainforests, represent the vast majority of biodiversity, but they face high risks of extinction due to climate change unless they can adapt. Using butterflies as a model, this project will examine whether rainforest restricted species are able to adapt to future climate change and provide insight into their extinction risk.
R&D Program: ARC - Discovery **– Project code:** DP110100665

TOPIC: Biodiversity
SUBTOPIC: At-risk species
REGION: Elsewhere in Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

NRM RELEVANCE SCORE: ★☆☆☆☆

Project Title: *Living in a changing climate: the impacts of temperature during aestivation on burrowing frogs*

Project leader(s): Craig Franklin; University of Queensland
Project period: 2011 - 2013
Description: Although arid zones of Australia are characterised by extremes of temperature, little is known about the thermal ecology of frogs inhabiting these regions. This project will determine the effects of temperature on the physiology of an arid□adapted frog and determine whether likely increases in global temperatures will impact its survival.
R&D Program: ARC - Discovery **– Project code:** DP110102976

TOPIC: Biodiversity
SUBTOPIC: At-risk species
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

NRM RELEVANCE SCORE: ★☆☆☆☆

Project Title: *Mapping Antarctic climate change in space and time using mosses as biological proxies*

Project leader(s): Sharon Robinson; University of Wollongong
Project period: 2011 - 2013
Description: This project will use polar mosses as sentinels for climate change to determine the extent to which change is already affecting Antarctica and enable development of more robust global climate models. Novel remote sensing methods will be developed to identify biodiversity most at risk from climate change thus maintaining Antarctic treaty obligations.
R&D Program: ARC - Discovery **– Project code:** DP110101714

TOPIC: Biodiversity
SUBTOPIC: At-risk species
REGION: Elsewhere in Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

NRM RELEVANCE SCORE: ★☆☆☆☆

Project Title: *Reproductive plasticity and climate change: insights from an opportunistic breeder*

Project leader(s): Simon Griffith; Deakin University
Project period: 2013 - 2015
Description: Across the globe, birds are struggling to optimise their reproductive timing and investment in a changing and unpredictable climate. This project will use the highly adaptable and opportunistic Australian zebra finch to develop an understanding of how birds tailor their behaviour and physiology to breed across a range of conditions.
R&D Program: ARC - Discovery **– Project code:** DP130100417

TOPIC: Biodiversity
SUBTOPIC: Corridors, connectivity & refugia
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★★★★☆

Project Title: *Optimal habitat protection and restoration for climate adaptation*

Project leader(s): Richard Fuller; University of Queensland
Project period: 2011 -
Description: Research has shown that many species are likely to go extinct because of climate change, but which species these will be, and what we can do to prevent these extinctions remain uncertain. This project will predict how species and habitats will move in response to climate change over the next century, then work out how much it will cost to protect existing habitat and restore new habitat where this would help species survive.
www.nccarf.edu.au/content/optimal-habitat-protection-and-restoration-climate-adaptation
R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Corridors, connectivity & refugia
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Rainforest refugia and hotspots of plant genetic diversity in the Wet Tropics and Cape York Peninsula*

Project leader(s): Darren Crayn; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on the genetic diversity of Wet Tropics rainforest plants and will assist in prioritising climate change adaptation planning by identifying areas and species that are most at risk from climate change.
www.nerptropical.edu.au/project/identifying-rainforest-refugia-and-hotspots

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 3.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Corridors, connectivity & refugia
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *River to landscape connections and biodiversity*

Project leader(s): Stuart Bunn; Griffith University
Project period: 2011 - 2014
Description: The project will provide a detailed understanding of the importance of floodplains to freshwater biodiversity in northern Australian river systems, and inform water resource management. Researchers are identifying which areas flood, how deep, and for how long, and developing landscape-scale models to show connectivity and flows between floodplains, river channels and coasts. They are also measuring the amount of microscopic aquatic plants produced in different floodplain habitats, identifying where fish and other animals get their food for growth and reproduction, and measuring the movement of large predators, such as sawfish, between habitats.
www.nerpnorthern.edu.au/research/projects/31

R&D Program: NERP Northern Australia **– Project code:** NERP NA 3.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Corridors, connectivity & refugia
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *The role of refugia in ecosystem resilience and maintenance of terrestrial biodiversity in the face of global climate change*

Project leader(s): Stephen Williams; James Cook University
Project period: -
Description: This research will maximise the protection of Australia's terrestrial biodiversity by improving our understanding of what parts of the landscape provide natural refuges from the impacts of global climate change. Researchers will assess, map and quantify the vegetation types and species associated with each refuge and assess their relative vulnerability and likelihood of persistence across a range of future climate scenarios. This research will form the basis for systematic conservation planning, enabling management actions to be prioritised to ensure cost-efficient allocation of resources.
www.nccarf.edu.au/content/role-refugia-ecosystem-resilience

R&D Program: NCCARF

TOPIC: Biodiversity　　　　　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Corridors, connectivity & refugia
REGION: Australia-wide **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Indirect

Project Title: *Identification and characterisation of freshwater refugia in the face of climate change*

Project leader(s): Jeremy VanDerWal; James Cook University
Project period: -
Description: Refuges from climate change within freshwater systems will be crucial for both freshwater biodiversity and for the terrestrial biodiversity that use freshwater habitats, for example riverside zones, during hotter and drier periods. How such refuges will be affected by climate change, however, is poorly understood. This research will improve understanding of which parts of the landscape provide natural refuges in the face of global climate change. Identified refuges will be mapped and assessed for what species and habitats they will protect across a range of possible future climates. The research will quantify the biodiversity assets of each refuge and assess their relative vulnerability under future climate scenarios, enabling management actions to be prioritised to ensure cost-efficient allocation of resources.
www.nccarf.edu.au/content/identification-and-characterization-freshwater-refugia-face-climate-change
R&D Program: NCCARF

TOPIC: Biodiversity　　　　　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Corridors, connectivity & refugia
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Climate change, larval dispersal and patterns of connectivity in coral metapopulations*

Project leader(s): Andrew Baird; James Cook University
Project period: 2011 - 2013
Description: Patterns of connectivity among coral populations are virtually unknown and these patterns are likely to change with changing climate. This project will test how temperature and pH will change patterns of coral dispersal in order to assist the design of an effective marine reserve network throughout the Great Barrier Reef.
R&D Program: ARC - Discovery **– Project code:** DP110101168

TOPIC: Biodiversity　　　　　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Corridors, connectivity & refugia
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Peripheral isolates as hotbeds of adaptive diversity*

Project leader(s): Benjamin Phillips; James Cook University
Project period: 2013 - 2015
Description: This project uses cutting edge molecular technology and spatial analyses to predict the location of diversity relevant to managing the impact of climate change. Knowledge generated in this project will open the door to the informed use of genetic translocation in efforts to kerb expected biodiversity losses.
R&D Program: ARC - Discovery **– Project code:** DP130100318

TOPIC: Biodiversity　　　　　　　　　　　　　**NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Distribution & abundance of species & communities
REGION: Northern Australia **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Indirect

Project Title: *Predicting patterns of biodiversity in the Alligator Rivers Region*

Project leader(s): David Williams; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project is focused on the coastal and estuarine regions of the Alligator Rivers, which are wholly located within Kakadu National Park. These rivers are also the focus of other ecological and social research which will benefit from a better understanding of water and sediment flows and how these will change under various climate change scenarios. Hydrodynamic, sediment transport and water quality models will be created that incorporate water and sediment flows, coastal and estuarine tidal ranges and water quality. These models can be used to predict the impacts of a range of coastal change, land use and climate change scenarios. These models will be used by many other researchers to underpin other ecological and social research in the region. Models will also be developed that allow park managers and traditional owners to map present conditions and analyse changes over time. The models will be particularly relevant to research looking at estuarine plant and animal species, including estuarine fish.
www.nerpnorthern.edu.au/research/projects/34
R&D Program: NERP Northern Australia **– Project code:** NERP NA 3.4

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Distribution & abundance of species & communities
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Identification of climate driven species shifts and adaptation options for recreational fishers: learning general lessons from a data rich case*

Project leader(s): Daniel Gledhill; CSIRO
Project period: 2010 -
Description: This project aims to determine changes in distributions of rocky reef fish in eastern Australia over the past four decades, and establish correlation of these changes to climate induced environmental change, such as temperature. It will develop and test a "process model" for engagement and development of climate change adaptation options that can be deployed for other fishing sectors and user groups, including commercial fishers.

www.nccarf.edu.au/content/identification-climate-driven-species-shifts-and-adaptation-options-recreational-fishers

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Distribution & abundance of species & communities
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Getting smaller as temperatures rise? Body size responses of Australian birds to climate change*

Project leader(s): Annie-Marie Peters; Monash University
Project period: 2012 - 2014
Description: Many animals appear to be declining in size as climate change occurs, but why this is so is unclear. Using historical records and museum specimens we will determine the factors underlying body size reductions in Australian birds, and especially the role of changing temperature and ecosystem productivity.
R&D Program: ARC - Discovery **– Project code:** DP120102651

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Climate change and the impacts of extreme events on Australia's Wet Tropics biodiversity*

Project leader(s): Justin Welbergen; Australian National University
Project period: 2011 - 2014
Description: This project will provide baseline information on climatic conditions of the Wet Tropics, and an assessment of the impact of extreme climatic events on Wet Tropics plants and animals. It will identify areas where species are most and least at risk from climate change and developing a tool for assessing climate change risks.

www.nerptropical.edu.au/project/climate-change-and-impacts-extreme-climatic-events-australias-wet-tropics

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 7.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Biodiversity patterns, conservation planning and resilience of freshwater fauna*

Project leader(s): Mark Kennard; Griffith University
Project period: 2011 - 2014
Description: This research will help identify priority areas for conservation of aquatic biodiversity and develop recommendations about how these areas can be effectively and efficiently management to help ensure their long-term resilience.

www.nerpnorthern.edu.au/research/projects/33

R&D Program: NERP Northern Australia **– Project code:** NERP NA 3.3

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Combined water quality–climate effects on coral and other reef organisms*

Project leader(s): Sven Uthicke; Australian Institute of Marine Science

Project period: 2011 - 2014

Description: This project will assess individual and interactive effects of water quality (increased nutrients & sediments; reduced light & salinity) and climate change variables (increasing sea temperatures; ocean acidification) on the health of GBR species.

www.nerptropical.edu.au/project/experimental-and-field-investigations-combined-water-quality-and-climate-effects

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 5.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Understanding Great Barrier Reef diversity: spatial and temporal dynamics and environmental drivers*

Project leader(s): Glenn De'ath; Australian Institute of Marine Science

Project period: 2011 - 2014

Description: This project will provide baseline maps of Great Barrier Reef diversity and condition. It will provide understanding of the environmental factors and threats (including climatic events) affecting diversity and condition. This information will help identify likely climate change impacts on GBR condition and to prioritise marine areas to be considered in climate change adaptation planning.

www.nerptropical.edu.au/project/understanding-diversity-great-barrier-reef

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 5.1

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *An assessment of the vulnerability of Australian forests to climate change Part II: Scene setting and biophysical impacts review*

Project leader(s): Belinda Medlyn; Macquarie University

Project period: 2012 -

Description: Forests and the industries associated with them are vulnerable to the impacts of climate change. Australia has 149 million hectares of forest managed for conservation and heritage areas and for production of forest products. This part of the project discusses the overall impact of climate change on vegetation and the ecosystem services provided by forests. It reviews the evidence of impacts of climate change on Australian forests in relation to direct stresses (CO_2, temperature and rainfall), indirect stresses (fire, pests, pathogens and weeds) and plant processes (growth, transpiration and phenology).

www.nccarf.edu.au/content/assessment-vulnerability-australian-forests-climate-change-part-ii-scene-setting-and

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Australian savannah landscapes: past, present and future*

Project leader(s): Jason Beringer; Monash University

Project period: 2013 - 2015

Description: Australian savannahs are productive and culturally and biologically significant landscapes but are vulnerable to climate change. The project will determine savannah function (carbon and water balance) for the present and assess how sensitive they have been to past climate variability. The project will then address how they may respond to future climate change.

R&D Program: ARC - Discovery **– Project code:** DP130101566

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Next-generation vegetation model based on functional traits*

Project leader(s): Iain Prentice; Macquarie University
Project period: 2012 - 2014
Description: Global vegetation models try to answer big questions, such as the effects of climate change and carbon dioxide (CO2) on ecosystems and vice versa. But as present models are out-dated and give inconsistent results, the project is planning a new, more robust model that will fully exploit recent advances in plant functional ecology and earth system science.
R&D Program: ARC - Discovery **– Project code:** DP120103600

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: WT Cluster **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Testing the importance of large-scale climate factors to plant community assembly following land-use change*

Project leader(s): Margaret Mayfield; University of Queensland
Project period: 2012 - 2014
Description: This project will examine the native plant species and functional diversity of Australia's rain forest communities to create a predictive framework of how plant communities recover following deforestation. Such a framework is key to focusing conservation efforts in degraded and multi-use landscapes.
R&D Program: ARC - Discovery **– Project code:** DP120101392

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: Elsewhere in Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

Project Title: *El Nemo National Fishing and Aquaculture Climate Change RD&E Coordination Program - Aquatic Biodiversity and Resources*

Project leader(s): Col Creighton; Fisheries Research & Development Corporation
Project period: 2009 -
Description: The program aims to prepare the marine fisheries and aquaculture sectors and fisheries management agencies to adapt to future changes. This program has involved scientists, managers and fishers in projects that span engagement, education, outreach, discovery and application. New linkages have been forged between scientists, fishers and managers that place the south-east of Australia in a national and world leading position with regard to understanding the observed and projected impacts of physical change, the spectrum of biological responses, and the suite of management and policy actions that are possible.
http://frdc.com.au/environment/climate_change/Pages/elnemo_frdc_approach.aspx
R&D Program: FRDC **– Project code:** FRDC 2009/074

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Revitalising estuaries and wetlands for carbon sequestration, biodiversity, fisheries and the community*

Project leader(s): Colin Creighton; Fisheries Research & Development Corporation
Project period: 2012 -
Description:
R&D Program: FRDC **– Project code:** FRDC 2012/036

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *The architecture of resilient landscapes: scenario modelling to reveal best-practice design principles for climate adaptation*

Project leader(s): Veronica Doerr; CSIRO
Project period: 2011 -
Description: One of the most cost-effective ways to help Australia's native species survive climate change is to ensure their populations are as large and connected as possible. This means that management to protect Australia's biodiversity will need to happen over whole landscapes, not just in national parks. So do we need lots of corridors or

more habitats? This project will evaluate different approaches to managing biodiversity across landscapes and calculate how likely they are to improve the resilience of native species.

www.nccarf.edu.au/content/architecture-resilient-landscapes-scenario-modelling

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Coupled physical and biogeochemical dynamics on the Australian North West Shelf*

Project leader(s): Gregory Ivey; University of Western Australia

Project period: 2012 - 2014

Description: Information regarding the natural function of the Australian North West Shelf is urgently required to sustainably manage the often conflicting uses of the region. This project will study the role of ocean processes in driving ocean productivity on the North West Shelf and determine the impact of projected climate variability.

R&D Program: ARC - Discovery **– Project code:** DP120103036

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *How arid zone wetlands persist: linking ecological dynamics with hydrological regimes*

Project leader(s): Jennifer Davis; Monash University

Project period: 2012 - 2014

Description: This project will investigate how aquatic food webs assemble and persist in mound springs, relict streams and river pools in the Australian arid zone. Knowing how aquatic systems respond to wet and dry phases is the first step towards 'climate proofing ' these systems against future extreme events.

R&D Program: ARC - Discovery **– Project code:** DP120103010

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Climate-resilient vegetation of multi-use landscapes: exploiting genetic variability in widespread species*

Project leader(s): Margaret Byrne; Department of Environment & Conservation, WA

Project period: 2011 - 2013

Description: Multi-million dollar investments in ecosystem maintenance through restoring Australia's degraded landscapes currently take little account of climate change. Until recently there has been a strong focus on maintaining local genetic patterns for optimal restoration. In a changing climate this paradigm will no longer be relevant. This project will undertake pioneering research at the interface between molecular genetics, plant physiology and climate adaptation, targeting the question 'What new genetic frameworks can facilitate adaptive restoration in changing environments?" Addressing this question will ensure optimal outcomes for Australia-wide investment in ecological restoration and provide solutions to ecosystem adaptation in changing environments.

www.nccarf.edu.au/content/climate-resilient-revegetation-multi-use-landscapes-exploiting-genetic-variability

R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Phenotypic plasticity and plant water use in a changing climate: a multi-species, multi-site investigation*

Project leader(s): Adrienne Nicotra; Australian National University

Project period: 2012 - 2014

Description: Plants are highly responsive to the conditions under which they grow, but the combination of conditions they experience will be altered under climate change. This research into plant responses to the novel environments posed by climate change will examine plasticity in water-use-traits to better predict native plant tolerance of climate change.

R&D Program: ARC - Discovery **– Project code:** DP120100945

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Pollination in a new climate: evolutionary simulation of bee and flower interactions for predicting impacts of climate change on pollination*

Project leader(s): Alan Dorin; Monash University
Project period: 2013 - 2015
Description: This project uses computer simulation to understand the potential impact of temperature variation associated with climate change on insect pollinator behaviour. The result will be a model of bee and flower interactions under future Australian conditions to be used for agricultural and environmental resource management and planning.
R&D Program: ARC - Discovery **– Project code:** DP130100015

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Capturing Proteus: 65 million years of ecosystem change revealed through evolution of Proteaceae in Australasia*

Project leader(s): Gregory Jordan; University of Tasmania
Project period: 2011 - 2013
Description: By assessing past changes in the iconic Australian plant family Proteaceae, this research will show how the Australasian vegetation has responded to 65 million years of profound landscape and climate changes. This knowledge from the past will give important insights into how ecosystems can be expected to change under future climate scenarios.
R&D Program: ARC - Discovery **– Project code:** DP110104926

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Coping with flooding: nutrient transport in oxygen-deprived roots*

Project leader(s): Tim Colmer; University of Western Australia
Project period: 2012 - 2014
Description: Flooding damages plants by reducing oxygen supply to roots. The project will study effects of low oxygen on nutrient transport by roots. Understanding root functioning during low oxygen will enhance knowledge of plant acclimation to soil water logging. The project will contribute to the National Goal of 'Responding to Climate Change and Variability'.
R&D Program: ARC - Discovery **– Project code:** DP120101482

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Coping with temperature extremes: morphological constraints on leaf function in a warmer, drier climate*

Project leader(s): Marilyn Ball; Australian National University
Project period: 2011 - 2013
Description: This project will determine how hydraulic properties of temperate, evergreen leaves affect their capacity to cope with seasonal variation in temperature extremes. The results will enhance mechanistic understanding of temperature tolerance, and inform prediction of vegetation change in response to climate warming and increasing CO_2 concentrations.
R&D Program: ARC - Discovery **– Project code:** DP110105380

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: Elsewhere in Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Dispersal and persistence of large seeded forest species under global environmental change*

Project leader(s): Neal Enright; Murdoch University
Project period: 2011 - 2013
Description: This project investigates how decline of a key seed disperser, the emu, due to global environmental change (fragmentation, fire regime change, human population growth, climate change) affects the persistence and migration potential of endemic SW Australian forest plant species. Results will inform approaches to ecosystem management and conservation
R&D Program: ARC - Discovery **– Project code:** DP110101480

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Functional analysis of alternative splicing in plants*

Project leader(s): Mrs Sridevi Sureshkumar; University of Queensland
Project period: 2011 - 2013
Description: Higher temperatures affect flowering and seed set in plants. How plants sense and respond to temperature is currently unclear. Here we study alternative splicing, one of the processes affected by temperature. These studies will advance our knowledge and help develop crops that can withstand negative effects of climate change.
R&D Program: ARC - Discovery **– Project code:** DP110100964

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Global ocean productivity: revealing interaction patterns and nutrient pathways*

Project leader(s): Mark Holzer; University of New South Wales
Project period: 2012 - 2014
Description: This project will reveal how the nutrient supply of a given region of the ocean can strongly influence biological productivity at great distances because of long-range oceanic nutrient transport. This has important implications for global-scale resource management, such as the artificial fertilisation of the ocean for climate-change mitigation.
R&D Program: ARC - Discovery **– Project code:** DP120100674

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Keeping pace with a changing climate: can Australian plants count on rapid evolution?*

Project leader(s): Tianhua He; Curtin University of Technology
Project period: 2013 - 2015
Description: Integrating field and common-garden experiments with cutting-edge genomic technology, this project will answer the critical question of whether Australia's flora can count on evolution to keep pace with a rapidly changing climate. The project outcomes will inform science-based policies integrating social-economic development and biodiversity conservation.
R&D Program: ARC - Discovery **– Project code:** DP130103029

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Lifestyle choices: genomic analysis of niche adaptations in marine Synechococcus*

Project leader(s): Ian Paulsen; Macquarie University

Project period: 2011 - 2013

Description: Photosynthetic marine bacteria are very important in the global carbon cycle. This project aims to discover how these bacteria adapt to survive in different marine environments. This is important for understanding how they will be affected by climate change and other environmental alterations.

R&D Program: ARC - Discovery **– Project code:** DP110102718

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Microscale insights into ocean□scale processes: microbial behaviour as a driver of ocean biogeochemistry*

Project leader(s): Justin Seymour; University of Technology, Sydney

Project period: 2011 - 2013

Description: Microscopic plankton regulate the ocean's chemical cycles, which ultimately support life on earth. However, the ecological interactions driving these processes are poorly understood. This project will use novel approaches to decipher the behaviours of marine microbes, providing a more complete perception of how ocean ecosystems operate and influence climate.

R&D Program: ARC - Discovery **– Project code:** DP110103091

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Mobility, stasis or extinction? The response of plants to long-term environmental change*

Project leader(s): Gregory Jordan; University of Tasmania

Project period: 2012 - 2014

Description: This study of Australian plants will improve our ability to predict how plants and vegetation will respond to climate change by investigating the ability of plants to survive climate change. In particular, this project is designed to generate simple principles that can be used in management of species and vegetation at risk from climate change.

R&D Program: ARC - Discovery **– Project code:** DP120100501

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Molecular and cellular mechanisms of action of novel plant guanylyl cyclase enzymes □ a new class of overlapping dual□domain molecules*

Project leader(s): Helen Irving; Monash University

Project period: 2011 - 2013

Description: A group of highly unusual catalytic molecules in plants has been identified. The mechanisms of action of these molecules will be studied in this project to learn their role in regulating plant growth in changing climates. The results will reveal how these molecules function and also provide new insights for the development of multi□ functional artificial molecules.

R&D Program: ARC - Discovery **– Project code:** DP110104164

TOPIC: Biodiversity **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Peridinin⬚chlorophyll⬚protein complex: unravelling the unique photosynthetic apparatus of dinoflagellates in response to climatic variation*

Project leader(s): Peter Ralph; University of Technology, Sydney
Project period: 2011 - 2013
Description: Dinoflagellates sustain the food chain. They live in coral and in ice, and also create toxic algal blooms. This project will dissect the unique photosynthetic machinery of these organisms to learn how they adapt and thrive in extreme environments. This new knowledge will predict how dinoflagellate⬚based ecosystems will respond to future climate change.
R&D Program: ARC - Discovery **– Project code:** DP110105200

TOPIC: Biodiversity **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Putting adaptation into vegetation models: towards a predictive theory of trait diversity and stand structure*

Project leader(s): Daniel Falster; Macquarie University
Project period: 2011 - 2013
Description: By incorporating natural selection into models of vegetation, this project will help to predict what sorts of plants are found where and why. This will greatly improve the ability to predict the likely outcomes of human impacts (changing climates, increased disturbance, logging) for future vegetation and species diversity.
R&D Program: ARC - Discovery **– Project code:** DP110102086

TOPIC: Biodiversity **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The krill pump: transferring carbon across a layered ocean in a changing climate*

Project leader(s): Matthew Taylor; University of New South Wales
Project period: 2012 - 2014
Description: Krill may have an important role in temperate oceanic ecosystems, and rise to the surface to feed at dusk, competing with other zooplankton and being eaten by commercial fish species. Their response to a rapidly warming ocean is a key unknown, especially with currents off eastern Australia warming 2.5 degrees Celsius by 2100.
R&D Program: ARC - Discovery **– Project code:** DP120100728

TOPIC: Biodiversity **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Ecological function, processes, critical thresholds (resilience)
REGION: Elsewhere in Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The physiology of biome shifts and macroevolutionary change: how did Australian skinks colonise the arid zone so successfully?*

Project leader(s): Brett Goodman; University of Adelaide
Project period: 2011 - 2013
Description: This project will examine two of Australia's most diverse lizard lineages, Lerista and Ctenotus, and will identify the physiological and morphological traits that enabled them to adaptively radiate within the arid zone. It will highlight those traits likely to be adaptive for environments predicted to become widespread under climate change.
R&D Program: ARC - Discovery **– Project code:** DP110104927

TOPIC: Biodiversity

NRM RELEVANCE SCORE: ★☆☆☆☆

SUBTOPIC: Ecological function, processes, critical thresholds (resilience)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Using Arabidopsis mutants to discover the role of guard cell chloroplasts in the stomatal response to light*

Project leader(s): Susanne Von Caemmerer; Australian National University
Project period: 2011 - 2013
Description: This project will use novel molecular approaches to study how guard cells on the surface of leaves regulate plant water loss and CO2 uptake. This will provide new molecular tools for improving plant water use in agricultural species and aid process based modelling of CO2 and water exchange needed for predicting climate change.
R&D Program: ARC - Discovery **– Project code:** DP110103836

TOPIC: Biodiversity

NRM RELEVANCE SCORE: ★★★☆☆

SUBTOPIC: Disease and disease vectors

REGION: WT Cluster **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Understanding the tipping point between epidemic and endemic disease: amphibian chytridiomycosis as a model system*

Project leader(s): Ross Alford; James Cook University
Project period: 2013 - 2015
Description: The amphibian disease chytridiomycosis has caused declines and extinctions in Australian frogs; it is very sensitive to environmental conditions, and changes in climate or weather could cause outbreaks that would eliminate many more species. This project will build greater understanding as to how and when that could occur and prevent it from happening.
R&D Program: ARC - Discovery **– Project code:** DP130101635

TOPIC: Biodiversity

NRM RELEVANCE SCORE: ★★☆☆☆

SUBTOPIC: Disease and disease vectors

REGION: WT Cluster **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Improved approaches for the detection and prevention of wildlife diseases in the Torres Strait*

Project leader(s): Sue Laurance; James Cook University
Project period: 2011 - 2014
Description: This project will provide a monitoring program to detect animal-borne disease arriving in the Torres Strait and identify factors contributing to their spread. While not specifically addressing climate change, the monitoring system will provide an early warning of changes in disease vectors as a result of climate change.
www.nerptropical.edu.au/project/approaches-for-detecting-disease-and-preventing-spread-torres-strait
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 11.2

TOPIC: Biodiversity

NRM RELEVANCE SCORE: ★★☆☆☆

SUBTOPIC: Disease and disease vectors

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Avian migrants as vectors of zoonotic diseases in a changing world*

Project leader(s): Marcel Klaassen; Deakin University
Project period: 2013 - 2015
Description: There is an urgent need to understand the role of migratory birds in spreading avian influenza and other diseases. This project focuses on the effect of global change on the interactions between avian influenza and threatened waders migrating between the Arctic, Asia and Australia. This project will help us assess and manage the health risks to man and birds alike.
R&D Program: ARC - Discovery **– Project code:** DP130101935

TOPIC: Biodiversity　　　　　　　　**NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Disease and disease vectors
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Climate-driven windblown dust and flood runoff can increase marine diseases by fungal pathogens*

Project leader(s): Gustaaf Hallegraeff; University of Tasmania
Project period: 2013 - 2015
Description: Determination of the role of fungal pathogens in marine disease outbreaks, and their linkages to climate-driven dust and flood events, have important applications for coastal fisheries and the Great Barrier Reef. This project will develop molecular tools and plankton recorder protocols to detect fungal outbreaks and assess ecosystem resilience.
R&D Program: ARC - Discovery **– Project code:** DP130102725

TOPIC: Biodiversity　　　　　　　　**NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Invasive species & emergent risks
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Invasive species risks and responses in the Wet Tropics*

Project leader(s): Helen Murphy; CSIRO
Project period: 2011 - 2014
Description: This project will provide information on the potential current and future distributions of existing and emerging weed species in the Wet Tropics, and identify management strategies to reduce future weed impacts and the future cost of weed management. The project will also identify potential high-risk source areas for future weed threats to the Wet Tropics. NB: Although focused on the Wet tropics, bioclimatic modelling of weed species will apply Australia-wide.
www.nerptropical.edu.au/project/invasive-species-risks-and-responses-wet-tropics
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 7.2

TOPIC: Biodiversity　　　　　　　　**NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Invasive species & emergent risks
REGION: WT Cluster **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Pests and Pest Management - Impact of climate change*

Project leader(s): Robert Sutherst; CSIRO
Project period: - 2000
Description: The report describes the results of two case studies on impact assessments of major insect pests on horticultural industries in Australia under climate change. The two pests are the Queensland fruit fly, Bactrocera tryoni, and the light brown apple moth, Epiphyas postvittana. The report defines the relative vulnerability of the affected industries to changes in the losses and increased costs that are likely from each pest species under a changed climate. It then compares the impacts and the adaptation options for each species.
https://rirdc.infoservices.com.au/items/00-016
R&D Program: RIRDC **– Project code:** CSE-76A

TOPIC: Biodiversity　　　　　　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Invasive species & emergent risks
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Determining future invasive plant threats under climate change: a decision tool for managers*

Project leader(s): Lesley Hughes; Macquarie University
Project period: 2011 - 2013
Description: This project will provide the first comprehensive, national assessment of the risks of weeds emerging from naturalised plants. In Australia, invasive plants cost the economy at least $4 billion annually, not including the cost to terrestrial biodiversity. As many invasive species may be advantaged by climate change, this figure will increase significantly. Of the 29,000 introduced plant species in Australia, approximately 400 have become significant weeds and a further 2700 have become 'naturalised' - established self-sustaining populations in the wild. With around 15 species added to this list each year, these species represent a ticking time bomb of future weed problems.
www.nccarf.edu.au/content/determining-future-invasive-plant-threats-under-climate-change-decision-tool-managers
R&D Program: NCCARF

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Invasive species & emergent risks
REGION: Northern Australia **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *Feral cat management on Indigenous lands*

Project leader(s): Graeme Gillespie; Northern Territory Department of Land Resource Management
Project period: 2011 - 2014
Description: The project will build on existing relationships between scientists and land managers in the Djelk and Warddeken Indigenous protected areas in Arnhem Land. These IPAs overlap the western Arnhem plateau, which is a biodiversity hotspot with many unique mammals, reptiles and birds. The team will trial and asses a variety of methods to monitor the density and distribution of feral cats, and to reduce cat numbers within targeted areas. The project will also contribute to an increased understanding of cat ecology in different ecosystems, since the researchers will be able to compare the findings from the rugged sandstone plateau of the Warddeken IPA, and the lowland woodland of the Djelk environment.
www.nerpnorthern.edu.au/research/projects/42

R&D Program: NERP Northern Australia **– Project code:** NERP NA 4.2

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Invasive species & emergent risks
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Exotic Woody Weeds*

Project leader(s): Darren Kriticos; CSIRO
Project period: - 2000
Description: The report describes the results of risk assessments of Acacia nilotica and Cryptostegia grandiflora under climate change. It defines the relative vulnerability of the pastoral industries to changes in the distribution and relative abundance of each species.
https://rirdc.infoservices.com.au/items/00-06

R&D Program: RIRDC

TOPIC: Biodiversity   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Invasive species & emergent risks
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Indirect

Project Title: *Does the tolerance of weeds to herbicide change with elevated CO2?*

Project leader(s): Paul Downey; University Of Canberra
Project period: -
Description: This project will build on a pilot study to determine the tolerance of weed species to herbicide under future elevated CO_2 levels. In a glasshouse experiment we will examine the tolerance of 20 weed species (8 perennial herbaceous species, 2 annual species, 4 grasses, 4 vine species, and 2 woody species) to two herbicides (glyphosate and metsulfuron; both commonly used herbicides) at a range of concentrations (specifically above label rates) under both ambient and elevated CO_2 levels (i.e. as predicted for 2050 or 2100). In addition we will look at age and/or biomass relative to the timing of herbicide application, as there appears to be a trend for greater tolerance in old larger plants, compared with small younger ones. The project will be replicated and run across two locations (University of Canberra and Macquarie University). The results will be published in peer-reviewed literature and a series of recommendations will be developed for weed managers to help manage weeds more effectively under climate change.
http://www.rirdc.gov.au/research-project-details/custr10_WEE/PRJ-007118

R&D Program: RIRDC - National Weeds and Productivity Research Program **– Project code:** PRJ-007118

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk social systems & communities
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Climate Change and the Welfare Sector – Risk and Adaptation of Australia's Vulnerable and Marginalised*

Project leader(s): Karl Mallon; Australian Council of Social Services
Project period: 2011 -
Description: Services provided to disadvantaged individuals by community welfare service organisations and communities comprise a critical component of social infrastructure. These are the people who are least resilient to adverse changes in circumstance, and will be affected first and worst by climate change impacts to infrastructure and the built environment. This project will research the sectors in society most vulnerable and least able to adapt to climate change in urban, regional and remote settlements, the nature of these vulnerabilities, the underlying causes of vulnerability and the measures that can be taken to increase adaptive capacity and manage climate change related risks of infrastructure failure.

www.nccarf.edu.au/content/climate-change-community-welfare-risks-and-adaptation

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: At-risk social systems & communities
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Australia's country towns 2050: what will a climate adapted settlement pattern look like?*

Project leader(s): Andrew Beer; Flinders University
Project period: 2011 -
Description: The project will test the hypothesis that many inland rural and remote communities are vulnerable to the impacts of climate change and that this vulnerability varies by location, industry structure, environment, and remoteness. It will assess whether public sector and community planning and action can reduce the impacts of climate change on the sustainability of settlements and whether some forms of intervention will be more effective than others.

www.nccarf.edu.au/content/australias-country-towns-2050-what-will-climate-adapted-settlement-pattern-look

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk social systems & communities
REGION: East Coast Catchments **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Linking social science and ecology to understand the vulnerability of coastal societies to changes in coral reef resources*

Project leader(s): Joshua Cinner; James Cook University
Project period: 2011 - 2013
Description: This project will examine how vulnerable communities in Australia and across the Indo-Pacific are to the impacts of climate change on coral reefs. Key outcomes will include: vulnerability assessments in 30 communities, new insights into the conditions that foster adaptations that erode reef resilience; and research training for three PhD students.

R&D Program: ARC - Discovery **– Project code:** DP110101540

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: At-risk social systems & communities
REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Naïve island landscapes: people and environmental change in tropical sclerophyll landscapes*

Project leader(s): Sean Ulm; James Cook University
Project period: 2012 - 2014
Description: A detailed history of how people in tropical island environments have managed environmental change will be produced for the South Wellesley Archipelago in the Gulf of Carpentaria. The outcomes will provide new insights into the dynamic relationship between people and environment during periods of climate change.

R&D Program: ARC - Discovery **– Project code:** DP120103179

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: At-risk social systems & communities
REGION: Elsewhere in Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Extreme heat and climate change: adaptation in culturally and linguistically diverse communities*

Project leader(s): Peng Bi; University of Adelaide
Project period: 2011 -
Description: Do cultural, socio economic and language factors affect a person's vulnerability to climate change? This project will study culturally diverse communities in three Australian cities: Adelaide, Melbourne and Sydney to identify factors that may affect people's vulnerability to climate change, and particularly hot weather. It will identify groups of people that may be more vulnerable, explore the behaviour they use to adapt to extreme heat, and their perceptions of climate change and recommend ways to increase their capacity to adapt, such as cross cultural information materials.
www.nccarf.edu.au/content/extreme-heat-and-climate-change-adaptation-culturally-and-linguistically-diverse-cald
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Changes to Country and Culture, Changes to Climate: strengthening institutions for Indigenous resilience and adaptation*

Project leader(s): Jessica Weir; Australian Institute of Aboriginal and Torres Strait Islander Studies ()
Project period: 2011 -
Description: This project will seek to understand the barriers to and enablers of Registered Native Title Bodies Corporate to facilitate community driven adaptation on native title lands, and to develop best practice for participatory climate change decision making.
www.nccarf.edu.au/content/changes-country-and-culture-changes-climate-strengthening-institutions-indigenous-resilience
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Climate Change Indigenous Opportunities Framework*

Project leader(s): Catherine Robinson; CSIRO
Project period: 0 -
Description: The project is linked to and builds on close collaborations established with the National Indigenous Climate Change Working Group and will involve Indigenous communities based at two pilot projects in the Kimberley and Murray Lower Darling region. The Opportunities Framework will 1) apply scenarios methods to enable Indigenous communities in each pilot project to articulate opportunities they wish to pursue in response to Australia's climate change mitigation and market strategies and 2) conduct a rapid appraisal approach to collaboratively identify types of economic, environmental, institutional and contextual attributes that enable or challenge Indigenous communities to capitalise on such opportunities.
www.rirdc.gov.au/research-project-details/custr10_DRC/PRJ-005438
R&D Program: RIRDC - Dynamic Rural Communities **– Project code:** PRJ-005438

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Future change in ancient worlds: Indigenous adaptation in Northern Australia*

Project leader(s): Steve Larkin; Charles Darwin University
Project period: 2012 -
Description: Northern Australia is likely to experience more frequent and intense extreme weather events as a consequence of climate change. Threats to biodiversity and changes to temperatures and seasons may impact heavily on Indigenous communities. Decisions about how to support Indigenous communities to adapt to, and reduce risks from, climate change must be informed by greater understanding of current capacity. The project will provide understanding of how Indigenous communities view change and risk, how they may be vulnerable or resilient, and how they have coped with past and ongoing environmental changes such as heatwaves, storm surges, cyclones, floods, sea level rise, drought and biodiversity loss.
www.nccarf.edu.au/content/future-change-ancient-worlds-indigenous-adaptation-northern-australia
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Learning from the past, adapting in the future: identifying pathways to successful adaptation in Indigenous communities*

Project leader(s): Meg Parsons; University of Melbourne
Project period: 2012 -
Description: This project will examine how Indigenous individuals, households, communities, business, and institutions perceive and respond to climate variability and extreme weather events, and explore the importance of climate change relative to other risks Indigenous communities face. It will identify entry points for developing and implementing equitable, efficient and appropriate climate change adaptation plans and policies for Australian Indigenous communities. Using case studies and a systematic review of experiences from across Australia and internationally, it will produce information to assist Indigenous communities and decision-makers develop community-level adaptation strategies, and suggest strategies to enhance adaptive capacity within the communities.
www.nccarf.edu.au/content/learning-past-adapting-future-identifying-pathways-successful-adaptation-indigenous

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Understanding how the use of intertidal marine resources by Indigenous women in the Northern Territory will be affected by climate change, and their preferred adaptation options*

Project leader(s): Ann Fleming; Northern Territory Department of Resources
Project period: 2012 -
Description: 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.
www.nccarf.edu.au/content/understanding-how-use-intertidal-marine-resources-indigenous-women-northern-territory-will

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Queensland **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Understanding urban and peri-urban Indigenous people's vulnerability and adaptive capacity to climate change*

Project leader(s): Daryl Low Choy; Griffith University
Project period: 2012 -
Description: The challenges facing coastal communities in Australia are potentially immense, and while community and stakeholders generally accept that change is occurring, the degree of change remains disputed, and the visual picture of what settlements might have to adapt to and address is unclear. Using case study areas in Queensland, South Australia and Victoria, this project will investigate the long-accumulated knowledge of Australia's Indigenous community regarding the challenges of climate change for coastal communities.
www.nccarf.edu.au/content/understanding-urban-and-peri-urban-indigenous-peoples-vulnerability-and-adaptive-capacity

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Northern Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Historical Case Studies: Adaptation lessons from Cyclone Tracy Part II – the institutional response and Indigenous experience of Cyclone Tracy*

Project leader(s): Katharine Haynes; Macquarie University
Project period: 2012 -
Description: The project will document how indigenous people in and around Darwin were impacted by, responded to, and recovered from Cyclone Tracy in 1974. Through a combination of qualitative interviews and quantitative population data analysis, the project aims to determine whether Indigenous communities in the Darwin area are now more or less vulnerable to cyclones than they were in 1974.

www.nccarf.edu.au/content/historical-case-studies-adaptation-lessons-cyclone-tracy-part-ii-%E2%80%93-institutional-response

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Climate change in the abandonment of islands: a high-resolution case study from the tropical Pacific*

Project leader(s): Geoffrey Clark; Australian National University
Project period: 2012 - 2014
Description: Climate change in the last 1000 years is thought to have had negative environmental and societal consequences in the Pacific, particularly in Palau through the occupation and abandonment of limestone islands. This project uses high- resolution data to establish the palaeoclimate and the cultural mechanisms used to cope with climate events.
R&D Program: ARC - Discovery **– Project code:** DP120103202

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Indigenous people, communities & cultural sites
REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Earth mounds in Northern Australia: archaeological and environmental archives of the mid to late holocene*

Project leader(s): Celia Brockwell; Australian National University
Project period: 2012 - 2014
Description: Earth mounds, created and occupied by humans, are a common feature of Australia's northern coastal plains. They can offer unique insights into the formation of this recent landscape, and shed light on climatic and environmental change, and human/environmental interaction. This study will provide important new data for climate change models.
R&D Program: ARC - Discovery **– Project code:** DP120100512

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Well-being & resilience
REGION: WT Cluster **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Building resilient communities for Torres Strait futures*

Project leader(s): James Butler; CSIRO
Project period: 2011 - 2014
Description: This project will develop scenarios to meet the aspirations of the Torres Strait communities taking climate change into account.

www.nerptropical.edu.au/project/building-resilient-torres-strait-communities

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 11.1

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Well-being & resilience
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Dengue transmission under climate change in Northern Australia: linking ecological and population based models to develop adaptive strategies*

Project leader(s): David Harley; Australian National University
Project period: 2011 -
Description: The health impact of the mosquito-borne dengue fever virus in Australia is increasing. Epidemics have become more frequent in North Queensland with more than 1000 cases and one death in the most recent epidemic. This project will develop a model of the relationship between climate, other determinants, and dengue for Australia. This will enable health authorities to estimate the impact of impending climate change on total dengue disease burden, the geographic range of dengue, and health system impacts including the availability of donor blood supply. These estimates will enable the development of adaptive strategies to reduce future disease risks and burden.
www.nccarf.edu.au/content/dengue-transmission-under-climate-change-northern-australia-linking-ecological-and

R&D Program: NCCARF, NHMRC

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Well-being & resilience
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Historical Case Studies: The 2008 floods in Queensland: A case study of vulnerability, resilience and adaptive capacity*

Project leader(s): Armando Apan; University of Southern Queensland
Project period: 2012 -
Description: A warmer climate, with its increased climate variability, will increase the risk of floods, and the accompanying damage to people, property, and the environment. Focusing on two flood events in Mackay and Charleville in 2008, this study aims to enhance understanding of the vulnerability, resilience and adaptive capacity of people and communities to flooding, and to assess the extent to which flood mitigation measures have been implemented. It will explore how societies that are regularly flooded operate and the characteristics of their resilience or non-resilience, as well as the characteristics of communities that are 'on the edge', where flooding might push them into non-viability. The findings will provide information, knowledge and insights on how various stakeholders can better respond and adapt to flood events.
www.nccarf.edu.au/content/historical-case-studies-2008-floods-queensland-case-study-vulnerability-resilience-and

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Well-being & resilience
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *A spatial vulnerability analysis of urban populations to extreme heat events in Australian capital cities*

Project leader(s): Margaret Loughnan; Monash University; Nigel Tapper; Monash University
Project period: - 2013
Description: This study will identify threshold weather conditions for mortality in Australian capital cities, describe spatial distribution of human vulnerability to extreme heat, and provide information to target emergency responses during heat waves. Baseline risk assessments will be used to predict changes in vulnerability in relation to predicted changes in climate extremes associated with climate change.
www.nccarf.edu.au/content/spatial-vulnerability-analysis-urban-populations-extreme-heat-events-australian-capital

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements
SUBTOPIC: Well-being & resilience
REGION: Australia-wide **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★★★★☆

Project Title: *Climate change adaptation - building community and industry knowledge*

Project leader(s): Jenny Shaw; Western Australia Marine Science Institution
Project period: 2013 -
Description: This project will increase knowledge and understanding of likely climate change and adaptation measures open to local communities. It will support a case study for Australia in adaptive management that cross-correlates regional needs with Australia-wide management policies. Key climate change information will be synthesised, analysed and adapted for marine biodiversity and fisheries businesses, and extension and knowledge sharing activities tailored for regional needs.

www.nccarf.edu.au/content/building-community-industry-knowledge

R&D Program: FRDC, DCCEE **– Project code:** FRDC 2011/503

TOPIC: Communities & organisational arrangements
SUBTOPIC: Well-being & resilience
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★★★★☆

Project Title: *Climate change and rural communities: Integrated study of physical and social impacts, health risks and adaptive options*

Project leader(s): Anthony McMichael; Australian National University
Project period: 2010 -
Description: Rural Australia has begun to experience climate change impacts, which will increase in future. Losses in farm yields, water supplies, property, community morale and family incomes have diverse health effects. This project will study the separate and joint effects of climate change and associated extreme events such as bushfires on selected health outcomes. Using integrative methods, it will clarify the main influences on health risks, their future projections, and how best to intervene to lessen risks.

www.nccarf.edu.au/content/climate-change-and-rural-communities-integrated-study-physical-and-social-impacts-health

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements
SUBTOPIC: Well-being & resilience
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★★★★☆

Project Title: *Climate change impacts on workplace heat extremes: health risk estimates and adaptive options*

Project leader(s): Elizabeth Hanna; Australian National University
Project period: 2011 -
Description: Despite its hot climate, Australia has no national guidelines to protect people who work in the heat. This represents an existing health challenge that will be significantly exacerbated as Australia warms within the projected range of 2-4oC by 2070. A policy vacuum exists as we have little understanding about the thermal working environment for Australians. Evidence is lacking about direct heat exposures, worker tolerance levels, early symptoms, the adoption of personal and industry strategies, and which of these are effective in averting heat stress. This innovative project aims to fill that knowledge gap by studying the current effects on health and productivity of heat-exposed workers, and modelling future trends in likely impacts under climate change in eight urban and rural regions, with and without adaptive health protection strategies.

www.nccarf.edu.au/content/climate-change-impacts-workplace-heat-extremes-health-risk-estimates-and-adaptive-options

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Well-being & resilience
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Health impacts of climate change on Indigenous Australians: identifying climate thresholds to enable the development of informed adaptation strategies*

Project leader(s): Donna Green; University of New South Wales
Project period: 0 -
Description: This project will provide decision-makers with clear, robust, policy-relevant evidence that identifies the connections between climate and the health and well-being of Indigenous people in Australia's tropical north. This project is the first major comparative study to test the hypothesis that Indigenous people are likely to be disproportionately vulnerable to the future health impacts of climate change. Overall, the research will better enable policy- makers to develop effective adaptation strategies to increase the resilience of Indigenous Australians, in both urban and remote communities, to the health impacts of climate change.
www.nccarf.edu.au/content/health-impacts-climate-change-indigenous-australians-identifying-climate-thresholds-enable

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Well-being & resilience
REGION: Australia-wide **FORMAT:** Indicators **PLANNING RELEVANCE:** Direct

Project Title: *Community Wellbeing Indicators: Measures for local government*

Project leader(s): Alan Morton and Lorell Edwards; Moreton Consulting Services Pty Ltd.
Project period: 2011 - 2012
Description: Indicators designed for local government to: (1) measure community wellbeing; (2) track changes over time in community wellbeing; (3) benchmark performance against results from comparative surveys across the State; and (4) identify policy measures that can improve community outcomes.
www.acelg.org.au/downloadUpdate.php?docId=206

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Well-being & resilience
REGION: Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Projection of the impact of climate change on the transmission of Ross River virus disease*

Project leader(s): Shilu Tong; Queensland University of Technology
Project period: 0 -
Description: Human pathogens transmitted by mosquitoes pose a significant threat to population health. Ross River virus (RRV) is Australia's most common and wide-spread mosquito-borne disease, with more than 4000 clinical cases reported each year. Although there have been a number of studies of the relation between climate variability and RRV, no research has examined the possible impact of future climate change on this disease. This study aims to establish baseline relations between climate variables and RRV at a local government area level across Queensland, determine the impact of projected temperature, humidity and rainfall changes on the transmission of RRV in each area; and use the projected impacts to align climate change and public health policies for surveillance and management.
www.nccarf.edu.au/content/projection-impact-climate-change-transmission-ross-river-virus-disease

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Well-being & resilience
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Systems thinking: Adapt between the flags – enhancing the capacity of Surf Life Saving Australia to cope with climate change and to leverage adaptation within local communities*

Project leader(s): Marcello Sano; Griffith University
Project period: 2012 -
Description: 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.
www.nccarf.edu.au/content/systems-thinking-adapt-between-flags-%E2%80%93-enhancing-capacity-surf-life-saving-australia-cope

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Well-being & resilience
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Enhancing the adaptive capacity of small-to-medium enterprises to climate change and variability*

Project leader(s): Natasha Kuruppu; University of Technology Sydney
Project period: - 2013
Description: Small-to-Medium Enterprises (SMEs) comprise 96 per cent of all private businesses in Australia and are the largest employers and the largest contributors to GDP. The capacity of SMEs to adapt to climate change and variability will be vital to the resilience of communities, government agencies and other sectors. Climate change may result in business interruptions, increased investment or insurance costs and declining financial value, return and growth. SMEs face greater short-term losses after natural disaster and may have lower adaptive capacity than larger businesses. This research aims to identify the extent to which SMEs consider and integrate adaptation into business planning; key barriers and opportunities to adaptation for SME in different sectors, and strategies to adopt in anticipation of climate change

www.nccarf.edu.au/content/enhancing-adaptive-capacity-small-medium-enterprises-smes-climate-change-and-variability

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Well-being & resilience
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *Achieving biodiversity conservation and ecosystem service delivery: the role of landscape structure*

Project leader(s): Jonathan Rhodes; University of Queensland
Project period: 2013 - 2015
Description: Achieving gains for human well-being and, at the same time, conserving biodiversity is the ultimate challenge for conservation policy. This project will develop new understandings and new methods to address this issue, with important impacts on the effectiveness of strategies to conserve biodiversity.
R&D Program: ARC - Discovery **– Project code:** DP130100218

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Well-being & resilience
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *A Framework for Adaptation of Australian Households to Heat Waves*

Project leader(s): Wasim Saman; University of South Australia
Project period: 2011 -
Description: What is the likely impact of heat waves on Australian homes and on the electricity infrastructure in Australia's various climate regions? This project will plan for a national framework that would: develop new summer design conditions for 2030 and 2050 for up to 100 Australian climate zones; establish new thermal comfort criteria for buildings; evaluate the impact of climate change on annual household cooling energy use and peak power demand; examine householder behaviour during heat waves; develop design options to ensure safety and comfort during heat waves, and develop affordable new design options for buildings to avoid heat stress.

www.nccarf.edu.au/content/framework-adaptation-australian-households-heat-waves

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Well-being & resilience
REGION: Elsewhere in Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Investigating factors that inhibit and enable adaptation strategies following the 2010/11 floods*

Project leader(s): David King; James Cook University
Project period: - 2013
Description: This project will identify the factors that inhibit and enable adaptation strategies within communities by explore issues of underlying vulnerability and constraints to recovery as well as adaptation and risk reduction strategies. It will focus on case study sites in Emerald, Qld, suburbs of Brisbane, and Donald in Victoria, all of which suffered severe loss from flooding in the summer of 2010/11.

www.nccarf.edu.au/content/adaptation-built-environment-climate-change-induced-increased-intensity-natural-hazards

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Well-being & resilience

REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Learning from regional climate analogues*

Project leader(s): Jon Kellett; University of South Australia

Project period: 2012 -

Description: This project explores the potential of learning from experience for selected target cities by studying cities that currently experience climate conditions similar to those predicted for the target cities. It focuses on developing relationships between paired climate target /climate analogue locations to share experiences and knowledge.

www.nccarf.edu.au/content/learning-regional-climate-analogues-0

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Well-being & resilience

REGION: Elsewhere in Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Assisting rural communities in South Australia adapt to the health challenges of increasing temperatures and climate change*

Project leader(s): Peng Bi; University of Adelaide

Project period: 2012 - 2014

Description: This study will investigate the effects of extreme heat, increasing temperatures and consequences of climate change, on the population health of rural communities in South Australia. Findings will inform adaptation strategies to prevent an increase in heat-associated and climate change-associated morbidity and mortality in rural areas.

R&D Program: ARC - Discovery **– Project code:** DP120101983

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Well-being & resilience

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *From science to policy: quantifying and managing the risk of mosquito borne disease in the context of climate change*

Project leader(s): Shilu Tong; Queensland University of Technology

Project period: 2011 - 2013

Description: It is important to assess and manage the health risks of climate change. This research will create fundamental knowledge and practical skills on the interdisciplinary assessment and management of health risks of climate change, and explore policy ramifications of research outcomes in this study.

R&D Program: ARC - Discovery **– Project code:** DP110100651

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Well-being & resilience

REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Marginal

Project Title: *Changing heat: direct impacts of temperature on health and productivity - current risks and climate change projections*

Project leader(s): Keith Dear; Australian National University

Project period: 2012 -

Description: We know that heat waves kill people. Some 50,000 died in the 2003 European heatwave, but little is known of the details. This project will discover three important dimensions of those details: who is at risk and where do they live; how are people at risk, for example from kidney failure; and just what is it about heat that is most dangerous? Mathematical models will be developed of the future risks, and explore what public health measures will best protect Australians in a warming climate.

www.nccarf.edu.au/content/changing-heat-direct-impacts-temperature-health-and-productivity-current-risks-and-climate

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Well-being & resilience
REGION: General/Global **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Marginal

Project Title: *Agent based simulation framework for improved understanding and enhancement of community and organisational resilience to extreme events*

Project leader(s): Lin Padgham; RMIT University
Project period: 2012 -
Description: Agent-based modelling is a means of analysing systems by simulating the actions and interactions of the individual elements or 'agents' they comprise. This project aims to develop an agent-based simulation platform that allows emergency management stakeholders to explore complex multi-scale, multi-actor, emergency management interactions under uncertain future conditions in order to promote more effective governance arrangements. The platform is also intended to be a long term decision support tool suitable for the development of agent-based simulations which address a range of extreme events, such as coastal flooding and heat stress.
www.nccarf.edu.au/content/agent-based-simulation-framework

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Well-being & resilience
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Displaced twice? Investigating the impact of Queensland floods on the wellbeing and settlement of a cohort of men from refugee backgrounds living in Brisbane and Toowoomba*

Project leader(s): Ignacio Correa-Velez; La Trobe University
Project period: 2011 -
Description: This is a 2-year longitudinal descriptive study that uses a peer interviewer model and a mixed method approach. It builds on the success of the SettleMEN project which achieved a retention rate of 90%. An annual survey will be administered to participants over two years employing the same standardised instruments used in the SettleMEN study. Additional tools will be used to assess participants' exposure and adaptive capacity to the floods. Two focus groups will be conducted annually (n=12 each group) to assess in more detail participants' longer-term settlement and their perspectives of vulnerability and adaptive capacity to environmental disasters. Mixed effect models (GEE) will be used to analyse the quantitative data. Thematic and content analysis will guide the interpretation of the qualitative data. The study will generate evidence based knowledge of those elements and resources that best support refugee men's longer-term settlement and their capacity to adapt successfully to extreme weather disasters.
www.nccarf.edu.au/content/displaced-twice-investigating-impact-queensland-floods-wellbeing-and-settlement-cohort-men

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Well-being & resilience
REGION: Elsewhere in Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Heat-ready: Adapting aged care facilities to prevent premature death in elderly Australians*

Project leader(s): Deborah Black; University of Sydney
Project period: 2011 -
Description: The project will investigate the capacity of aged care facilities to adapt to increasing periods of extreme heat. It will examine policies, procedures, knowledge and environmental factors such as building design and cooling equipment used in aged care facilities in three Australian states and recommend ways they can adapt to prevent premature death from extreme heat in elderly residents.
www.nccarf.edu.au/content/heat-ready-adapting-aged-care-facilities-prevent-premature-death-elderly-australians

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Livelihoods & culture
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Relative social and economic values of residents and tourists in the WTWHA*

Project leader(s): Natalie Stoeckl; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on community values of, and income generated by, the Wet Tropics World Heritage Area based on surveys of residents and tourists. It assesses how they value environmental features (e.g. key species, habitats) and perceive threats (e.g. weeds) as well as how these contribute to tourism and fishing operations. It elicits community perception of changes, their responses to possible population, environmental and climate changes, their capacity to cope with change, and the financial implication of change. It uses these responses to identify community priorities for conservation efforts.

www.nerptropical.edu.au/project/wet-tropics-residents-and-tourists-social-and-economic-values

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 12.3

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Livelihoods & culture
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Socio-economic system and reef resilience*

Project leader(s): Natalie Stoeckl; James Cook University
Project period: 2011 - 2014
Description: This project will provide baseline information on community values of, and income generated by, the Great Barrier Reef. It assesses how locals and visitors to the region value environmental features (e.g. key species, wetlands, mangroves & reefs) as well as how these contribute to land and sea based tourism and fishing operations. It establish baseline information about the region's climate and water quality based on historical records, and elicits community perception of changes, their responses to predicted changes, their capacity to cope with change, and the financial implication of change. It uses these responses to identify community priorities for conservation efforts.

www.nerptropical.edu.au/project/socio-economic-systems-and-reef-resilience

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 10.2

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: Australia-wide **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Decision making in rural communities in relation to climate change*

Project leader(s): Helen Berry & Anthony Hogan; CSIRO
Project period: - 2011
Description: This RIRDC paper reports on a study of 4,000 Australian farmers. It examines factors that are associated with decisions they may or may not make to adapt to risks posed by climate change. The report reveals that a majority of farmers are simply focusing on surviving in the short term in the face of a myriad of challenges which go well beyond climate. It is evident that a large number of these farmers have identified the fact that they are not financially viable in the face of current climate challenges. Such a conclusion raises many challenges for both farmers and policy makers. Perhaps resilience, once regarded as a key attribute of the Australian farmer, needs to be set aside. In some parts of Australia, it is being realised that certain types of farming are no longer viable in the face of climate change, irrespective of how resilient our farmers are. In facilitating groups of farmers moving on from existing practices, policy makers will need to develop trans-sectoral, community focused solutions which address the many complexities which will arise. As farmers come off exceptional circumstances assistance, drought, climate, natural resource management and community service policy makers will need to work closely together to address the myriad of issues that will arise from this substantial process of social change. Many famers will have little if any equity left with which to rebuild their farms.

https://rirdc.infoservices.com.au/items/10-208

R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-004546

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Socio-economic tools to support biodiversity planning*

Project leader(s): Romy Greiner; Charles Darwin University; Socio-economic tools to support biodiversity planning;
Project period: 2011 - 2014
Description: This research aims to contribute to: • An improved understanding of pastoralists' enterprise decisions, attitudes and preferences. • A clearer understanding of the pastoral industry's position on on-farm conservation services. • Investment opportunities for government and the corporate and philanthropic sectors. • In the long term, a national reserve system for northern Australia that is successfully complemented by strategic on-farm biodiversity conservation programs.

www.nerpnorthern.edu.au/research/projects/12

R&D Program: NERP Northern Australia **– Project code:** NERP NA 1.2

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: North Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Understanding producers' change to more sustainable grazing practices in the tropical savanna rangelands of North Queensland*

Project leader(s): Ally Lankaster; CSIRO
Project period: 2008 - 2012
Description: The research found that beef producers' self-identity showed signs of more and less 'traditional' characteristics. Producers' described a range of more or less 'traditional' roles in their everyday life. Traditional cultural norms and values, such as gender expectations of roles, appear to still be a strong influence on producers' self-perceptions. Producers who also identified with 'less traditional' roles in life, such as 'resource condition monitor' and 'workshop participant', had a desire to re-label themselves to less production-oriented titles and were involved in equal decision-making with their partner in relation to the business and natural resource management. Results also revealed that beef producers with a long, ancestral and lived connection with the family property had a strong place attachment. This attachment was based on feeling a strong sense of belonging to the property and/or being attracted to lifestyle, occupational and business innovation aspects of the operation. Results of the research further revealed that, the less traditional were beef producers' sense of place and self-perceptions, the more likely they were to favour beliefs aligned with sustainability. Producers who identified with 'less traditional' roles and domestic and administrative roles were likely to favour beliefs that supported nature conservation, learning and/or adapting to change. Producers who identified strongly with domestic, administration and labouring roles were likely to be worried about adverse climatic and economic changes. Producers who felt a strong sense of belonging to the property and who were attracted to the business side of the operation were more likely to have an interest in learning and adapting to change than producers attached to the lifestyle and occupation of cattle grazing.

www.mla.com.au/Research-and-development/Final-report-details?projectid=15375

R&D Program: MLA

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Climate Champion Strategy 2010*

Project leader(s): Meat & Livestock Australia
Project period: 2010 - 2010
Description: Climate Champion participants have been involved in creating strategic links with local and national growers groups, Landcare and catchment groups, researchers, government departments and other initiatives. This has involved writing, reviewing, providing feedback, speaking, organising and networking for these groups and associations. Econnect has developed a national database of climate experts for the participants to contact if they have questions or need information or research for their speaking engagements. Participants have been willing and active participants in national and international conferences on climate, climate adaptation, growing and farming and general industry. They have also organised and spoken at workshops, field and demonstration days and field trials. Participants write for newsletters, magazines, newspapers and other groups, and are accordingly published in media as well. There have been well over 100 articles or radio/TV spots that mention Climate Champion participants and/or the program. Many of these have been long-length features and profiles, or descriptions of practices from their farms. Industry magazines have gone so far as to commission monthly articles on the program and its participants. As well, the Econnect team have been profiling participants for inclusion on the Climate Kelpie website – 30 out of 34 profiles (including transcripts, photos, audio and video) have been collected. As well as the MLA-sponsored participants, many other participants are mixed farmers who produce livestock, which would resonate with many MLA members. Many participants have been nominated by industry or government departments for awards, scholarships, prizes and leadership recognition. NGO awards have also been awarded to participants for work on their farms and in their

communities. The participants and the Econnect team keep in touch via a specially designed communication network (referred to as 'Ning'), where updates on activities, media, events and general news are shared.

www.mla.com.au/Research-and-development/Final-report-details?projectid=15273

R&D Program: MLA

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Climate Witness: A dispersed national observer network for NRM phenology (ClimateWatch)*

Project leader(s): Andy Donnelly; Earthwatch Institute
Project period: - 2011
Description: This RIRDC report overviews the first three years work of a project that sets out to understand how best to develop a network of citizens, scientists and information specialists capable of supporting climate change science in Australia. The report targets government departments and other sectors interested in the costs and benefits of engaging citizens in issues that require meaningful science. It provides the basis for a case study in how increasingly available internet-based technologies can be used to facilitate a relationship and interaction between scientists and the community.

https://rirdc.infoservices.com.au/items/11-048

R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-005449

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

Project Title: *Exploring the adaptive capacity of emergency management using agent-based modelling*

Project leader(s): Lin Padgham; RMIT University
Project period: 2012 -
Description: Little is known about how societies, organisations and individuals are responding or might respond to the challenges of climate changes. This project uses agent-based modelling that combines social science research and technical computing to explore a range of potential future scenarios at a scale that is not possible without computer support. It provides the opportunity for a wide variety of stakeholders to work together with the community using a practical tool to determine solutions to evolving changing climate impacts.

www.nccarf.edu.au/content/adaptive-capacity-emergency-management-using-agent-based-modelling

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *A climate change adaptation blueprint for coastal regional communities*

Project leader(s): Stewart Frusher; University of Tasmania; Nadine Marshall; CSIRO
Project period: 2010 -
Description: The aim of this project is to develop a 'blueprint' for a tool that provides the relevant information to reduce risks and increase the capacity of coastal regional communities to cope with, and where possible, benefit from climate change. Using community case study sites in south eastern, western and northern Australia, researchers will develop and trial a 'blueprint' that integrates a suite of adaptation assessment and evaluation tools to provide the best choice of marine adaptation options.

www.nccarf.edu.au/research/search?field_thematic_research_narp=&search_api_views_fulltext=&search_api_views_fulltext_1=Stewart+Frusher&search_api_views_fulltext_3=&field_thematic_area_tag=All&field_state_select=All&search_api_views_fulltext_2=

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *An assessment of the nature and utility of adaptive capacity research*

Project leader(s): Tim Smith; University of the Sunshine Coast
Project period: 2012 -
Description: Vulnerability to climate change is described as 'a function of exposure, sensitivity, and adaptive capacity'. The science, however, has been dominated by research on exposure. There has been a recent increase in studies on adaptive capacity, yet there has been no assessment of the nature of adaptive capacity research, or on its utility for decision-making. This project will assess the interpretation and approach to adaptive capacity research in

different disciplines, and assess the utility of the concept for decision-making and make recommendations to improve synergies between climate change adaptation researchers and decision makers. The project will actively involve stake holders through interviews and an online survey.

www.nccarf.edu.au/content/assessment-nature-and-utility-adaptive-capacity-research-0

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Collective self-regulation: the case of climate change mitigation*

Project leader(s): Yoshihisa Kashima; University of Melbourne
Project period: 2013 - 2015
Description: Solutions to contemporary societal problems such as climate change mitigation require cultural transformations, namely, widespread changes in the ideas and practices of community members. This project will examine how people may achieve this in part by regulating their own temptations and actions for the good of the community.
R&D Program: ARC - Discovery **– Project code:** DP130102229

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *What makes a climate leader? Developed countries' responsibilities under the international climate regime*

Project leader(s): Robyn Eckersley; University of Melbourne
Project period: 2011 - 2013
Description: This project seeks to elucidate the conditions and possibilities for climate leadership by developed states under the international climate regime. The project will generate insights into how and why climate leaders emerge, how they manage domestic and international political demands, and the conditions under which climate leadership is possible.
R&D Program: ARC - Discovery **– Project code:** DP110100669

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Capacities, capabilities, interests & aspirations
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Frontiers of Australian science popularisation*

Project leader(s): Joan Leach; University of Queensland
Project period: 2013 - 2015
Description: This project details Australia's role in science popularisation in the 1960s and 1970s, when the boundary between science fiction and science fact was often blurred. The project will explore how popular science of that era framed today's crucial issues of climate change, overpopulation and space exploration.
R&D Program: ARC - Discovery **– Project code:** DP130100623

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Motivations & barriers to adaptation
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Barriers to Effective Climate Change*

Project leader(s): Productivity Commission
Project period: 2011 - 2012
Description: Identifies regulatory and policy barriers to effective climate change adaptation and identify high-priority reforms to address these barriers. Examine the benefits and costs of a range of market and non-market policy options (including maintaining the status quo), and to take into account the relevant policies of all levels of government and the work on climate change adaptation undertaken through the Council of Australian Governments.

www.pc.gov.au/projects/inquiry/climate-change-adaptation

R&D Program: Productivity Commission **– Project code:** PRODCOM-414-9

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Motivations & barriers to adaptation
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Limits to Climate Change Adaptation for Two Low-Lying Communities in the Torres Strait*

Project leader(s): Scott Smithers; James Cook University
Project period: - 2011
Description: This report contributes to the understanding of the social and cultural limits to adaptation for small island communities in Torres Strait and elsewhere, elicited through interviews and focus groups with key stakeholders within the selected island communities. It seeks to better understand and define the adaptation strategies that communities and community members in the Torres Strait consider to be appropriate, what resources and required, and how and when particular adaptation strategies might be effective or otherwise. Thus the project provides new and necessary information required to guide culturally appropriate adaptation planning and responses for these communities in the future.

www.nccarf.edu.au/publications/limits-adaptation-low-lying-communities-torres-strait

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Communication: Enhancing climate change communication: Strategies for profiling and targeting Australian interpretive communities*

Project leader(s): Donald Hine; University of New England
Project period: 2012 -
Description: Surveys indicate that Australians differ in their understanding of, and response to, climate change threats. Effective climate change communication must take these differences into account, and tailor messages to specific audiences. This project will identify how people from different groups and sectors of Australian society respond to different types of messages, to enable communications about climate change adaptation to be better designed and targeted.

www.nccarf.edu.au/content/communication-enhancing-climate-change-communication-strategies-profiling-and-targeting

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Public understandings, risk perceptions, and responses to climate change and associated natural disasters*

Project leader(s): Joseph Reser; Griffith University
Project period: - 2012
Description: This project aims to: examine public understandings, risk perceptions, concerns, and adaptations to climate change and natural disasters in Australia and to identify ways in which public understandings and responses to the threat and impacts of climate change differ across population sub-groups defined in terms of gender, age, urban/peri-urban/rural residence, and other demographic considerations. It will provide a baseline from which the nature and direction of changes in community perceptions can be examined over time.

www.nccarf.edu.au/content/public-understandings-risk-perceptions-and-responses-climate-change-and-associated-natural

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Recovery from disaster experience: its effect on perceptions of climate change risk and on adaptive behaviours to prevent, prepare, and respond to future climate contingencies*

Project leader(s): Helen Boon; James Cook University
Project period: - 2012
Description: This project aims to identify private and public sector groups' beliefs, behaviours and policies that have supported community resilience to a disaster event and construct a model with findings to help implement appropriate and equitable emergency management policies and mitigation strategies for climate change events.

www.nccarf.edu.au/content/recovery-disaster-experience-its-effect-perceptions-climate-change-risk-and-adaptive

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *What about me? Factors affecting individual adaptive coping capacity across different population groups*

Project leader(s): Kerrie Unsworth; University of Western Australia
Project period: 2011 -
Description: As the scientific evidence for climate change becomes more convincing, the public appears to show a paradoxical decline in interest and recognition of the problem. Little research has examined how people adapt to climate change information and initiatives. The project will examine how individual values, beliefs and goals affect adaptive coping goals and behaviours. It will examine positive climate change adaptation behaviour and those that may have other negative impacts.
www.nccarf.edu.au/content/what-about-me-factors-affecting-individual-adaptive-coping-capacity-across-different
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Limits to climate change adaptation in the Great Barrier Reef: Scoping ecological, institutional and economic limits*

Project leader(s): Louisa Evans; James Cook University
Project period: - 2011
Description: This report looks at current and future climate change impacts on the Great Barrier Reef. It studies the perceptions of key stakeholder groups of potential outcomes, in order to better understand the motivations and capacities underlying adaptation action in the region.
www.nccarf.edu.au/publications/limits-adaptation-great-barrier-reef
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Changing Perceptions about Climate Change*

Project leader(s): Joseph Reser; Griffith University
Project period: 2011 -
Description: The research addresses diverse psychological considerations posed by climate change, with a focus on how the Australian public perceives and understands the threat of climate change, and how these considerations can be best addressed in terms of policies and risk communication strategies.
www.nccarf.edu.au/content/changing-perceptions-about-climate-change
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Indirect

Project Title: *Uncertainty I: Understanding end-user decisions and the value of climate information under the risks and uncertainties of future climates*

Project leader(s): Alan Randall; University of Sydney
Project period: 2012 -
Description: This project aims to understand how real people make decisions under conditions of climate uncertainty, how optimal climate change adaptation decisions can be made, and how to provide practical guidance to end users. It will review current literature to establish the nature of the uncertainty facing decision makers and the existing decision frameworks available. It will test the efficacy of selected methods, then refine the results to develop a decision support tool to help decision-making under conditions of climate risk and uncertainty
www.nccarf.edu.au/content/decisions-under-climate-risks
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Sending and responding to messages about climate change: the role of emotion and morality*

Project leader(s): Matthew Hornsey; University of Queensland
Project period: 2012 - 2014
Description: Climate change represents a moral challenge to humanity, and one that elicits high levels of emotion. This project examines how emotions and morality influence how people send and receive messages about climate change, and does so with an eye to developing concrete and do-able strategies for positive change.
R&D Program: ARC - Discovery **– Project code:** DP120100961

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Saving the world the first time: global climate theory and desiccation 1765□1960*

Project leader(s): Gregory Barton; Australian National University
Project period: 2011 - 2013
Description: Advocates of the world's first global climate theory asserted that deforestation caused desertification. Understanding how this theory, called desiccation theory, launched and guided the world wide environmental movement helps us to better understand the benefits and problems associated with our present day climate theory global warming.
R&D Program: ARC - Discovery **– Project code:** DP110104024

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Motivations & barriers to adaptation
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Locating science fiction*

Project leader(s): Andrew Milner; Monash University
Project period: 2012 - 2014
Description: The project will devise and develop a new 'cultural materialist' paradigm for science fiction studies and apply it to a case study of science fictional representations of catastrophe, especially nuclear war, plague and extreme climate change.
R&D Program: ARC - Discovery **– Project code:** DP120100622

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Governance systems
REGION: WT Cluster **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Governance, planning and the effective application of emerging ecosystem service markets: climate change adaptation and landscape resilience*

Project leader(s): Allan Dale; James Cook University
Project period: 2011 - 2014
Description: This collaborative project will identify effective governance arrangements to plan for climate change adaptation to ensure social and ecosystem resilience. It will assist NRM groups to incorporate climate change considerations in NRM plans, specifically by supporting regions to negotiate national policy on this front. This will also include the identification of opportunities for ecosystem service delivery, including carbon farming, and working towards regional progression of these markets.
www.nerptropical.edu.au/project/governance-planning-and-effective-application-emerging-ecosystem-service-markets
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 12.4

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Governance systems
REGION: WT Cluster **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Indigenous peoples and protected areas*

Project leader(s): Ro Hill; CSIRO
Project period: 2011 - 2014
Description: This collaborative project will identify effective governance arrangements for co-management of natural and cultural resources in the Wet Tropics. While not specifically addressing climate change, it will provide a useful collaborative forum in which climate change adaptation can be planned.

www.nerptropical.edu.au/project/indigenous-peoples-and-protected-areas

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 12.1

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *An assessment of Australia's existing statutory frameworks, associated institutions, and policy processes: do they support or impede national adaptation planning and practice?*

Project leader(s): Karen Hussey; Australian National University
Project period: 2011 -
Description: 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.

www.nccarf.edu.au/content/assessment-australia%E2%80%99s-existing-statutory-frameworks-associated-institutions-and-policy

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Changing currents in marine biodiversity governance and management responding to climate change*

Project leader(s): Michael Lockwood; University of Tasmania
Project period: 2010 -
Description: This project will identify the requirements for adaptive marine biodiversity conservation governance and management in the context of climate change. It will assess how well current regimes, particularly marine protected areas, meet these requirements, and determine any necessary changes. It will identify alternatives to current regimes that are likely to enhance adaptive capacity and advise how regime reform might be achieved.

www.nccarf.edu.au/content/changing-currents-marine-biodiversity-governance-and-management-responding-climate-change

R&D Program: NCCARF, FRDC **– Project code:** FRDC 2010/532

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Governance systems
REGION: WT Cluster **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Harnessing private sector logistics for emergency food and water supplies in flood prone areas*

Project leader(s): Leo Dobes; Australian National University
Project period: - 2012
Description: Climate change is expected to increase the frequency and/or intensity of cyclones, which will affect the availability of food and water supplies in times of emergency. This project will use the Cairns community as a model for a nationally-applicable scoping study to estimate the costs of supplying water and food using conventional public sector emergency services and of harnessing private sector logistics as an alternative. It will compare the relative efficiency of public and private sector arrangements, and estimate any additional government subsidies that may be justified by a cost-benefit analysis.

www.nccarf.edu.au/content/harnessing-private-sector-logistics-emergency-food-and-water-supplies-flood-prone-areas

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Governance systems
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Northern Australia Sustainable Futures program*

Project leader(s): Office of Northern Australia
Project period: 2010 - 2014
Description: This program includes measures that address the need for: (1) national leadership and inter-jurisdictional dialogue and collaboration; (2) enhanced Indigenous and community engagement in policy and planning; (3) development of sustainable careers and business opportunities for Indigenous people in northern and remote communities; (4) improved understanding of regional infrastructure investment priorities; (5) improved water management; and (6) improved understanding of opportunities and risks to sustainable development in the northern beef industry.
www.regional.gov.au/regional/ona/nasf.aspx

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *Governing carbon: Australia's cities and carbon control*

Project leader(s): Pauline McGuirk; University of Newcastle
Project period: 2011 - 2013
Description: Two thirds of Australians live in cities. Developing governance systems to control urban carbon is essential to any effective response to climate change. This project will provide, for the first time, a baseline map and analysis of the actors, roles, relationships, and networks that govern carbon in Australia's cities.
R&D Program: ARC - Discovery **– Project code:** DP110100081

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Climate change adaptation building community and industry knowledge*

Project leader(s): Jenny Shaw; WA Marine Science Institution
Project period: 2013 -
Description: This project will increase knowledge and understanding of likely climate change and adaptation measures open to local communities. It will support a Case Study for Australia in adaptive management that cross-correlates regional needs with Australia-wide management policies. Key climate change information will be synthesised, analysed and adapted for marine biodiversity and fisheries businesses, and extension and knowledge sharing activities tailored for regional needs.
www.nccarf.edu.au/content/building-community-industry-knowledge
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Innovation, Ingenuity and Initiative: The adoption and application of new ideas in Australian local government*

Project leader(s): John Howard; Howard Partners
Project period: 2012 -
Description: This project has sought to identify areas where local government has embraced the adoption and application of new ideas and sought to transform the way the business of local government is undertaken. It has been carried out in an environment where local government is budget constrained, resource poor, and operating environments are tightly controlled. The paper concludes with a number of challenges and agenda issues for consideration in developing innovation strategies and programs in local government.
www.acelg.org.au/downloadUpdate.php?docId=180

TOPIC: Communities & organisational arrangements　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

Project Title: *Every state for themselves? Learning from cross border regulatory instruments to support and promote climate change adaptation in Australia*

Project leader(s): Wendy Steele; Griffith University
Project period: 2011 - 2013
Description: This project focuses on reforming regulatory mechanisms to support and promote cross border cooperation for climate change adaptation in Australia. It will explore the challenges and opportunities of implementing cross border regulatory reform, by assessing innovative cross border regulatory initiatives such as: the Murray Darling Basin water strategy; the Australian Alps conservation management plan; the Cross border sub regional strategy between ACT and NSW; and the Cross border disaster management sub plan 2010 between the Gold Coast City (QLD) and Tweed Shire (NSW).
www.nccarf.edu.au/content/every-state-themselves-learning-cross-border-regulatory-instruments-support-and-promote
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Governance systems
REGION: WT Cluster **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Social and economic long–term monitoring program*

Project leader(s): Nadine Marshall; CSIRO
Project period: 2011 - 2014
Description: This project will provide baseline datasets for socioeconomic monitoring and evaluation to underpin resource use planning, which will be a useful resource for climate change adaptation planning.
www.nerptropical.edu.au/project/seltmp
R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 10.1

TOPIC: Communities & organisational arrangements　　　**NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Governance systems
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Agricultural Extension, Learning and Change*

Project leader(s): Amabel Fulton;
Project period: - 2003
Description: This paper reports on what research has been conducted in four key areas, as identified by the steering committee of the Joint Research and Development Corporation project: 1. Institutional change and organisational structures supporting learning and change 2. The professional development of farm advisers including their structural arrangement and careers 3. The facilitation of enhanced learning/change processes on farm 4. Better understanding of the barriers to participation in learning opportunities
https://rirdc.infoservices.com.au/items/03-032
R&D Program: RIRDC

TOPIC: Communities & organisational arrangements　　　**NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Overcoming barriers: Cross-scale barriers to adaptation in local government in Australia*

Project leader(s): Pierre Mukheibir; University of Technology Sydney
Project period: 2012 -
Description: Many climate change impacts will be experienced at the local level, and many local governments have initiated adaptation plans. The pathway to planning and implementation of adaptation is not a barrier free process, as local governments are embedded in a larger governance context that has the potential to limit the effectiveness of adaptation initiatives on the ground. This study will identify barriers that limit planned adaptation at the local government level. It will identify factors that give rise to these barriers, for example, process and governance structures, and suggest options for how barriers can be overcome.
www.nccarf.edu.au/content/overcoming-barriers-adaptation-local-government
R&D Program: NCCARF

TOPIC: Communities & organisational arrangements
SUBTOPIC: Governance systems

NRM RELEVANCE SCORE: ★★★☆☆

REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Drivers of Structural Change in Australian Agriculture*

Project leader(s): Australian Bureau of Agricultural and Resource Economics
Project period: -
Description: This report provides an overview of current and future drivers of structural adjustment for Australia's agricultural industries. It describes the ways these adjustment pressures impact on the rural and regional sectors, and options for farmers to manage these changes. The report also provides some preliminary analysis, by way of selected case studies, of the nature of specific instances of structural adjustment and possible government responses to facilitate change.

https://rirdc.infoservices.com.au/items/07-057

R&D Program: RIRDC

TOPIC: Communities & organisational arrangements
SUBTOPIC: Governance systems

NRM RELEVANCE SCORE: ★★★☆☆

REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Learning from experience: Historical case studies and climate change adaptation (synthesis report)*

Project leader(s): Anthony Kiem; University of Newcastle
Project period: 2012 -
Description: This study analysed and synthesised the results from a series of seven case studies of past extreme events. It examined management actions taken before, during and after the event including preparedness, immediate response, post event response and policy changes implemented as a result of the events. It proposed a series of key lessons learnt for adapting management regimes to cope with future climate events.

www.nccarf.edu.au/content/learning-experience-historical-case-studies-and-climate-change-adaptation-synthesis-report

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements
SUBTOPIC: Governance systems

NRM RELEVANCE SCORE: ★★★☆☆

REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Developing an Excel spread sheet tool for local governments to compare and prioritise investment in climate adaptation*

Project leader(s): Stefan Trueck; Macquarie University
Project period: 2011 -
Description: 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.

www.nccarf.edu.au/content/developing-excel-spread-sheet-tool-local-governments-compare-and-prioritise-investment

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements
SUBTOPIC: Governance systems

NRM RELEVANCE SCORE: ★★★☆☆

REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Systems thinking: Overcoming challenges for decision making about climate change adaptation*

Project leader(s): Kambiz Maani; University of Queensland
Project period: 2012 -
Description: This project will compile, categorise and synthesise a variety of 'systems thinking' tools and approaches relevant to climate change adaptation. It will develop an end-user's guide that demonstrates the applications of various systems thinking tools to climate change adaptation decisions. This will enable end users to understand the relative utility of each approach and select the best approaches and tools for their purpose.

www.nccarf.edu.au/content/systems-thinking-overcoming-challenges-decision-making-about-climate-change-adaptation

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Web based tools for adaptation in Australia – an international and Australian review*

Project leader(s): Bob Webb; Australian National University
Project period: 2012 -
Description: This project will test the usefulness for Australian decision makers of a range of adaptation tools available on international websites. It will assess the strengths and weaknesses of each tool for Australian situations, determine what is required to make tools more applicable and recommend the best approach for delivering suitable tools for Australian users.

www.nccarf.edu.au/content/web-based-tools-adaptation-international-australian

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *From prediction to action: Responding to rapid ecosystem shifts under climate change*

Project leader(s): Brendan Wintle; University of Melbourne
Project period: 2011 - 2013
Description: Nobody knows exactly how climate change will affect the ecosystems on which we depend for our own existence, though negative impacts are widely predicted. This project integrates mathematical, economic and ecological approaches to learn about the most effective way to spend limited funds for sustaining ecosystems threatened by climate change.

R&D Program: ARC - Discovery **– Project code:** DP110103737

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Assessing the potential for, and limits to, insurance and market-based mechanisms for encouraging climate change adaptation*

Project leader(s): John McAneney; Macquarie University
Project period: 0 -
Description: Insurance provides a means of helping communities recover from natural disasters. It is clear, however, that many people afflicted by flooding in Southern Queensland in 2011 lacked suitable insurance cover, making recovery difficult and prolonged. This project seeks to understand why cover for riverine flood was so limited when damage from other natural hazards like bushfire, earthquake, tropical cyclone and hail storm are explicitly covered and routinely dealt with in home and contents policies. This project will propose solutions to align the incentives necessary at various levels of government to reduce the risk to Australian communities.

www.nccarf.edu.au/content/assessing-potential-and-limits-insurance-and-market-based-mechanisms-encouraging-climate

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Developing adaptively: The role and capacities of private sector development institutions in urban climate change adaptation*

Project leader(s): Jago Dodson; Griffith University
Project period: 2011 -
Description: How equipped is the private urban development sector – developers and financial institutions – to respond to the task of adapting new urban developments to climate change? This study will investigate the capacity of developers and financial institutions to develop and fund climate adapted urban developments.

www.nccarf.edu.au/content/developing-adaptively-role-and-capacities-private-sector-developers-and-financing-urban

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Economics: Economics of government as insurer of last resort for climate change adaptation*

Project leader(s): Leo Dobes; Australian National University
Project period: 2012 -
Description: This project will provide new insight into the economic, financial and distribution implications of government taking on the role of insurer of last resort for climate change adaptation. It brings together Australia's foremost climate change adaptation economists, policy analysts and modellers to identify the potential risks in government assuming the role of insurer of last resort. It will model and analyse the fiscal flows and the distributional implications, and potential tensions between the principle of subsidiarity and vertical fiscal imbalance, and develop proposals for obviating identified adverse fiscal effects where government does take on the role of insurer.
www.nccarf.edu.au/content/economics-economics-government-insurer-last-resort-climate-change-adaptation

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Limp, leap or learn?: Developing a legal framework for adaptation planning in Australia*

Project leader(s): Jan McDonald; University of Tasmania
Project period: 2011 - 2013
Description: 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.
www.nccarf.edu.au/content/limp-leap-or-learn-developing-legal-framework-adaptation-planning-australia

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Living with floods: key lessons from Australia and abroad*

Project leader(s): Karen Hussey; Australian National University
Project period: 2012 -
Description: The project will compare findings from current flood inquiries underway in Queensland, Victoria and New South Wales with studies from the US, China and the Netherlands. It aims to identify key lessons that could help local and state governments, emergency services and resource managers prepare for future floods.
www.nccarf.edu.au/content/living-floods-key-lessons-australia-and-abroad

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *The right tool for the job: Achieving climate change adaptation outcomes through improved disaster management policies, planning and risk management strategies*

Project leader(s): Michael Howes; Griffith University
Project period: 2011 -
Description: Australia is highly susceptible to climate change impacts such as more frequent and/or intense floods and bushfires. There is considerable uncertainty about when and how disaster management organisations should address climate change adaptation and the priority that should be granted compared to other problems. This project will create a nationally- consistent approach with a supporting set of risk assessment tools to identify potential conflict, improve stakeholder engagement, and integrate climate change adaptation into disaster management. The tools are derived from a comparison of case studies including the 2010-11 Queensland floods; the 2009 Victorian bushfires; the 2011 Perth hills bushfires and state-wide risk profiles. The research will improve policymaking, planning and emergency risk management by decision-makers at all levels of government.
www.nccarf.edu.au/content/right-tool-job-achieving-climate-change-adaptation-outcomes-through-improved-disaster

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Climate and natural hazards in Australasia: a comprehensive impact analysis of prehistoric droughts, great earthquakes, and the Toba super□eruption*

Project leader(s): Michael Gagan; Australian National University
Project period: 2011 - 2013
Description: Climate change, great earthquakes, and volcanic disasters pose untold risks for environmental, economic, and social harm in rapidly developing Australasia. This project's ground□breaking natural hazard risk analysis will showcase Australasia's research strengths and provide fundamental knowledge for visionary leadership in sustainable development.
R&D Program: ARC - Discovery **– Project code:** DP110101161

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Climate change and environmental security in the Pacific: the role of regional organisations*

Project leader(s): Marc Williams; University of New South Wales
Project period: 2011 - 2013
Description: This project through exploring the twin features of climate change and security in the Pacific region and assessing the role of regional organisations to respond to these threats will enable Australian policy□makers to better design and implement policies to promote sustainable development and human security in the region.
R&D Program: ARC - Discovery **– Project code:** DP110105299

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Climate change law and mitigation: forest carbon sequestration and Indigenous and local community rights*

Project leader(s): Maureen Tehan; University of Melbourne
Project period: 2011 - 2013
Description: The project examines the impact of climate change law and mitigation on Indigenous peoples and local forest communities in Australia, India and Malaysia. It examines the United Nations □ Reducing Emissions from Deforestation and Forest Degradation scheme which gives credits for carbon sequestration in forests thus providing financial incentives to avoid deforestation for communities in sensitive ecosystems.
R&D Program: ARC - Discovery **– Project code:** DP110100259

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Conflicting temporalities of climate governance: a comparative sociology of policy design and operationalization in Australia and the United Kingdom*

Project leader(s): Stewart Lockie; Australian National University
Project period: 2013 - 2015
Description: This project will investigate the ways in which climate policy in Australia and the United Kingdom deals with uncertainty in the timing of climate change and climate change impacts. It will evaluate the utility of various approaches to climate policy and the potential contradictions that arise between climate dynamics and the policy design.
R&D Program: ARC - Discovery **– Project code:** DP130104842

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *International coalitions for climate change mitigation: the role of carbon market linkages and trade restrictions*

Project leader(s): Frank Jotzo; Australian National University
Project period: 2011 - 2013
Description: This project uses cooperative game theory, implementation theory and agent based modelling to investigate how coalitions to reduce greenhouse gas emissions could be formed and maintained among countries. Applications include the role of carbon market linkage and trade policy, in countries of the Asia Pacific region.
R&D Program: ARC - Discovery **– Project code:** DP110102057

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Rethinking climate justice in an age of adaptation: capabilities, local variation, and public deliberation*

Project leader(s): David Schlosberg; University of Sydney
Project period: 2012 - 2014
Description: This project aims to produce recommendations, designed by citizens and stakeholders, for climate adaptation policies in three regions of Australia. These recommendations will be based on a definition of climate justice that incorporates basic needs and resources to be protected, as identified by potentially impacted communities.
R&D Program: ARC - Discovery **– Project code:** DP120104797

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Risk assessment of climate change mitigation measures*

Project leader(s): Carl Chiarella; University of Technology, Sydney
Project period: 2013 - 2015
Description: This project will consider market based mechanisms for environmental protection policies and will have both a theoretical and a practical dimension. The main benefactors of the project will be environmental regulators and policy makers working in this area.
R&D Program: ARC - Discovery **– Project code:** DP130103315

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Transition to a clean energy future: the role of climate change litigation in shaping our regulatory path*

Project leader(s): Jacqueline Peel; University of Melbourne
Project period: 2013 - 2015
Description: As the world seeks a clean energy future, courts in Australia and other key fossil fuel-producing nations, like the United States, are increasingly hearing cases seeking to block the use of coal due to its climate change effects. This project critically assesses the role such climate litigation plays in generating regulatory momentum to address climate change.
R&D Program: ARC - Discovery **– Project code:** DP130100500

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Sustainable organisational change: Australian business responses to climate change*

Project leader(s): Christopher Wright; University of Sydney
Project period: 2011 - 2013
Description: Australian businesses are expected to play a leading role in the fight against global warming. This project will generate new insights into how, though organisational change initiatives, Australian corporations are responding to the issue of climate change, as well as the sustainability of these initiatives.
R&D Program: ARC - Discovery **– Project code:** DP110104066

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Uncertainty II: Bridging the gap between end user needs and science capability – dealing with uncertainty in future scenarios*

Project leader(s): Danielle Verdon-Kidd; University of Newcastle
Project period: 2012 -
Description: This project will work with climate scientists and government and business practitioners to bridge the disconnect between what decisions-makers need and what climate science can provide. Researchers will survey decision-makers to identify what climate information they most need, and in what format. They will conduct workshops to connect climate scientists with decision-makers to discuss ways to govern effectively within the limitations of climate science, and work with the team from the partner Uncertainty I project to deliver products for practitioners including a masterclass, handbook and decision support tool.
www.nccarf.edu.au/content/uncertainty-ii-bridging-gap-between-end-user-needs-and-science-capability-%E2%80%93-dealing

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Valuing adaptation under rapid change: anticipatory adjustments, maladaptation and transformation*

Project leader(s): Roger Jones; Victoria University
Project period: -
Description: The project will develop a robust economic methodology to support decision making for adaptation actions and investments ranging from adjustment to transformation. It will identify and respond to the limitations in current approaches and explore methods for a "good" adaptation test that accounts for existing information and new learning over time. Researchers will investigate four key elements contributing to the economics of adaptation: information, regulation and standards, institutions and public investment.
www.nccarf.edu.au/content/valuing-adaptation-under-rapid-change

R&D Program: NCCARF

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Benefiting from injustice*

Project leader(s): Robert Goodin; Australian National University
Project period: 2011 - 2013
Description: This project argues that people can acquire duties to compensate victims of injustice when they benefit from these injustices, even when they neither caused the injustices nor could have prevented them. We explore the implications of this argument for the treatment of colonised peoples, and for policies on climate change and international trade.
R&D Program: ARC - Discovery **– Project code:** DP110100175

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Political normativity and the feasibility requirement*

Project leader(s): Nicholas Southwood; Australian National University
Project period: 2012 - 2014
Description: Commonsense says that claims about how social and political life ought to be arranged must not make infeasible demands. This project will investigate this piece of commonsense and explore its implications for a number of pressing issues, such as climate change, multiculturalism, political participation, inequality, historical justice, and the rules of war.
R&D Program: ARC - Discovery **– Project code:** DP120101507

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Spinning out of control: the management of news by two Australian governments, 2004-2010*

Project leader(s): David McKnight; University of New South Wales
Project period: 2012 - 2014
Description: This project will examine the use of news management or 'spin' by Australian governments. Is it a legitimate tool of government in the face of a hyper-adversarial news media or a technique which undermines democracy? It will examine 'spin' in connection with policies on climate change, economic policy, indigenous policy and asylum seekers policy.
R&D Program: ARC - Discovery **– Project code:** DP120100629

TOPIC: Communities & organisational arrangements   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Governance systems
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The dynamics of turbulent entrainment in sheared convective boundary layers*

Project leader(s): Michael Kirkpatrick; University of Sydney
Project period: 2011 - 2013
Description: This project aims to develop general laws to enable the accurate prediction of boundary layer entrainment processes. This will be significant in a wide range of environmental and engineering applications. In particular, the current lack of understanding of this area is a major source of uncertainty in the latest generation of global climate models.
R&D Program: ARC - Discovery **– Project code:** DP110102343

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *An assessment of the vulnerability of Australian forests to climate change Part IV: Adaptive capacity, barriers to adaptation and vulnerability*

Project leader(s): Steve Turton; James Cook University
Project period: 2012 -
Description: Forests and the industries associated with them are vulnerable to the impacts of climate change. Australia has 149 million hectares of forest managed for conservation and heritage areas and for production of forest products. This part of the project considers the adaptation options and strategies available for the forest sector to adapt for climate change, including tools and guidance available to inform planning and policy in government and the private forestry sector.
www.nccarf.edu.au/content/assessment-vulnerability-australian-forests-climate-change-part-iv-adaptive-capacity
R&D Program: NCCARF

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Rural & primary industries
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Beef production adaptation in northern Australia*

Project leader(s): Meat & Livestock Australia
Project period: 2009 - 2012
Description: The main conclusions from the project include: • management strategies which reduce the risks, or take the opportunities under climate change are consistent with those that optimise land condition, productivity and profitability under the current climate. These strategies of managing stocking rate around long-term carrying capacity, implementing wet season spelling to improve land condition and using fire to control woody regrowth have been significantly refined through modelling and engagement, and should continue to be promoted to individual producers and their advisors. These messages are much better received when presented in the context of managing climate variability rather than climate change • the potential impacts of climate change need to be benchmarked against other key profit drivers for northern Australian beef businesses to place the message in a whole-of-business context • assisting beef producers to develop their networks, their interest and capacity in strategic and business planning, and their awareness and knowledge of natural resource management is likely to improve their resilience to the effects of climate change • an idealised long-term strategic approach to industry adaptation may only be effective for engaging with a minority of producers. It will need to be complemented by approaches that are compatible with managers for whom engagement, adoption and change in management are more likely to occur as a result of short-term (1 3 year) tactical decisions made in response to immediate challenges.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/adaptation_research_program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Climate Change Research Strategy for Primary Industries 2012-2017*

Project leader(s):
Project period: 2012 - 2017
Description: A strategy based on the following principles: 1. Production systems based on best-available climate information; 2. Lowering of greenhouse gas emissions intensity of products; 3. Proactive participation in a carbon constrained economy.

www.ccrspi.org.au/ccrspi-strategy-2012-17

R&D Program: CCRSPI

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Growth opportunities & critical elements in the value chain for wild fisheries & aquaculture in a changing climate*

Project leader(s): Alistair Hobday; CSIRO; Rodrigo Bustamante; CSIRO
Project period: 2011 -
Description: The project aims to development realistic adaptation management and policy options to enhance cost-effectiveness along the supply chain. It will generate targeted recommendations to improve efficiency and reduce carbon footprints.

http://frdc.com.au/knowledge/Factsheets/NARP-Flyer_FRDC_2011-233.pdf

R&D Program: NCCARF **– Project code:** FRDC 2011/233

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *New industries for future climates*

Project leader(s): Brendan Cullen; University of Melbourne
Project period: - 2010
Description: This project will examine the potential for new crops either currently in the RIRDC New Rural Industries Portfolio or prospectively in this portfolio to provide new opportunities for a selection of 6 diverse geographical regions within Australian agriculture, representing a range of current and future climates. The project will use a case study approach in each of these regions to analyse potential challenges of future climates and greenhouse gas policy settings for current industry mixes to identify opportunities/need for new cropping species/enterprises. Where these analyses identify a priori cases for new cropping species/ enterprises in future climates the adaptation options and mitigation/emission footprint consequences associated with the introduction of these species/enterprises will be

investigated. Where promising opportunities are identified for future climates the requirements for the development of a full business case for further R & D investment in this area will be clearly outlined in a final report of the project.

https://rirdc.infoservices.com.au/items/10-010

R&D Program: RIRDC - New Plant Products **– Project code:** PRJ-003154

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Rural & primary industries
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Strategic directions for the northern Australia beef industry*

Project leader(s): Office of Northern Australia
Project period: 2012 -
Description: A situation analysis of the northern beef industry and strategy to develop its economic viability

www.regional.gov.au/regional/ona/strategic-directions-for-northern-australia-beef-industry.aspx

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Horticulture Climate Change Action Plan*

Project leader(s):
Project period: - 2009
Description: The Horticulture Climate Change Action Plan has three components: 1. Adaptation, 2. Mitigation, and 3. Information, awareness and communication.

www.horticulture.com.au/areas_of_Investment/Environment/Climate/climate_change_action_plan.asp?src=side

R&D Program: HAL

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Rural & primary industries
REGION: Northern Australia **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Agriculture transforming to adapt to climate change: Peanut industry expansion in the Northern Territory as a blueprint*

Project leader(s): CSIRO
Project period: 2009 - 2012
Description: Through application of the blueprint to the peanut industry's transformation experience, this project has shown that there is potential for mal-adaptations in establishing peanut production systems in the Katherine area (Northern Territory). One is the potential for substantial nitrogen leaching from peanut production systems to groundwaters, which sustain dry season flows and valuable ecosystems in the region's rivers, unless nitrogen fertiliser inputs are carefully managed. Another is that future climates in the Katherine region may be less favourable to agricultural production than they are now, so the advantages being sought through transformation by the peanut industry may diminish.   Biosecurity risks associated with establishing peanut production systems in the Northern Territory are small, and landscape modelling suggests there is scope for reducing pest and disease pressures on future crops through maintaining native vegetation cover of more than 30 per cent.   Social data suggests that it is unlikely that peanut farmers in traditional production areas would relocate to Katherine. Some reasons included: • dependency on what farmers do now • level of attachment to their place and their occupation • lack of knowledge on how to farm in Katherine • uncertainty of research and development support • lack of experienced labour.   The blueprint identified the barrier range for the peanut production system to be able to successfully transform to Katherine. Out of the 36 attributes: • 10 attributes were identified as potential critical barriers • 8 attributes were identified as being little or no barrier • remaining attributes had some potential to be a barrier.   Although the Peanut Company of Australia (PCA) had well developed plans to reduce or overcome these barriers PCA decided to withdraw from the expansion in Katherine.   This project suggests that transformational adaptation: • is costly, risky, unpredictable and cannot be rushed • must meet multiple conditions for success • needs to be underpinned by long-term vision, commitment, planning and innovation • can occur simultaneously with in situ incremental adaptation at a new location—they are not necessarily either/or options • could be integrated into business plans.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/adaptation_research_program

TOPIC: Industries & livelihoods　　　　　　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Australian horticulture's response to climate change and climate variability*

Project leader(s): Peter Deuter; Queensland Department of Agriculture, Fisheries & Forestry
Project period: 2006 - 2009
Description: The key outputs from the project were: - Documentation of the most vulnerable regions and commodities (or production systems) in Australia to Climate Change; - Checklist of horticulture specific Adaptation Strategies to Climate Change; - Action Plan for Horticulture in the area of Climate Change; and - Web page dedicated to horticulture specific climate change and variability information.
www.horticulture.com.au/areas_of_Investment/Environment/Climate/AH06019_Australian_horticulture_response.asp
R&D Program: HAL **– Project code:** AH06019

TOPIC: Industries & livelihoods　　　　　　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Critical thresholds ('tipping points') and climate change impacts/adaptation in horticulture*

Project leader(s): Peter Deuter; Queensland Department of Agriculture, Fisheries & Forestry
Project period: 2009 -
Description: The project aims to determine critical temperature thresholds of significance to key horticultural crops, how climate change will impact on these commodities & regions, and suggest adaptation options for specific commodities & regions.
www.horticulture.com.au/areas_of_Investment/Environment/Climate/Climate_critical_thresholds.asp
R&D Program: HAL **– Project code:** HG08037

TOPIC: Industries & livelihoods　　　　　　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Developing climate change resilient cropping and mixed cropping / grazing businesses in Australia*

Project leader(s): CSIRO
Project period: 2009 - 2012
Description: The results from this study suggest that some adaptation options provide resilience to both modest and more extreme climate change across much of Australia. These adaptation options include changes to the farm enterprise mix to enhance the livestock component and earlier dry sowing, in combination with the use of other crop varieties.　The changing enterprise mix adaptation option improved median yield production by between 2 and 27 per cent for a modest global warming scenario, depending on region and existing enterprise mix. The greatest improvements in median yield were returned in regions with higher water holding capacity soils on the drier margins of the cropping zone.　Some adaptation options showed little production value across all case study regions. These included amelioration of subsoil constraints and introduction of a fallow into the crop rotation. While production increases were simulated at all sites in response to fallowing, the loss of income from removing parts of the farm from production outweighed the modest production gains in subsequent years. The fallow adaptation option proved viable if yield reduction due to weeds (which cannot be captured with the modelling tools used in this project) were assumed to be at least 10 per cent, or the fallowed paddocks were grazed by stock to reduce feed costs.　The project has shown that crop management adaptations are likely to play a significant role in maintaining or increasing yields, as well as influencing the potential temperature threshold beyond which yield is negatively affected. From data generated by this project, the temperature thresholds beyond which yield is progressively reduced with further temperature increases was around 2.5°C, if rainfall remained unchanged from current conditions, 2°C if rainfall declined by 10 per cent, and 1.5°C if annual rainfall declined by 20 per cent.　The results of this study suggest that adaptation options most effective under temperature increases of 1 to 2.5°C, raise yields by 5.5 to 19 per cent. At higher temperatures, further benefit from adaptation was limited, particularly under scenarios with reduced rainfall. The results from this study would suggest that the net worth of adaptation could be in excess of $500 million per annum based on the simulated percentage benefit from adaptation.　This project has also successfully mapped regions of low and high vulnerability to future climate change. Across all 24 of the climate futures considered, regions of consistently high vulnerability existed across South Australia, western New South Wales, western Queensland, the south eastern parts of New South Wales and parts of the Northern Territory.　Regions of consistently low vulnerability were found in the high rainfall zones of Queensland and northern New South Wales, much of the northern and south western parts of the Western Australian wheat belt and isolated areas of southern New South Wales and eastern Victoria.
www.csiro.au/en/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/resilient-farmers.aspx
R&D Program: DAFF - Adaptation Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Rural & primary industries
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Developing improved industry strategies and policies to assist beef enterprises across northern Australia adapt to a changing and more variable climate*

Project leader(s): Meat & Livestock Australia
Project period: 2009 - 2012
Description: The key results were: 1. Vulnerability is a function of both climate sensitivity and adaptive capacity. We assessed the climate sensitivity of pastoralists as the levels of; (i) occupational identity, (ii) family circumstances, (iii) place attachment, (iv) employability, (v) formal and informal networks, (vi) business approach, (vii) business size, (viii) income diversity, (ix) environmental awareness, and (x) local environmental knowledge. We assessed the adaptive capacity of pastoralists as; (i) approaches to the management of risk and uncertainty, (ii) level of skills for planning, experimenting, reorganising and learning, (iii) level of psychological and financial buffers, and (iv) level of interest in adapting to change. 2. The vulnerability of the sample of pastoralists was high. We identified pastoralists belonging to one of four types of vulnerability. We found that two types representing 85% of pastoralists were highly vulnerable because they had low planning skills, low interest in adapting to the future, managed risk and uncertainty poorly and were not strategic in their business. 3. A threshold to change for one person is not necessarily a threshold for another. Thresholds were very much an individually-set construct. We think that individuals' proximity to their thresholds can be understood in terms of their sensitivity. For example, some pastoralists may be close to their thresholds of change if they have high occupational identity and the change event directly threatens their identity as a pastoralist. 4. Barriers to change were also able to be identified on the basis of the sensitivity of pastoralists to change. For example, pastoralists with a lifestyle approach would erect barriers around proposed adaptation strategies that threatened their sense of lifestyle. 5. Quantitative measures of adaptive capacity were highly correlated with many measures of climate sensitivity. Pastoralists that had higher adaptive capacity had stronger networks, a strategic approach to their business, had high environmental awareness and high local environmental knowledge.
www.mla.com.au/Research-and-development/Final-report-details?projectid=15314
R&D Program: MLA

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Global change: helping inform the Australian sugar industry on potential impacts, possible adaptation strategies and best-bet investment of R&D*

Project leader(s): BSES
Project period: 2006 - 2007
Description: A preliminary analysis of the impacts of climate change on the east coast sugar producing regions of Australia, the knowledge needs and the adaptation options available to the sugarcane industry. The study was conducted in a consultative manner with sugar industry stakeholders representing all sectors of the industry attending workshops held in Maryborough and Brisbane during the period January to February 2007.
www.srdc.gov.au/page/Research/Search_SRDC_Reports/Autoimported/Global_change__helping_inform_the_Australian_sugar_industry_on_potential_impacts__possible_adaptation_strategies_and_best-bet_investment_of_R_D/
R&D Program: SRDC **– Project code:** CSE019

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *How will climate change impact climate variability in sugarcane growing regions?*

Project leader(s): Yvette Everingham; James Cook University
Project period: 2009 - 2012
Description: Complementing our investment in climate forecasting and climate change, this research project led by James Cook University aims at estimating how climate change will affect the statistical distributions of key atmospheric variables relevant to crop production for selected sugarcane growing regions. This knowledge will be integrated into cropping simulation systems to estimate the climate impact on crop productivity and enhance understanding of the year to year variability in crop production. With this knowledge, then the project will attempt to investigate the impact climate change will have on harvest disruption. The project will link project findings with findings from other research and contribute to sensible pathways forward that will help the Australian sugar industry adapt to a changing and variable environment. During 2012-2013, the project will report key findings to industry and document future pathways for adapting to a changing and variable climate.
R&D Program: SRDC **– Project code:** JCU032

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Rural & primary industries

REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Management implications of climate change impacts on fisheries resources of northern Australia*

Project leader(s): David Welch; James Cook University

Project period: 2010 -

Description: The aims of this project are to describe the projected climate driven changes that are relevant to northern Australian marine fisheries, assess the potential impacts of climate change on key fisheries and species in northern Australia and assess current management to identify approaches that are adaptive to potential climate change scenarios.

www.nccarf.edu.au/sites/all/modules/pubdlcnt/pubdlcnt.php?file=www.nccarf.edu.au/sites/default/files/attached_files_research_projects/2010-565%20Website%20snippet%20Welch_0.pdf&nid=480

R&D Program: FRDC, NCCARF, DCCEE **– Project code:** FRDC 2010/565

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Rural & primary industries

REGION: Northern Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *On-farm demonstration of best practice options for climate change mitigation and adaptation for beef producers across northern Australia*

Project leader(s): Meat & Livestock Australia

Project period: 2009 - 2012

Description: The project engaged beef businesses across the five regions, stimulating practice change and enhancing their business resilience. Over 90 producers have already made significant practice changes consistent with cost-effective implementation of best practice options. The impacts of changed practices and technologies on productivity, economic returns, adaptability and net emissions found wet season spelling to be effective in maintaining livestock carrying capacity, improving pasture condition, increasing profitability, and reducing greenhouse gas emissions. Stocking management and spelling around water bores (by turning them on and off) was found to spread grazing pressure more evenly across the paddock and reduce overgrazing and damage around bores. The benchmarking and analysis approach provided a useful tool for identifying opportunities and risks in property management, taking account of natural resource condition, productivity, business performance and net greenhouse gas emissions. A qualitative overview of trade-offs among various best management practices showed that recommended adaptation measures will have largely neutral implications for greenhouse gas emissions, and tend to reinforce many existing best practice recommendations aimed at improving productivity and sustainability. Simulation modelling of three practices (adjusting stocking rates to maintain safe utilisation levels; improving land; and increasing woody carbon stores) show the effectiveness of mitigation measures in northern rangelands will be extremely sensitive to future changes in climate (and associated adaptation actions). For example, any gains in sequestering carbon would be threatened not only by drying climate scenarios but also by scenarios with warming alone. Sequestration through increased tree stocks can be a more significant and reliable option but comes with major costs to productivity.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/demonstration

R&D Program: DAFF - Demonstration

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Rural & primary industries

REGION: East Coast Catchments **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Participatory adaptation and mitigation strategies for climate change on the mixed farms of north-eastern Australia*

Project leader(s): David Lawrence; Queensland Department of Agriculture, Fisheries & Forestry

Project period: 2010 - 2012

Description: The project will use participatory methods to engage primary producers and their advisers in central Queensland, southern Queensland, and north-western NSW in on-farm trials and demonstrations to adapt mixed farming systems to changed climate conditions. High-profile on-ground activities in Queensland and NSW will address each of the Climate Change Research Program priorities: managing emissions, better soil management, and adapting to a changing climate. These activities will help farmers and advisers to understand the implications for management on their own farms and start developing their own adaptation strategies.

www.grdc.com.au/Research-and-Development/DAQ00163

R&D Program: GRDC **– Project code:** DAQ00163

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Rural & primary industries
REGION: Northern Australia **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Relocation of intensive crop production systems to northern Australia: Costs and opportunities*

Project leader(s): Queensland Department of Agriculture, Fisheries & Forestry
Project period: 2009 - 2012
Description: To adapt to changes in climate and reduced availability of irrigation water, businesses and growers in southern Australia, northern New South Wales and southern Queensland may consider relocating their businesses to northern Australia. Some results from this project showed that if industries are to remain in their existing location/s the following things may occur: • rice production may remain more profitable than in northern Queensland as yields in the north will be lower • projected increased temperatures and lower rainfall in southern Queensland may cause declines in cotton production • processing tomato production may also be affected because there may be a risk of decreased season length or a break in the season • irrigated cropping industries may also need to, or continue to diversify under climate change as there will most likely be lower water availability. If industries are to relocate to northern Queensland the following things may need to occur: • based on limited agronomic and financial data, rice production in the Burdekin area could be profitable depending on land and water values • rice production may be less profitable than in the existing locations because of lower yields, however, access to water is more secure in the north • rice and cotton systems are more likely to be grown as complementary crops between sugarcane plantings rather than be the dominant crop because of the higher value of sugar cane • significant investment in processing infrastructure will need to occur. Overall, this project provides evidence to indicate that movement of processing tomatoes, rice and cotton industries to northern Australia is unlikely to occur rapidly or easily. Some barriers to moving to northern Queensland include lack of suitable varieties, lack of infrastructure, transport costs, pest and diseases, local reactions to land use change and difficulty attracting new farmers. Also support in terms of infrastructure for processing the product e.g. milling and ginning are critical, but it is also important not to overlook the need for research into agronomic practices that assist in reducing risk to the grower.
www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/adaptation_research_program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Understanding and identifying the threats and opportunities posed by climate change for the banana industry*

Project leader(s): Peter Deuter; Queensland Department of Agriculture, Fisheries & Forestry
Project period: 2009 - 2009
Description: Final report provides information on: Regulatory environment and obligations emanating from the Carbon Pollution Reduction Scheme (CPRS), an emissions trading scheme to be introduced by the Commonwealth Government in July 2010 - a summary regulatory position having regard to currently available legislation, regulations and associated discussion papers. Climate change glossary of terms – to provide climate change information in simple terms. Quick guide calculator - for banana growers to assess their basic GHG emissions – an Excel spreadsheet which can be used by individual growers to estimate on-farm GHG emissions. Boundary issues – relating to estimating GHG emissions on-farm and from the whole industry. Supply chain participants specific to the banana industry - a list of the types of businesses which have a capacity to pass on costs of compliance with a future ETS to the banana industry. The banana industry's carbon footprint – an estimate of the banana industry's carbon footprint. Greenhouse gas abatement measures – a list of potential GHG abatement measures which banana growers can implement to reduce their carbon footprint, and the overall footprint of the industry.
www.horticulture.com.au/areas_of_Investment/Environment/Climate/threats_opportunities_climate_change_banana.asp
R&D Program: HAL **– Project code:** BA08014

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Adapting to change: minimising uncertainty about the effects of rapidly-changing environmental conditions on the Queensland Coral Reef Fin Fish Fishery*

Project leader(s): Andrew Tobin; James Cook University
Project period: 2008 - 2010
Description: The project has demonstrated, through fishery independent assessment (underwater visual assessment), that although emergent coral reef may suffer extensive structural damage as a result of tropical cyclones, in the short-term (three months post-TC Hamish, March 2009) the associated fish community structure and species abundances are not adversely affected.
http://frdc.com.au/research/Documents/Final_reports/2008-103-DLD.pdf
R&D Program: FRDC **– Project code:** 2008/103

TOPIC: Industries & livelihoods
SUBTOPIC: Rural & primary industries

NRM RELEVANCE SCORE: ★★★★☆

REGION: Australia-wide **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *Developing agree life cycle assessment methodologies*

Project leader(s): Don Burnside; URS Australia Pty Ltd
Project period: 2008 - 2008
Description: Objectives: To develop agreed Environmental Life Cycle Assessment (LCA) methodologies for cotton, sugar, pork, poultry, and meat and livestock production systems. The LCA methodologies will mainly focus on water and energy use and greenhouse emission impacts and will identify and quantify eco-efficiency improvements in the primary production systems. The LCA methodologies will guide and inform future eco-labelling projects.
www.rirdc.gov.au/research-project-details/custr10_GC/PRJ-002940
R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-002940

TOPIC: Industries & livelihoods
SUBTOPIC: Rural & primary industries

NRM RELEVANCE SCORE: ★★★☆☆

REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *An assessment of the vulnerability of Australian forests to climate change Part III: Socio-economic impacts review*

Project leader(s): Geoff Cockfield; University of Southern Queensland
Project period: 2012 -
Description: Forests and the industries associated with them are vulnerable to the impacts of climate change. Australia has 149 million hectares of forest managed for conservation and heritage areas and for production of forest products. This part of the project identifies the potential socio-economic impacts of climate change and develops a framework for thinking about coordinated responses to socially and economically adverse outcomes. It develops a model of plantation decision making under climate change, and surveys people in two timber growing regions to determine their response to climate change.
www.nccarf.edu.au/content/assessment-vulnerability-australian-forests-climate-change-part-iii-socio-economic-impacts
R&D Program: NCCARF

TOPIC: Industries & livelihoods
SUBTOPIC: Rural & primary industries

NRM RELEVANCE SCORE: ★★★☆☆

REGION: East Coast Catchments **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Carbon and sustainability - A demonstration on vegetable properties across Australia*

Project leader(s): Peter Deuter; Queensland Department of Agriculture, Fisheries & Forestry; Ian Porter; Victorian Department of Primary Industries
Project period: 0 -
Description: This project will establish five demonstration sites on vegetable production farms on the east coast of Australia to trial a vegetable industry carbon footprinting process, measure the impact of greenhouse gas (GHG) emissions (N2O, CO2, CH4) and a number of on-farm emission management practices. This project will also consider the broader implications of carbon and sustainability requirements across the supply chain and will host a number of forums with growers, industry representatives and retailers to ensure that the information products and other outcomes are appropriate for their application and adoption across the supply chain.
www.horticulture.com.au/areas_of_Investment/Environment/Climate/climate_research_programs.asp?src=side
R&D Program: HAL **– Project code:** VG09190

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Harnessing soil biology to improve the productivity of the new farming system*

Project leader(s): Susanne Schmidt; University of Queensland
Project period: 2007 - 2010
Description: The project assessed how management options of the 'new sugarcane farming system' (reduced tillage, legume break crop, trash blanketing, and reduced nitrogen (N) fertiliser application), impact soil biology. The results show that sugarcane management affects soil microorganisms with respect to their biomass, functional community composition and gene expression. These changes were mostly short-lived and had little or no effect on the overall availability of N, N cycling, N losses and sugarcane yield. This response of the studied sugarcane production systems supports the notion that less input, as implied by the new sugarcane farming system, is not detrimental to sugarcane yield and reduces environmental impacts.

www.srdc.gov.au/page/Research/Search_SRDC_Reports/Autoimported/Harnessing_soil_biology_to_improve_the_productivity_of_the_new_sugarcane_farming_system_UQ043/UQ043_Final_Report/

R&D Program: SRDC **– Project code:** UQ043

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Implications of climate change for recreational fishers and the recreational fishing industry*

Project leader(s): Colin Creighton; Fisheries Research & Development Corporation
Project period: 2011 -
Description:
R&D Program: FRDC (RFIDS) **– Project code:** FRDC 2011/037

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: Australia-wide **FORMAT:** On-line tool **PLANNING RELEVANCE:** Indirect

Project Title: *Australian Vegetable Industry Carbon Footprint Tool - stage 2 (national development and adoption of the tool)*

Project leader(s): Arris
Project period: 2009 - 2011
Description: This website is intended to assist the Australian Vegetable Industry account for on-farm greenhouse gas emissions. The website has two elements: A Vegetable specific carbon calculator; and Vegetable industry carbon education, information products and extension systems to prepare the vegetable industry for operating in a carbon constrained world. These projects build on work completed by Houston's Farm in May 2009 to modify their carbon footprinting tool for the wider vegetable industry. Houston's Farm's Footprinting Tool has been made available to HAL for this second stage.

www.vegiecarbontool.com/

R&D Program: HAL **– Project code:** VG09142

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Capacity Building of Rural and Remote Communities to Manage Their Mental Health via the Primary Industries Health and Safety Partnership*

Project leader(s): Delwar Hossain; University of Southern Queensland
Project period: 2008 - 2012
Description: The main aim of this project is: to build the capacity of climate variability (drought, flood, and storm) affected rural and remote communities to manage their mental health issues. Specific objectives are to: • gauge the extent and nature of mental health issues in drought – affected rural and remote communities; • identify the appropriate and effective means of capacity building in these communities to deal with mental health issues; and • scope an action research program to develop the capacity of rural and remote communities to deal with mental health issues associated with droughts, climate variability and climate change.

www.srdc.gov.au/page/Research/Search_SRDC_Reports/Autoimported/Capacity_Building_of_Rural_and_Remote_Communities_to_Manage_Their_Mental_Health_Stage_1_-_Identification_of_issues_and_measures/Capacity_Building_of_Rural_and_Remote_Communities_to_Manage_Thei

R&D Program: RIRDC, SRDC **– Project code:** OHS003

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Climate Change for Horse Owners*

Project leader(s): Julie Fiedler; Horse SA
Project period: - 2012
Description: This Rural Industries R&D Corporation project sought to engage horse owners to examine the potential impact on them of climate change. As the horse keeping population of Australia moves towards capital cities and major regional townships, horse keeping practices have shifted from broad acre or rangeland grazing to smaller properties. With this comes an increased need for horse property managers to demonstrate environmentally sound practices to protect drinking water quality and remnant habitat, and reduce neighbourhood complaints about issues such as dust, mud and erosion. New horse owners often find themselves being new land managers.
https://rirdc.infoservices.com.au/items/12-077
R&D Program: RIRDC - Horses **– Project code:** PRJ-006136

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Factors driving agricultural productivity*

Project leader(s): Prem Thapa; Australian Bureau of Agricultural and Resource Economics
Project period: 2009 - 2010
Description: The main objective of this project is to make it easier for non-technical users of productivity estimates to understand, interpret and communicate productivity and relevant statistics in an informed way, by 1. Providing an outline the theories and methodology underlying the productivity estimates with minimum technicality; and 2. Providing a guidance on the factors that are found to be influential on the changes (over time) or differences (between farms or industries at a particular point in time) in agricultural productivity. The second part of the project will focus on the factors that distinguish the agricultural productivity between farms and industries and that influence changes in productivity over time. Productivity measures business performance from a particular perspective and it is influenced by a subset of economic and technical factors (known as "disembodied technologies").
www.rirdc.gov.au/research-project-details/custr10_GC/PRJ-004592
R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-004592

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Regional scenario analyses for cropping in future climates*

Project leader(s): Department of Agriculture, Fisheries & Forestry GRDC
Project period: 2011 - 2014
Description: The project will engage farmers, researchers, consultants and agribusiness people to develop a regionally specific assessment of adaptive capacity of farms by examining practices in a given region which has enabled survival during the last 10 years. By comparing climate patterns of the last 10 years with those projected in the next 10-20 years in terms of temperature, rainfall and CO_2 , the project will conduct a gap and cost-benefit analysis of farm management practices that may be successful in maintaining viability of farms in future climates. The project will utilise and build upon on existing methodologies developed by SARDI, and CSIRO in assessing the components of adaptive capacities and utilise other GRDC funded extension programs such as the Climate Champion Program and the National Adaptation and Mitigation Initiative to extend the outcomes of the research. It is important that the project engages with local growers and their consultants to capture the breadth of adaptive business and practice approaches. Work has been undertaken in some regions for example the Eyre Peninsula of South Australia and the Northern Agricultural Region of Western Australia.
R&D Program: GRDC **– Project code:** DEF00001

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *Identifying and overcoming limitations in crop models with respect to drought tolerance and climate change*

Project leader(s): Justin Sexton; James Cook University
Project period: 2013 -
Description: The objective of this project is to simulate breeder experiments that identify traits associated with higher sucrose yields in drier climates. This will be achieved using the Agricultural Production systems Simulator (APSIM). Models allow us to simulate breeder experiments without the costs associated with field trials. However, for models to be accurate field measurements must be translated into coefficients within APSIM. Sophisticated statistical methodologies integrated with APSIM outputs offer a novel solution to this problem. It is hoped the knowledge produced in this project will allow researchers and breeders to develop more economical breeding programs.
R&D Program: SRDC

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *Improving yield forecasting capability to enhance market strategies for the Australian sugar industry*

Project leader(s): Yvette Everingham; CSIRO
Project period: 2002 - 2005
Description: A series of SugarCam models have been developed for predicting yields across the Ingham, Ayr, Mackay and Bundaberg terminal regions. These models have been tested in hind-cast mode for the 2004 season and used operationally for predicting the size of the crop for the 2005 harvest. Forecasts are initiated on the 1st December prior to harvest. The simulated forecasts produced on the 1/12/03 for the 2004 season were very accurate. The forecasts were within 2% of the size of the final crop for Ingham, Ayr and Mackay. The forecast produced on 1/12/03 for Bundaberg had a larger (13%) but still acceptable error considering the time of year that the forecast was produced. As more climate data from the 03/04 summer were incorporated into the model, this error decreased. The project team was particularly pleased with the accuracy of these forecasts, especially since these forecasts were produced using a desktop approach with limited local data.
www.srdc.gov.au/page/Research/Search_SRDC_Reports/Autoimported/Improving_yield_forecasting_capability_to_enhance_market_strategies_for_the_Australian_sugar_industry/
R&D Program: SRDC **– Project code:** CSE004

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

Project Title: *Trade implications of climate change policy*

Project leader(s): David Pearce; Centre for International Economics
Project period: 0 -
Description: The purpose of this project is to analyse emerging climate policies in Australian and around the world with a view to understanding the trade implications of these policies — particularly for the agricultural sector. By changing relative costs of production and relative prices, it is expected that climate policies could exert a significant influence on trade patterns, offering both opportunities and threats to Australian producers. It will also use quantitative analysis (supplemented with qualitative assessments as appropriate) to analyse the trade implications of climate policy. The resulting information will be useful for stakeholders and rural policy makers in both developing new policies and in planning for the implications of existing policies.
http://www.rirdc.gov.au/research-project-details/custr10_GC/PRJ-006649
R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-006649

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Indirect

Project Title: *Vegetable Industry Carbon Footprint Scoping Study - Discussion Papers and Workshop*

Project leader(s): Peter Deuter; Queensland Department of Agriculture, Fisheries & Forestry
Project period: 2008 - 2009
Description: Discussion papers addressing: 1. What is a carbon footprint? 2. How will carbon footprinting address the issues of reduction, mitigation, emissions trading and marketing? 3. What carbon footprinting tools are currently available? 4. Is there a preliminary estimation of the carbon footprint of the Australian vegetable industry? 5. Who will use the vegetable carbon tool? 6. What are the options for mitigating greenhouse gas emissions for the Australian vegetable industry?

www.horticulture.com.au/areas_of_Investment/Environment/Climate/vegetable_industry_carbon_footprint_scoping.asp

R&D Program: HAL

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Adoption of an optimal season length for increased industry profitability*

Project leader(s): Lawrence Di Bella; Herbert Cane Productivity Service Limited
Project period: 2004 - 2007
Description: The project developed information packages and tools to assist with the decision-making process on when to harvest particular blocks on farms, optimum season start and finish times for different areas, and opportunities manage cane to maximise CCS, particularly for early harvest. The project has failed to make significant alterations to season length, because at present it is difficult to engage the growing sector in seeking any significant extension of the harvest season. The rationale behind this issue is the perceived risk and lack of financial benefits to obtain increased monetary returns from the crop harvested under current cane pricing arrangements. Surveys conducted throughout the project highlighted that growers would consider season length extension only if there were opportunities to increase monetary returns from value-adding opportunities.

www.srdc.gov.au/page/Research/Search_SRDC_Reports/Uncategorised/Adoption_of_an_optimal_season_length_for_increased_industry_profitability_BSS264/BSS264_-_Final_Report/

R&D Program: SRDC **– Project code:** BSS264

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Climate ready sugarcane: Traits for adaption to high CO2 levels*

Project leader(s): Chris Stokes; CSIRO
Project period: 2009 - 2013
Description: This project led will investigate plant physiological adaptation to climate as a result of inevitably elevated CO_2 conditions. The aim of this project is to contribute to the sugar industry's adaption to climate change by providing strategies that will maximise the benefits of increasing CO_2 levels, ultimately through more effective varieties. The project will reassess the impact of climate change on the industry by establishing the physiology of sugarcane growing in elevated CO_2. It will also assess adaptive strategies for the sugarcane plant in terms of improved water use efficiency and photosynthesis and assess the opportunity for selecting for greater response to elevated CO_2. During 2011–2012 the project will establish CO_2 response curves for leaf segments for acclimated and non-acclimated plants. The results of experiment 1 and 2 results will be analysed, response of whole plants to elevated CO_2 will be defined and models modified to deal with measured responses to elevated CO_2.
R&D Program: SRDC **– Project code:** CPI018

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Rural & primary industries
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Defeating the Autumn Predictability Barrier*

Project leader(s): Yvette Everingham; James Cook University
Project period: 2006 - 2009
Description: This project addressed the gap in forecasting early in the year (e.g. Jan-Mar) the chance of rain during the sugarcane harvesting period. Surveys conducted towards the end of the project among case study participants indicated clear improvements in understanding of climate forecasting as a result of participation in the project. Participants intended to apply their knowledge and the tools available to their future planning practices.

www.srdc.gov.au/page/Research/Search_SRDC_Reports/Uncategorised/Defeating_the_Autumn_Predictability_Barrier_JCU027/

R&D Program: SRDC **– Project code:** JCU027

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Adapting to climate change: does enhanced metabolism provide heritable protection against ocean acidification and increasing temperature in oysters?*

Project leader(s): David Raftos; Macquarie University
Project period: 2012 - 2014
Description: By the end of this century, our oceans will have much higher concentrations of carbon dioxide and will be several degrees warmer. We have developed a population of oysters that can survive in these conditions, and the project will examine these oysters at the molecular level to determine whether increased metabolism is responsible for their survival.
R&D Program: ARC - Discovery **– Project code:** DP120101946

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Antimethanogenic bioactivity of Australian plants for grazing systems*

Project leader(s): Philip Vercoe; University of Western Australia
Project period: 2009 - 2011
Description: The project identified a range of tropical legumes (e.g. Leucaena leucocephala, Desmanthus virgatus), novel forages (e.g. turnip and chicory), plant extracts (e.g. Eremophila glabra, Santalum spicatum) and feed additives (e.g. grape marc or marine products—docosahexaenoic acid (DHA) and Nannochloropsis oculata), that have the potential to reduce methane in the rumen. Significant reduction in methane was observed with 21 samples, including eight feed additives (up to 40 per cent reduction), all eight essential oils (up to 75 per cent reduction), two plant extracts (14 per cent reduction) and three industry by-products (up to 37 per cent reduction). One plant (E. glabra) was shown to reduce methane by directly affecting the methanogens in the rumen. This effect persisted over several weeks and is now being studied to confirm if it works in sheep. The specific plant fractions that are responsible for these effects were purified, as it is anticipated that this will lead the research to the specific compounds that are antimethanogenic and the mechanism behind their action. Most variability in antimethanogenic bioactivity was observed when plants were grown at different locations and between different plant accessions within a species. Season, phenology and grazing had less influence on the variability. The results will assist in developing new grazing and management systems for reducing methane emissions from grazing ruminants.

https://communities.research.uwa.edu.au/vivo/display/grant0000017112

R&D Program: DAFF/MLA - Reducing Emissions from Livestock Research Program **– Project code:** BCCH.1012, P1 FP03b

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Novel strategies for enteric methane abatement*

Project leader(s): University of New England
Project period: 2008 - 2012
Description: The amount of methane (CH4) emitted by ruminants per unit production is higher in animals subjected to poor nutrition. Livestock in northern Australia are often restricted to diets of low nutrition consisting of predominantly dry mature roughage. Supplementing animals on low quality forage (e.g.. standing dry-season grass pastures in tropical and sub tropical Australia) with urea and nitrate (NO3) has been shown to improve production by increasing rumen ammonia concentration, increasing the rate of fermentation and so increasing pasture intake.

However there is a risk from supplementing forages with urea and NO3 of nitrite toxicity which may result in fatalities. Nitrate salts can potentially replace urea as non protein nitrogen (NPN) with the added benefit that NO3 will reduce CH4 emissions. This research showed that dietary nitrate is a highly effective abatement technology reducing methane emissions in proportion to the dose added for livestock in northern Australia. It can be delivered safely in processed feeds and in lick blocks at levels which deliver quantifiable emissions reduction. Ruminal nitrate reduction is extremely rapid and emission levels return to normal after three hours of nitrate feeding. Methane yield of cattle without rumen protozoa did not differ from that of untreated cattle, but protozoa-free cattle were 30 kg heavier than untreated counterparts by the completion of the study. Bioactive compounds from a range of chemical families were assessed for anti-protozoal action in the laboratory. The lead compound showed no efficacy in sheep. Further research is required to investigate the nutritional value and animal safety of supplementing livestock diets with nitrates. Such research is required to warrant the development of nitrate supplementation as a Carbon Farming Initiative methodology for reducing methane emissions of livestock in northern Australia farming systems.

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE: ★ ☆ ☆ ☆**
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Wetting of cattle to alleviate heat stress on ships*

Project leader(s): John Gaughan; University of Queensland
Project period: - 2003
Description: Wetting cattle with warm salt water reduced rectal temperature, respiration rate and panting score & increased cattle comfort. Critical thresholds for cattle to reduce their heat load for relative humidity (~60%) and wet bulb temperature (~30oC). Documented clinical heat stress symptoms. Recommended wetting treatments for cattle during transport

www.livecorp.com.au/rd-report/wetting-cattle-alleviate-heat-stress-ships
R&D Program: LiveCorp, MLA **– Project code:** LIVE.0219

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE: ★ ☆ ☆ ☆**
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Archeaphage therapy to control rumen methanogens*

Project leader(s): Athol Klieve; University of Queensland Queensland Department of Agriculture, Fisheries and Forestry
Project period: 2008 - 2012
Description: A range of animal-derived and environmental source samples were tested using culture-based methodology, however no lytic phages of methanogens were isolated. Given the dearth of knowledge regarding phages of rumen methanogens, this project established that these naturally-occurring phages may be present in very low concentrations within the rumen and this will need to be considered in future methanogen-phage isolation investigations. The project has begun the process of developing and adapting new methodologies for detecting and examining these phages.

http://futurebeef.com.au/wp-content/uploads/5-Archaeaphage-therapy-to-control-rumne-methanogens1.pdf
R&D Program: DAFF - Reducing Emissions from Livestock Research Program

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE: ★ ☆ ☆ ☆**
SUBTOPIC: Rural & primary industries
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *More than defence: primary roles for cyanogenic glucosides*

Project leader(s): Roslyn Gleadow; Monash University
Project period: 2013 - 2015
Description: The tropical crop, sorghum, produces toxic cyanide to avoid being eaten by herbivores, but this diverts resources away from growth and reproduction. Using non-toxic sorghum mutants, this project seeks to explain how cyanide production is regulated and enhance agricultural efficiency in the face of climate change.
R&D Program: ARC - Discovery **– Project code:** DP130101049

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Rural & primary industries

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Rubisco for all climates: unlocking the enzyme's structure-function relations for more efficient photosynthesis*

Project leader(s): Spencer Whitney; Australian National University

Project period: 2012 - 2014

Description: This projects biotechnological research will identify structural features in the carbon dioxide (CO_2)-capturing enzyme from plants that improve its performance, particularly at warmer temperatures. This knowledge is vital for predicting the influence of climate change on crop productivity and paving the way for supercharging photosynthesis to boost crop performance.

R&D Program: ARC - Discovery **– Project code:** DP120101603

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Rural & primary industries

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The global history of organic farming*

Project leader(s): Gregory Barton; Australian National University

Project period: 2013 - 2015

Description: The first global history of the organic farming movement explains how organic farming changed land-use, government policy and consumer habits. Understanding how this scientific and cultural movement arose, where it succeeded and where it failed, helps to better formulate policy that promotes sustainable agriculture, human health and climate.

R&D Program: ARC - Discovery **– Project code:** DP130104633

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Improving the efficiency of biodiversity investment*

Project leader(s): Natalie Stoeckl; James Cook University

Project period: 2011 - 2014

Description: This project will help identify ways of promoting biodiversity conservation while also promoting other goals of private land managers. So it will enable land managers to identify low-cost strategies (ones that do not compromise other goals) for protecting and maintaining biodiversity in northern Australia. This will significantly benefit Australia as a whole because it will improve the efficiency of biodiversity investments. By working closely with private landholders, natural resource management bodies and other researchers in northern Australia, the project will help: • Improve our understanding of the activities, resources and cost required to achieve different social, financial and biodiversity objectives. • Identify complementary objectives. • Quantify some of the potential savings that could be made by pursuing multiple, related objectives.

www.nerpnorthern.edu.au/research/projects/13

R&D Program: NERP Northern Australia **– Project code:** NERP NA 1.3

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *National strategies and coordination (Reducing Emissions from Livestock Research Program (RELRP))*

Project leader(s): Tom Davison; Meat & Livestock Australia

Project period: 2008 - 2012

Description: Key Outcomes: Preliminary results indicate that it will be possible to identify sires whose progeny will produce less methane. Feed supplements– dietary oil and grape marc have shown promising results for reducing methane. Several forages have been identified as having immediate, persistent and maintained methane reduction impact when included as part of a mixed diet. Nitrate supplements have consistently and rapidly reduced methane production, however further understanding of its potential toxicity impact is required. Online calculator – FarmGAS has been developed and launched to allow producers to explore abatement options.

www.mla.com.au/Research-and-development/Research-programs-and-projects/Environment/Reducing-emissions-from-livestock-research-program

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Building Markets in Environmental and Land Management Services*

Project leader(s): Office of Northern Australia
Project period: 2013 -
Description: This project will develop a proof of concept for establishing an economic market in environmental and land management services in northern Australia. The project will also identify barriers to participation for Indigenous communities in managing Australia's environment and cultural heritage.
www.regional.gov.au/regional/ona/bmelms.aspx

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Northern Australia **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *Remote sensing estimation of greenhouse gas emissions from floodplains in the wet☐dry tropics*

Project leader(s): Marc Leblanc; James Cook University
Project period: 2011 - 2013
Description: This project provides regional scale estimates of greenhouse gas emissions from major floodplains in the wet dry tropics. These estimates are required for future national carbon accounting, and are critical knowledge gaps for current global climate models.
R&D Program: ARC - Discovery **– Project code:** DP110103364

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: North Queensland **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Compost and biochar amendments for increased carbon sequestration, increased soil resilience and decreased greenhouse gas fluxes in tropical agricultural soils*

Project leader(s): Michael Bird; James Cook University
Project period: 2012 - 2015
Description: This project will trial compost, biochar and COMBI-mix (biochar mixed with organic waste prior to composting) soil amendments to North Queensland tropical agricultural soils. The trials will consist of business as usual, compost alone, biochar alone, COMBI-mix and compost mixed with biochar at a number of field sites. From the trials, the project will determine the impact of each on carbon sequestration, greenhouse gas fluxes and crop performance.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf
R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Coordination of the National Livestock Methane*

Project leader(s): Tom Davison; Meat & Livestock Australia
Project period: 2012 - 2015
Description: This project will coordinate and manage the National Livestock Methane Program. The program will assist livestock producers to reduce methane emissions by conducting research under a nationally agreed collaborative program including nutrition, rumen processes, genetics, modelling focussed on abatement and increased farm productivity that will underpin methodology development for the Carbon Farming Initiative.
R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: North Queensland **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Demonstration projects for on-farm practical methane strategies*

Project leader(s): Meat & Livestock Australia
Project period: 2008 - 2012
Description: Key activities at the Lansdown Research Station (638 hectares of native and improved pastures) included: • An inaugural field day attracting about 120 visitors and the CSIRO Agriculture Flagship leadership team • Primary Industries Adaptation Research Network Master Class one day workshop and tour • Northern Australian Beef Research Council forum. The CSIRO Lansdown demonstration site is helping to communicate research activities and results to the northern beef industry. The Lansdown location makes it ideal for further demonstrations that will be required to demonstrate measuring emissions under local conditions for the northern beef herd.
R&D Program: DAFF - Reducing Emissions from Livestock Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Effective management practices to reduce nitrous oxide emissions from sugarcane soils*

Project leader(s): Weijin Wang; Queensland Department of Science, Information Technology, Innovation & the Arts
Project period: 2012 - 2015
Description: This project will identify best management practices for mitigating nitrous oxide emissions in sugarcane production. The research will use state-of-the-art approaches including automatic gas sampling chambers, big manual chambers, stable isotope tracing and modelling to provide robust scientific data and evidence-based advice. Environmentally effective and economically efficient mitigation strategies for different ecological conditions and management regimes will be identified and communicated to stakeholders through strong government and industry participation. These activities will help promote low-emission farming practices in the sugar industry.
www.n2o.net.au/index.php/research-projects/2012-2015/effective-management-practices-to-reduce-nitrous-oxide-emissions-from-sugarcane-soils\
R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Environmental plantings for soil carbon sequestration on farms*

Project leader(s): Keryn Paul; CSIRO
Project period: 2012 - 2015
Description: This national project will support the extension of the Carbon Farming Initiative (CFI) methodology for mixed-species environmental plantings to include carbon in soil. It will target agricultural-environmental planting sites for diverse climates and soil types and study how management of farmland with low opportunity costs affects soil carbon. The project aims to give land managers the required knowledge for CFI reforestation participation on marginal farm land.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf
R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *Integrated data and synthesis framework for reducing nitrous oxide emissions from Australian agricultural soils*

Project leader(s): Peter Grace; Queensland University of Technology
Project period: 2009 - 2012
Description: Emissions of N2O across Australia's diverse soils and agricultural systems varied widely, from coarse textured cropping soils of Western Australia (50 g N2O-N ha-1 annum-1) to high rainfall fertile pastures of southern Victoria and cane systems of northern Queensland (with episodes > 1 kg N2O-N ha-1 day-1). Land use and farming systems history have a major impact on N2O emissions, particularly the interaction with carbon (C) availability and especially when soil moisture levels are high (and conducive to denitrification). For example, in high rainfall southern Victoria, annual N2O emissions from cropped soils which have just come out of pasture may exceed 35 kg N2O-N, with no application of additional nitrogen (N). Similarly, in trash retained cane systems of northern Queensland emissions, N2O emissions average 16 kg N2O-N/annum.

www.isr.qut.edu.au/domains/greenhouse/

R&D Program: DAFF - Nitrous Oxide Research Program, GRDC **– Project code:** QUT00002

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *National coordination of an integrated, data synthesis and modelling network for reducing nitrous oxide emissions from Australian soils*

Project leader(s): Peter Grace; Queensland University of Technology
Project period: 2012 - 2015
Description: This project aims to deliver a suite of mitigation strategies to reduce nitrous oxide emissions from Australian agricultural soils which embrace the synergies of the soil carbon and nitrogen cycles, increase nitrogen use efficiency, long-term productivity and profitability. This will be achieved through complementary laboratory and field studies, data integration, synthesis and modelling under the management of the Grains Research and Development Corporation. The project will close research gaps, improve modelling capability and link relevant rural research, demonstration and extension programs.

www.n2o.net.au/index.php/research-projects/2012-2015/national-coordination-of-an-integrated-data-synthesis-and-modelling-network-for-reducing-nitrous-oxide-emissions-from-australian-soils

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Optimising and managing coastal carbon: Comparative sequestration and mitigation opportunities across Australia's landscapes and land uses*

Project leader(s): Anissa Lawrence; TierraMar Consulting Pty Ltd
Project period: 2011 - 2012
Description: This report summarises the ability of Australia's coastal wetland ecosystems, particularly mangroves, saltmarsh and seagrass to capture and store carbon. Coastal carbon capture and storage was compared with carbon capture of Australia's terrestrial ecosystems, including native forests, grasslands, croplands, freshwater wetlands and agricultural land use. It is internationally recognised that carbon sequestration, or removing carbon from the atmosphere and storing it in vegetation and soils is a key part of the strategy to mitigate against the world's changing climate. The focus of Kyoto and many other international forums has been on accounting for emissions and removals of greenhouse gases from the land, including the growth and life cycles of forests and agricultural crops, soils, land cover change and land management. There is evidence and growing consensus that through avoided emissions, conservation, repair and sustainable use the world's coastal wetland ecosystems can play a major role in carbon management. Known as blue carbon sinks, mangroves, seagrass and saltmarsh can sequester and store carbon in their sediments and biomass at higher rates than those of terrestrial forests. Unlike most terrestrial ecosystems, the carbon stored in coastal wetland ecosystem sediments has extremely long residence times, potentially for millennia.

http://frdc.com.au/research/final-reports/Pages/2011-084-DLD.aspx

R&D Program: FRDC **– Project code:** 2011/084

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

Project Title: *Potential soil carbon sequestration in Australian grain regions and its impact on soil productivity and greenhouse gas emissions*

Project leader(s): Enli Wang; CSIRO
Project period: 2012 - 2015
Description: This project will define soil organic carbon (SOC) sequestration potential and identify management practices that benefit both productivity and SOC stocks. It will use the farming systems model APSIM (Agricultural Production Systems Simulator), together with measurements to identify agricultural practices that increase SOC, quantify SOC sequestration potential across Australian grain regions, assess the vulnerability of sequestered carbon to subsequent changes in management and climate, and investigate the impacts of SOC change on carbon-nitrogen cycling, productivity and greenhouse gas emissions.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/nitrous-oxide-research

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: East Coast Catchments **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Reducing nitrous oxide emissions from sugarcane lands*

Project leader(s): Weijin Wang; Queensland Department of Science, Information Technology, Innovation & the Arts
Project period: 2008 - 2012
Description: The results suggest that Australian sugarcane cropping systems can be a significant source of N2O emissions, and the researchers believe further investigation is required to identify the most effective mitigation strategies for this industry. The present study confirmed that the rate of fertiliser nitrogen (N) application under legume rotation is generally much lower than under continuous sugarcane cropping or bare fallow, as legume crops fix N from the atmosphere and supply N to the succeeding crop. In addition, soybean rotation can improve soil health and fertility and provide extra income to growers from grain sale. However, in this study soybean fallow also significantly increased N2O emissions during the late stage of the fallow period, particularly in the months following incorporation of the soybean biomass. Particular soybean residue management practices that could reduce nitrous oxide emissions and maximise nitrogen use efficiency by sugarcane crops have not yet been identified or developed. Emissions of N2O following urea application (150 kg N/ha) accounted for 4.5 per cent of the fertiliser nitrogen applied. Addition of the nitrification inhibitor DMPP in urea reduced N2O emissions by 34 per cent. However, the efficacy of nitrification inhibitors is affected by soil properties and environmental conditions. The researchers therefore suggest that the effectiveness of this technique should be assessed in other areas under different climatic conditions. Substantial CH4 emissions occurred during both fallow and cropping periods, with cumulative CH4 emissions similar between fallow and fertilisation regimes. High CH4 emissions are generally created under prolonged waterlogged conditions; given the unusually wet weather during the experimental periods, this result is not predictive of methane emissions from other soil and climatic conditions. Further research would be required to verify whether significant CH4 emissions would occur in other soil and climate conditions across sugarcane cropping regions.

www.n2o.net.au/index.php/research-projects/2008-2012/reducing-n2o-on-sugarcane-lands-mackay-qld

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Northern Australia **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *The emerging carbon economy for northern Australia: challenges and opportunities*

Project leader(s): Office of Northern Australia
Project period: 2012 -
Description: Identifies three strong prospects for northern Australia to participate in the carbon economy: (1) Reduced emissions from fire and livestock; (2) Increased biosequestration in soils and vegetation; and (3) Growing feed-stocks for biofuel production. Discusses opportunities and impediments and how they could be overcome.

www.regional.gov.au/regional/ona/carbon-economy-for-northern-australia-2012.aspx

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Direct

Project Title: *Securing a Clean Energy Future*

Project leader(s):
Project period: -
Description:
www.cleanenergyfuture.gov.au/clean-energy-future/securing-a-clean-energy-future

R&D Program: Commonwealth of Australia

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Carbon sequestration in soil under no-till as affected by rainfall, soil type and cropping systems in Queensland*

Project leader(s): Mike Bell; Department of Science, Information Technology, Innovation & the Arts
Project period: 2008 - 2012
Description: Research findings indicate that there is no evidence of increases in soil organic carbon stocks in response to no-till management in Queensland grain or sugarcane growing regions. However, no-till management does appear to have slower soil organic carbon loss and may be able to maintain stocks of organic carbon for longer periods following the input of organic carbon via pasture leys or green manure crops. On a regional level, climatic variables (particularly the average vapour pressure deficit in the last five years), sand content and plant biomass production have had the most influence on the organic carbon stocks of the cropping soils sampled. Management would appear to have had minimal impact on a regional level. This is likely because of the low input nature of the crop-fallow management system used throughout Queensland, and the low use of management practices, such as pasture leys, capable of inputting significant quantities of organic carbon (especially via plant roots) into the soil.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Coordination of the National Soil Carbon Program / Soil carbon increase through rangeland restoration by facilitating native forest regrowth*

Project leader(s): Ram Dalal; Queensland Department of Science, Information Technology, Innovation & the Arts
Project period: 2012 - 2015
Description: This project will coordinate and manage the soil carbon projects as a national program. In addition, it will also use standardised sampling and measurement methods in previously-cleared Queensland rangelands to quantify increases in carbon and carbon pools in soil and biomass under native forest regrowth up to 50 years old. Through modelling, the project will quantify the optimal soil carbon sequestration and pasture production for rangeland. The project will also contribute to developing a Carbon Farming Initiative methodology for managed forest regrowth for rangelands.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods　　　　　**NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: Queensland **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Quantifying nitrous oxide losses and nitrogen use efficiency in grains cropping systems on clay soils with contrasting soil carbon status and land management*

Project leader(s): Mike Bell; Queensland Alliance for Agriculture & Food Innovation / University of Queensland

Project period: 2012 - 2015

Description: Declining soil organic matter and mineralisable nitrogen reserves characterise grain cropping soils in Queensland. Management responses include increasing fertiliser nitrogen use or increasing soil organic matter and mineralisable nitrogen with pasture leys, manures and more frequent use of leguminous species. The effectiveness of these strategies on sustainably and efficiently meeting system nitrogen demand, maintaining or improving soil carbon stocks and minimising losses of nitrous oxide have not been determined. This project will quantify the effects of these strategies on fertiliser nitrogen requirement, gaseous nitrogen losses and soil carbon status.

www.n2o.net.au/index.php/research-projects/2012-2015/quantifying-nitrous-oxide-losses-and-nitrogen-use-efficiency-in-grains-cropping-systems-on-clay-soils-with-contrasting-soil-carbon-status-and-land-management

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods　　　　　**NRM RELEVANCE SCORE:** ★★★★☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: WT Cluster **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *Harnessing natural regeneration for cost-effective rainforest restoration*

Project leader(s): Carla Catterall; Griffith University; Luke Shoo; University of Queensland

Project period: 2011 - 2014

Description: This project evaluates active vs passive options for re-establishing rainforest on post-agricultural land, with biodiversity and carbon benefits. The project is part or a broader research program and practical on-ground adaptation concerned with restoring and connecting habitat within priority climate change refugia.

www.nerptropical.edu.au/project/project-122-harnessing-natural-regeneration-cost-effective-rainforest-restoration

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 12.2

TOPIC: Industries & livelihoods　　　　　**NRM RELEVANCE SCORE:** ★★★☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Soil carbon benefits through reforestation in sub-tropical and tropical Australia*

Project leader(s): Tim Smith; Queensland Department of Agriculture, Fisheries & Forestry

Project period: 2012 - 2015

Description: This project will assess soil carbon sequestration under reforestation to enable accounting of full mitigation benefits (biomass and soil) and assist land managers to participate in Carbon Farming Initiative reforestation projects with increased confidence. It also will collect soil and biomass carbon data across hardwood, softwood, savannah and rainforest ecosystems in sub-tropical and tropical Australia to develop relationships of changes in soil carbon pools over time following reforestation of agricultural land. Finally, it will refine sampling protocols for improved measurement of soil carbon, develop a decision support calculator and provide economic case studies, enabling land managers to determine the feasibility of carbon farming through reforestation.

www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods　　　　　**NRM RELEVANCE SCORE:** ★★★☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Advanced process level understanding of factors controlling gaseous nitrogen partitioning to reduce nitrous oxide losses from Australian agricultural soils*

Project leader(s): Clemens Scheer; Queensland University of Technology

Project period: 2012 - 2015

Description: This project will improve the level of understanding of the interaction of the carbon and nitrogen cycles on nitrous oxide emissions, specifically the variation in the nitrous oxide to nitrogen ratio during emissions events. The partitioning between nitrous oxide and nitrogen gas emissions is influenced by soil moisture, carbon and nitrogen availability, and is a major area of uncertainty when predicting nitrous oxide emissions in response to management. Models are absolutely critical for the development and verification of practical abatement strategies to reduce nitrous oxide emissions under the Carbon Farming Initiative.

www.n2o.net.au/index.php/research-projects/2012-2015/advanced-process-level-understanding-of-factors-controlling-gaseous-nitrogen-partitioning-to-reduce-nitrous-oxide-losses-from-australian-agricultural-soils

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Development of a low-emission nitrogen fertiliser based on slow release of ammonium from clay-modified activated charcoal*

Project leader(s): Scott Donne; University of Newcastle
Project period: 2012 - 2015
Description: This is a one year proof of concept project to further develop a novel nitrogen fertiliser that limits availability of substrate for denitrification. High emission agro-climatic regions are typified by high soil carbon and nitrogen input in high rainfall or irrigated zones (e.g. dairy, sugarcane, subtropical horticulture). By reducing the rate of nitrogen release to plants, via controlled desorption of ammonium from clay-modified activated carbon, the substrate for denitrification can be limited without reducing crop productivity. The fertiliser will be tested in controlled and field conditions, and data made available for Carbon Farming Initiative methodology development.
www.n2o.net.au/index.php/research-projects/2012-2015/development-of-a-low-emission-nitrogen-fertiliser-based-on-slow-release-of-ammonium-from-clay-modified-activated-charcoal
R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Enhanced efficiency fertilisers as mitigation tools for reducing greenhouse gas emissions from intensive agricultural systems*

Project leader(s): Deli Chen; University of Melbourne; Helen Suter; University of Melbourne
Project period: 2008 - 2012
Description: Nitrification inhibitors were found to reduce N_2O emissions from a range of soils and agricultural industries under different climatic conditions by up to 90 per cent. Use of Green Urea instead of granular urea reduced NH_3 loss by 68 per cent. The impact of the urease inhibitor was found to be highly climate dependent. Emissions of N_2O increased with the use of Green Urea in a field trial. This result highlights the need for targeting application of enhanced efficiency fertilisers. Sugarcane production has been identified as an enterprise with high N inputs where the use of nitrification inhibitors can reduce direct and indirect N_2O emissions (from nitrate leaching). Results from three sugarcane soils (two from Mackay and one from Pin Gin) showed that N_2O emissions could be reduced by up to 75 per cent and that industries that apply urea to the soil surface would gain the greatest benefit from the use of Green Urea. The greatest reductions in N_2O emissions were observed in pasture soils, sugarcane soils and soils converted from pasture to grain. The effectiveness of the inhibitor to reduce N_2O emissions decreased with increasing temperature, but this effect was also dependent upon the soil type.

www.piccc.org.au/research/project/264
R&D Program: DAFF - Nitrous Oxide Research Program, GRDC

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *Fertiliser management strategies for decreasing on-farm greenhouse gas emissions*

Project leader(s): Louise Barton; University of Western Australia
Project period: 2009 - 2012
Description: Grain production is a net producer of greenhouse gases (GHG) via fertiliser, herbicide and farm machinery usage. In south-western Australia, previous research demonstrated that applying N fertiliser as urea contributed ca. 80% to total on-farm emissions by emitting carbon dioxide (CO_2) via urea hydrolysis, and nitrous oxide (N_2O) via soil biological activity. This project will determine if on-farm CO_2 emissions from urea can be decreased by substituting urea with grain-legume fixed N; and if on-farm N_2O emissions can be decreased by raising soil pH (via liming). Nitrous oxide emissions will be measured on a sub-daily basis from lupin-wheat rotations (limed and unlimed) using soil chambers connected to a fully automated system that enables simultaneous determination of greenhouse gases (N_2O, CH_4, CO_2). Research findings will equip grain producers with strategies to manage on-farm GHG emissions.
www.grdc.com.au/Research-and-Development/Advancing-profitable-farming-systems/UWA00131
R&D Program: GRDC **– Project code:** UWA00131

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Direct

Project Title: *From Source to Sink: A National Initiative for Biochar Research*

Project leader(s): CSIRO
Project period: 2009 - 2012
Description: Biochar can be highly variable in chemical and physical properties and should be characterised to ascertain suitability for purpose. Results indicated that wood, green-waste and nutshell biochars are most likely to have a higher organic carbon content and a lower nutrient content than biochar produced from food waste, paper mill waste and poultry manure. While it is now possible to advise which feedstock and production temperatures are necessary to either maximise carbon sequestration or agricultural benefit, the researchers noted that the differences within broadscale feedstock groupings needs further research to determine whether these differences impact on the behaviour of biochar in soils. Biochars produced at higher temperatures (550°C) and from wood derived materials tend to be more stable than lower temperature (450°C) or high ash biochars, which tend to have a greater amount of agronomically available nutrients. As such, biochars produced at the higher temperature offer a promising option for the long-term sequestration of carbon in the landscape. Biochar did not reduce nitrous oxide emissions under dryland agricultural conditions (typical of large parts of Western Australia). However, the same biochar source did decrease nitrous oxide emissions under moist pedoclimatic conditions (e.g. northern New South Wales). These results show that the same biochar source can have a markedly different response depending on soil type and climatic conditions. Biochar has been shown to reduce herbicide efficacy in laboratory experiments but this effect and its longevity need to be verified under field conditions. Most biochars produced in Australia had a low amount of organic and metal toxicants such as polycyclic aromatic hydrocarbons (PAHs) and dioxins. The researchers noted that caution should be exercised when importing biochars from overseas and recommended that guidelines detailing the minimum amount of chemical analysis should be put in place. Life cycle assessment showed that most biochar scenarios examined led to a substantial reduction in greenhouse gas emissions. However, the assumptions applied to the reference use of the biomass means these findings are uncertain.
www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/biochar-research
R&D Program: DAFF - National Biochar Initiative

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Maintenance of soil organic carbon levels supporting grain production systems: The influence of management and environment on carbon and nitrogen turnover*

Project leader(s): Frances Hoyle; Department of Agriculture & Food, Western Australia
Project period: 2012 - 2015
Description: This project will investigate the stability of soil carbon under variable climate and management practices. Established research sites with different (or altered) soil organic carbon contents will be used to determine maximum soil carbon storage, the influence of carbon on critical soil functions and long-term viability of sequestering carbon as an emissions management practice. This evidence based approach combines field-based research with database analysis to provide information to landholders on beneficial/perverse outcomes associated with changing soil carbon levels in grain production systems. This will enable landowners to determine the profitability and risk of managing carbon from a sequestration versus production perspective.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf
R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Australia-wide **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *Improved carbon and greenhouse gas outcomes through better understanding and management of soils and plant inputs at the farm scale*

Project leader(s): Mark Adams; University of Sydney
Project period: 2012 - 2015
Description: This project will develop methodologies for auditable quantification of carbon-equivalent benefits of management practices. Practices will include tillage and incorporation of legumes in crop rotations and pastures, with emphasis on the effects of management on soil structure and chemistry of soil organic matter. Methodologies include farm- or paddock-scale (flux) measures of carbon dioxide, methane and nitrous oxide as well as soil carbon sequestration. Outcomes of this phase of research will be incorporated into newly developed models that include temperature and moisture regimes determined using remote sensing. Final outcomes will be predictive tools that can be applied to the major cropping and grazing regions of New South Wales.

www.n2o.net.au/index.php/research-projects/2012-2015/improved-carbon-and-greenhouse-gas-outcomes-through-better-understanding-and-management-of-soils-and-plant-inputs-at-the-farm-scale

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Northern Australia **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *Mitigation of methane emissions from the northern Australian beef herd*

Project leader(s): Ed Charmley,; CSIRO
Project period: 2008 - 2012
Description: A micrometeorological methodology for estimating herd scale emissions using an indirect open-path spectroscopic technique and an atmospheric dispersion model is described. Livestock emissions have been measured for properties in Queensland and the Northern Territory. In addition, 22 diets, combining tropical grass and legume species, have been fed to cattle under animal house conditions and methane (CH_4) emissions measured using open-circuit respiration chambers. Daily mean (± sem*) CH_4 emissions from the study sites ranged from 136 ± 21.5 g/hd/d to 281 ± 22.3 g/hd/d. Low emissions were associated with young steers grazing irrigated and fertilised Rhodes grass. High emissions were associated with mature Brahman cows and heavier steers grazing Buffel/Sabi grass pasture. Animal house studies indicated that CH_4 production could be predicted as 19.6 g/kg forage dry matter intake. Mean CH_4 emission rates across all diets were approximately 5.2 - 7.2 per cent of gross energy intake which compare favourably with Tier 1 emission factors from the Intergovernmental Panel on Climate Change (IPCC, 2006) for large ruminants fed low-quality crop residues and by-products. Methane emission values for mixed diets have been characterised and can be benchmarked in grazing systems across northern Australia using the dispersion methodology.

www.mla.com.au/files/fc376ff5-25fc-4873-9c8f-9da0009d1411/Mitigation-of-methane-Nth-beef.pdf

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Direct

Project Title: *Characterising nitrous oxide emissions from nitrification*

Project leader(s): Ryan Farquharson; CSIRO
Project period: 2012 - 2015
Description: This project will improve understanding and modelling of nitrous oxide emissions from nitrification by measuring potential nitrification rates and nitrous oxide emissions in laboratory incubations of a range of soils from various production systems. The assumption that a constant proportion of nitrified nitrogen is emitted as nitrous oxide will be tested and updated model algorithms will be provided. This will allow improvement of models that in future may underpin the development and assessment of mitigation strategies.

www.n2o.net.au/index.php/research-projects/2012-2015/characterising-nitrous-oxide-emissions-from-nitrification

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Elsewhere in Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *A method for efficient and accurate project level soil organic carbon determination using in situ spectrophotometry and advanced spatial analysis*

Project leader(s): James Schultz; Geo Carbon Services Pty Ltd
Project period: 2012 - 2015
Description: This project aims to demonstrate a commercially cost-efficient method to measure rangeland soil organic carbon (SOC) content and composition. The pilot project will be undertaken on 65 000 hectares of central Australian rangeland. It will utilise remote and ground based spectrometry, geospatial modelling using satellite derived soil with vegetation and landform indices to improve the basis for spatially stratifying soil types or land management zones to further improve sampling efficiency and confidence in SOC estimates.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf
R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Does increasing soil carbon in sandy soils increase soil nitrous oxide emissions from grain production?*

Project leader(s): Louise Barton; University of Western Australia
Project period: 2012 - 2015
Description: The project will investigate if increasing the amount of carbon stored in the soil will alter emissions of nitrous oxide, affect crop production or alter the amount of nitrogen fertiliser needed to produce a profitable crop. Understanding how increasing soil carbon effects soil nitrous oxide emissions and crop production will enable us to assess the suitability of soil carbon sequestration for abating greenhouse gas emissions from land.
www.n2o.net.au/index.php/research-projects/2012-2015/does-increasing-soil-carbon-in-sandy-soils-increase-soil-nitrous-oxide-emissions-from-grain-production
R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Emission Reduction Policies and Carbon Prices in Key Economies*

Project leader(s): Productivity Commission
Project period: 2011 - 2011
Description: This report examined and detailed key emissions reduction policies either in place or committed in Australia and other key economies, such as the UK, USA, Germany, New Zealand, China, India, Japan and South Korea; estimated the effective carbon price per tonne of carbon dioxide equivalent (CO_2-e) faced by the electricity generation sectors in these economies, and selected industries drawn from manufacturing and transport sectors in these and other countries where relevant and data permitting; described the methodology, assumptions and data sources used, so as to inform further analysis in this area.
www.pc.gov.au/projects/study/carbon-prices
R&D Program: Productivity Commission **– Project code:** PRODCOM-414-9

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Genetic improvement of beef cattle for greenhouse gas outcomes*

Project leader(s): New South Wales Department of Primary Industries
Project period: 2008 - 2012
Description: Results from this research showed that there are cattle that naturally produce less methane relative to their feed intake, that is, cattle that have a naturally lower MY. Differences between sires in MY by their progeny were observed and were statistically significant. Preliminary results show that phenotypic associations are low, probably negotiable, for MY with weight gained on pasture, body composition and meat quality taken near the time of methane measurement. While the magnitude of genetic correlations cannot be determined until more records for MY are collected, it does appear that phenotypic variation in MY does not appear to be associated with genetic variation in weight traits, important body composition and carcass traits, and fertility traits (as indicated by lack of associations with Estimated Breeding Values (EBV)). The implications from these preliminary results are that it is unlikely to be possible to predict MY for individual cattle based on simple phenotypic measurements such as weight

or scanned body composition information. Further, selection using current BREEDPLAN®. EBV to change methane production, particularly MY, in the next generation of cattle will not lead to a predictable change in MY. Therefore, to be able to use animal breeding to predictably reduce methane yield will require a new breeding value for a methane-related trait to become available to cattle breeders.

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Genetic technologies to reduce methane emissions from Australian beef cattle*

Project leader(s): Graham Denney; New South Wales Department of Primary Industries

Project period: 2012 - 2015

Description: This project aims to deliver genetic technologies for breeding cattle with a low methane trait. It will provide new knowledge on genetic variation in methane production and genetic associations with other production traits and will record methane production by animals from the major Australian breeds. It will also cost methane emissions into the breeding values and profit indices used to describe the genetic merit of cattle in the national genetic evaluation system BREEDPLAN.

R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Impacts of Leucaena spp. plantations on greenhouse gas emissions and carbon sequestration in northern Australian cattle production systems*

Project leader(s): Chris McSweeney; CSIRO

Project period: 2012 - 2015

Description: This project will build on previous work by CSIRO that demonstrates that Leucaena spp. supplementation to cattle may result in decreased methane emissions. This project will investigate the potential to reduce greenhouse gas emissions through Leucaena cattle-feeding systems in comparison with native pastures by evaluating yearly livestock productivity, herd methane emissions and the sequestration of carbon in the soil. The project will also assess the microbial changes in the rumen that reduce methane to inform research that aims to manipulate the rumen through improved digestive efficiency.

R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Increasing productivity and reducing methane emissions by supplementing feed with dietary lipids*

Project leader(s): Queensland Department of Primary Industries & Fisheries University of Queensland

Project period: 2008 - 2012

Description: In vitro research using Algamac 3050 at all levels of inclusion reduced methane generation whilst appearing not to affect rumen microbial population dynamics, including the methanogen population. There were no differences in dry-matter digestion or the numbers of methanogens or methanogen population structure. All levels of Algamac inclusion had similar effects, suggesting that the mechanism that lowers methane with algal oils is different to that of other oils, which directly impacts on the microbial ecosystem at higher levels of inclusion.

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Increasing soil carbon in eastern Australian farming systems: Linking management, nitrogen and productivity*

Project leader(s): Fiona Robertson; Department of Primary Industries, Victoria

Project period: 2012 - 2015

Description: This project will determine the effectiveness of a range of management practices for increasing soil carbon in cropping and pasture systems across eastern Australia, focusing on enhancing carbon input and permanence in key soil types and climatic zones. Soil carbon will be measured in farm paddocks and field trials. Simulation models, validated with measurement data will be used to extend experimental findings across eastern Australia. The project will support development of Carbon Farming Initiative methodologies to help landholders increase soil carbon and reduce greenhouse gas emissions.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/biochar-research

R&D Program: DAFF - Biochar Capacity Building Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Manure management to reduce greenhouse gas emissions from cattle feedlots*

Project leader(s): University of Melbourne

Project period: 2008 - 2012

Description: UI application to cattle pens was found to have a significant effect on urea content in manure but, even after treatment, retained urea was rapidly depleted within the first days after pen clearing and manure stockpiling, and UI-treatment could not be reliably linked to reduced NH_3 emissions from manure stockpiles. Sustained retention of urea in the manure as it is removed, stockpiled and ultimately incorporated into agricultural soils remains an operational challenge, because of the transient effect of the UI, and pen-access difficulties in wetter months. Moreover, even if practicable, the additional cost of implementing UI application at the label rate was estimated at $38 per turned-out-steer, or $459 per tonne of mitigated CO2-e. Cost effectiveness of UI application for mitigation of ammonia and greenhouse gas emissions seems doubtful however recommendations to progress this work include more resilient additives, cheaper and more reliable application methods, and improved emissions measurement within the pens.

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Mitigating nitrous oxide emissions from soils using pulses and improved nitrogen management*

Project leader(s): Graeme Schwenke; University of New England

Project period: 2009 - 2012

Description: Environmentally, losses of N2O from cropping soils are significant, with the N2O emitted directly from the soil accounting for about 45% of the total greenhouse gas emissions coming from the entire operation of growing, fertilising, spraying and harvesting a wheat crop. Another 27% of the total came from urea production and urea hydrolysis in the soil. A complete Life Cycle Assessment of the CO2-equivalents produced by our canola-wheat and the chickpea-wheat rotation treatments showed 1926 kg CO2–e/ha coming from the canola-wheat compared to only 730 kg CO2–e/ha from the chickpea-wheat (nil N applied), and 1290 kg CO2–e/ha from the chickpea-wheat+N.

www.grdc.com.au/Research-and-Development/Advancing-profitable-farming-systems/UNE00012

R&D Program: GRDC **– Project code:** UNE00012

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Native perennial vegetation: Building stable soil carbon and farm resilience*

Project leader(s): Jonathan Sanderman; CSIRO

Project period: 2012 - 2015

Description: This project will quantify changes in soil carbon stocks and composition with the re-establishment of native perennial grasslands through adoption of rotational grazing and include measurement of soil carbon and its allocation to major fractions. The project aims to deliver the knowledge and tools needed for these extensive grazing systems to participate in the Carbon Farming Initiative.

www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Indirect

Project Title: *Reducing nitrous oxide emissions from applied nitrogen with nitrification inhibitors: Identification of the key drivers of performance*

Project leader(s): Deli Chen; University of Melbourne

Project period: 2012 - 2015

Description: This project aims to quantify reductions in nitrous oxide emissions through use of nitrification inhibitors that have different properties in a variety of climatic conditions and soils. It will determine why the inhibitors work only in some soils and develop algorithms describing inhibitor impact on nitrous oxide emissions for existing models. It will also verify model predictions using field trials. The project will lead to a clear set of soil and environmental factors for determining the potential of nitrification inhibitors for decreasing nitrous oxide emissions across a range of soils and climates while using less nitrogen and maintaining yield.

www.n2o.net.au/index.php/research-projects/2012-2015/reducing-nitrous-oxide-emissions-from-applied-nitrogen-with-nitrification-inhibitors-identification-of-the-key-drivers-of-performance

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *The contribution of biochar in increasing soil carbon in native woody bioenergy crops and on-farm revegetation*

Project leader(s): Antonio Patti; Monash University

Project period: 2012 - 2015

Description: This project will demonstrate the potential of biochar and biochar/compost blends to increase soil carbon in native woody bioenergy crops. The project will produce and characterise biochars from local sources. It will conduct germination, growth and survival trials of the native species under various soil conditions in both greenhouse and field and quantify changes to soil carbon content. The outcomes will assist land managers to make informed decisions about using biochars to establish native plants in a range of soils, improve compromised soils and increase soil carbon.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/biochar-research

R&D Program: DAFF - Biochar Capacity Building Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *The National Biochar Initiative II—A country wide approach to biochar systems*

Project leader(s): Lynne Macdonald; CSIRO

Project period: 2012 - 2015

Description: This project builds on the first National Biochar Initiative. There is a strong focus on further developing or establishing new demonstration sites around the country. Establishing a large number of high quality biochar demonstration sites will demonstrate the applicability of biochar in a broad range of agricultural and land management situations. There will also be research activities to underpin the development of Carbon Farming Initiative offset methodologies such as examining biochar stabilisation processes and effects.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/biochar-research

R&D Program: DAFF - Biochar Capacity Building Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Understanding and observing the benefits of biochar in the carbon cycle*

Project leader(s): Chris Reid; North East Catchment Authority

Project period: 2012 - 2015

Description: This project will produce biochar from woody weeds (willow) and establish a number of biochar field sites and trials. The project will communicate to farmers the benefits of biochar, conduct field days around trial sites and develop and distribute glove-box manuals for the use of biochar. It will also monitor and evaluate changes in soil chemistry and establish base-line data on biochar use.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/biochar-research

R&D Program: DAFF - Biochar Capacity Building Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Are proposed land based sinks for greenhouse gases resilient to climate change and natural variability?*

Project leader(s): Andrew Pitman; University of New South Wales

Project period: 2011 - 2013

Description: One strategy to reduce the scale of future climate change is to enhance the storage of carbon in vegetation and soils. Evidence suggests carbon stored in vegetation and soils is itself vulnerable to climate change, placing this stored carbon at risk; this project will assess this risk to advise on the reliability of using terrestrial systems as carbon sinks.

R&D Program: ARC - Discovery **– Project code:** DP110102618

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Green shoots? Exploring the genesis and development of a Green Economy in Australia*

Project leader(s): Peter Newton; Swinburne University of Technology

Project period: 2011 - 2013

Description: Creating a green economy is fundamental to the sustainability of Australia in the twenty first century. This project will explore the genesis of this new economy, and for the first time, develop a classification of green industries, measure their significance and map the geography of the nation's green economy by sector and region.

R&D Program: ARC - Discovery **– Project code:** DP110100543

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *Direct quantification of biochar that is stable on centennial timescales*

Project leader(s): Michael Bird; James Cook University

Project period: 2012 - 2015

Description: The objective of this project is to develop a matrix that relates common biochar feedstock types and pyrolysis conditions to the proportion of stable carbon in the resultant biochar. The outcomes of the project will be a simple means of predicting the stable carbon content of biochar from common feedstock types, leading to an offset methodology and better enabling land managers to participate in carbon markets.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/biochar-research

R&D Program: DAFF - Biochar Capacity Building Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Indirect

Project Title: *The fate of aboveground carbon inputs: A key process that is poorly understood*

Project leader(s): Richard Conant; Queensland University of Technology
Project period: 2012 - 2015
Description: This project aims to increase present understanding of surface carbon movement into the soil, improve soil carbon/nitrogen simulation models and work directly with soil carbon and nitrous oxide network modellers to provide greater certainty on the potential for reducing emissions. It will include site-based experimentation that complements other research on how management and climate affect carbon sequestration, nitrogen inputs to the soil and nitrous oxide emissions.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf
R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Northern Australia **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Practical and sustainable considerations for the mitigation of methane emissions in the northern Australian beef herd using nitrate supplements*

Project leader(s): Louise Edwards; Ridley AgriProducts Pty Ltd
Project period: 2012 - 2015
Description: The project will determine if nitrate salts in supplement blocks can safely replace urea when feeding low quality forages and if the nitrate blocks will effectively reduce methane emissions of cattle consuming forages typical of northern Australia. Research will occur in methane chambers, individual pens and in the paddock, where supplement blocks are self-fed. In both studies cattle will consume low quality tropical forages, typical of those used in conjunction with urea supplement blocks. This project will be funded as part of a collaboration with the University of New England application "Strategic science to develop dietary nitrate and defaunation as mitigation methodologies for grazing ruminants".
R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Linking soil acidification with carbon dynamics in Australian agroecosystems*

Project leader(s): Caixian Tang; La Trobe University
Project period: 2012 - 2014
Description: The ability to mitigate climate change by sequestering soil carbon may be limited in acidic soils, which are prevalent in Australia. The project will investigate the link between carbon cycling, soil acidification and liming, and provide important knowledge to identify agricultural practices which have the capacity to build soil carbon.
R&D Program: ARC - Discovery **– Project code:** DP120104100

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Indirect

Project Title: *Mitigation of indirect greenhouse gases in intensive agricultural production systems with the use of inhibitors*

Project leader(s): Helen Suter; University of Melbourne
Project period: 2012 - 2015
Description: This project will quantify the mitigation of ammonia volatilisation from nitrogen fertilisers in intensive agricultural production systems (dairy, vegetables) resulting from the use of inhibitors. Micrometeorological techniques will be used to measure ammonia volatilisation. It will also obtain a nitrogen mass balance through the use of 15N labelled fertilisers on collaborative field sites, and to provide data to improve the capability of nitrogen models to simulate ammonia volatilisation. The data on the potential mitigation of ammonia volatilisation by inhibitors, and nitrogen mass balance are essential for establishing methodologies to reduce indirect nitrous oxide emission.
www.n2o.net.au/index.php/research-projects/2012-2015/mitigation-of-indirect-greenhouse-gases-in-intensive-agricultural-production-systems-with-the-use-of-inhibitors
R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Marginal

Project Title: *What role for policies to supplement and emissions trading scheme? Submission to the Garnaut Climate Change Review*

Project leader(s): Baker; Productivity Commission
Project period: 2008 - 2008
Description: Assesses the efficacy and mechanisms of an emissions trading scheme to reduce greenhouse gas production
www.pc.gov.au/research/submission/garnaut
R&D Program: Productivity Commission **– Project code:** PRODCOM-414-9

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Development of algae based functional foods for reducing enteric methane emissions from cattle*

Project leader(s): Nigel Tomkins; CSIRO
Project period: 2012 - 2015
Description: This project is focusing on proof of concept for the development of algae based functional foods for reducing enteric methane emissions from cattle. It will evaluate a range of algae for antimethanogenic activity and identify lines of algae which may be trialled in future research.
R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Marginal

Project Title: *Managing an integrated, data synthesis and modelling research network for reducing nitrous oxide emissions from Australian soils*

Project leader(s): Martin Blumenthal; Grains Research & Development Corporation
Project period: 2012 - 2015
Description: This project will provide the overall management and reporting linkages between the Department of Agriculture, Fisheries and Forestry and researchers selected through the Filling the Research Gap Program in the delivery of the National Agricultural Nitrous Oxide Research Program.
www.n2o.net.au/index.php/research-projects/2012-2015/managing-an-integrated-data-synthesis-and-modelling-research-network-for-reducing-nitrous-oxide-emissions-from-australian-soils
R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Review of GHG and Water in the Red Meat Industry*

Project leader(s): FSA Consulting The University of New England
Project period: 2009 - 2009
Description: Greenhouse gas emissions and mitigation options are extremely diverse throughout the red meat supply chain. The fundamental processes driving greenhouse emissions and mitigation options range across the traditional fields within agricultural science and engineering. For the industry to respond and adapt to the changing regulations related to greenhouse emissions, a robust framework needs to be established that can account for this diversity. Similarly, water usage in red meat production can be estimated using a surprising variety of methods that produce results from 27 L to 200,000 L / kg beef. Clearly for the industry to address water usage (a resource issue) and water usage (as a possible environmental impact) a robust methodology that suits the industry needs to be adopted. This report, the first of three to be presented for the project, covers methodological issues related to greenhouse gas estimation at the industry level, energy usage, a review of vegetation management regulations, and a review of the literature on greenhouse gas emissions and water use for red meat and alternative protein sources.
www.mla.com.au/Research-and-development/Final-report-details?projectid=15227
R&D Program: MLA

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Strategic science to develop dietary nitrate and defaunation as mitigation methodologies for grazing ruminants*

Project leader(s): Belinda Snell; University of New England
Project period: 2012 - 2015
Description: This project seeks to develop the science underpinning nitrate supplementation of livestock to ensure these become safe, sure and commercially attractive methane mitigation technologies by June 2015. Intensive study of the modes of action of these processes in the rumen will be undertaken to optimise their efficacy and safety for ruminants on pasture. This project is funded as part of a collaboration project with the project "Practical and sustainable considerations for the mitigation of methane emissions in the northern Australian beef herd using nitrate supplements".
R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *Supplementation with tea saponins and statins to reduce methane emissions from ruminants*

Project leader(s): Chris McSweeney; CSIRO
Project period: 2012 - 2015
Description: This project aims to research the suitability of feed additives (tea saponins and statins) to reduce methane emissions from ruminants. Problems that may be associated with some methane reducing additives that prevent their use includes toxicity to microbes and animals, short-lived effects due to microbial adaptation, expense and failure to meet consumer acceptance. The project will undertake animal studies with varying levels of supplementation to intensively fed ruminants with the tea saponin extract and the yeast Monascus ruber.
R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Management options **PLANNING RELEVANCE:** Marginal

Project Title: *The mechanism of antimethanogenic effects of bioactive plants and products on methane production in the rumen*

Project leader(s): Phillip Vercoe; University of Western Australia
Project period: 2012 - 2015
Description: This project aims to deliver information for reducing methane in the rumen. It will determine the compounds and mechanisms that reduce methane production by testing plants and plant products in pure and batch cultures and in an artificial rumen to examine their effects at both the microbial ecology and cellular levels.
R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: Northern Australia **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *The pasture type and management affect on soil carbon stocks in grazing lands of northern Australia*

Project leader(s): Queensland Department of Science, Information Technology, Innovation & the Arts
Project period: 2008 - 2012
Description: Main project outcomes are: • increased quantification of magnitude and variability of SOC stocks in northern Australian rangelands; • insight into key variables influencing SOC stocks in northern Australian rangelands amount and variability of vegetation on the ground, local slope, annual rainfall, and ten-year average stocking rate); • significant differences in SOC stock relating to pasture utilisation rate at a long-term trial site, which relates to measures of total standing dry matter and remote sensing information (NDVI). Pasture utilisation at 20 per cent provided the optimum SOC stock while at 80 per cent the SOC stocks were the lowest; • humus formed > 50 per cent of total SOC stock at the long-term pasture utilisation trial site and showed a similar trend to SOC stock in response to management; • the effect of grazing pressure at the Wambiana grazing trial was not statistically significant; • the effect of fire management at the Kidman Springs fire management trial was not statistically significant; • both sites had significant differences in SOC carbon levels between soil types; • further analysis on individual samples from the sites may provide a more sensitive test for the effect of management practices.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf
R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: Australia-wide **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Farming systems for lower methane emissions, demonstration and information delivery*

Project leader(s): Meat & Livestock Australia

Project period: 2008 - 2012

Description: This project expanded and improved the original FarmGAS Calculator, enabling farmers to incorporate options for livestock emissions abatement based on the outputs of the RELRP. However, with mixed production making up more than 80 per cent of all farm enterprises it is important that the tool is capable of demonstrating the impact of new research on mitigation options across commodity mixes, to increase farmers' awareness of alternative management systems and enable them to consider the economic and emissions implications of these options. The new Scenario Tool developed under this project extends the capabilities of the Calculator through the provision of additional enterprise options, reporting features and the ability to alter relevant emission factors. The Scenario Tool enables two estimates (two sets of results) to be produced, one set of 'Default' emissions which utilise the production factors assumed in Australia's National Greenhouse Gas Inventory (NGGI) Methodology (2006), and the other producing 'revised' emissions based on choices and inputs from the user. To increase awareness and capacity of advisor and extension specialists to use the FarmGAS Scenario Tool and encourage adoption amongst clients, train the trainer workshops were held in each Australian state, except Northern Territory during March to May 2012. Following training, users would be sufficiently skilled to use the Scenario Tool with farmers, in research and policy applications. Approximately 64 advisor and extension specialists were trained in use of FarmGAS with an additional three workshops planned. A publication database and collection was constructed from publically available literature reporting the effects of dietary mitigation on methane emissions. The data collection contained 782 sources from the international peer reviewed literature. The literature was subdivided into a number of individual collections. A scoping study of the issues around the development of the framework (including a metadata database) for all the projects within the RELRP has been undertaken. A schema for the storage of the metadata has been designed and implemented in Microsoft Access to facilitate the process of gathering and storing the metadata about the datasets generated and held by the component projects of the RELRP. Two rounds of metadata collection have been conducted to collect information on the experimental designs, the parameters and variables relating to the measurement of greenhouse gas emissions, the data format and structures, and the data storage and management systems used by the research groups. Collation of the metadata information from individual projects identified a range of issues relating to the accuracy of the definition of datasets and experiments, data formats and concerns about intellectual property. Through redefining the system structure and quality editing of metadata information (including applying a controlled vocabulary list developed for this project), a metadata database illustrating the basic framework of a future database and data summary sheets showing the current status of data attributes for each project have been produced.

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

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TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Information synthesis **PLANNING RELEVANCE:** Marginal

Project Title: *The Stern review: an assessment of its methodology*

Project leader(s): Productivity Commission

Project period: 2008 - 2008

Description: A description and assessment of the 'The Stern Review: The Economics of Climate Change', released in October 2006

www.pc.gov.au/research/staff-working/sternreview

R&D Program: Productivity Commission **– Project code:** PRODCOM-414-9

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *An assessment of the carbon sequestration potential of organic soil amendments*

Project leader(s): Mark Farrell; CSIRO
Project period: 2012 - 2015
Description: This project will quantify the relationship between the chemical composition of organic carbon and how it decomposes in a variety of potential soil organic amendments. Spectroscopic techniques will be used to measure carbon chemistry and long-term incubation experiments will quantify degradation dynamics. The data generated will be used to define the relationship between chemical composition and potential longevity / stability of different types of organic amendments in soil. The results of this analysis will be used within FullCAM (the model used to construct Australia's national greenhouse gas emissions account for the land sector) to provide consistency with Australia's national inventory and Carbon Farming Initiative methodologies.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Comparative analyses of rumen microbiomes to mitigate ruminant methane and improve feed utilisation*

Project leader(s): Mark Morrison; CSIRO
Project period: 2012 - 2015
Description: This project aims to increase the understanding of the greater rumen microbial populations in livestock using the datasets produced in Australia and abroad. The project will generate the knowledge required to develop low methane animals, either by animal selection and/or by increasing the metabolic capacity of the microbial community.

R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Development of cost effective soil carbon analytical capability*

Project leader(s): CSIRO
Project period: 2008 - 2012
Description: A rapid method of analysing the content and composition of soil carbon was developed in this project which has the potential of making the laboratory analysis more cost-effective and lowering the cost of soil carbon measurement. The laboratory based methodology used previously to divide soil organic carbon into its component fractions was successfully modified to reduce operator dependence, improve sample throughput, make it more transferable to other laboratories, and allow for the direct measurement of all fractions. Training was given to all SCRP partner organisations as well as several researchers and students from other organisations to build fractionation capacity across Australian soil laboratories. The capability of mid-infrared spectroscopy combined with partial least squares regression analysis (MIR/PLSR) to predict the content of total carbon, organic carbon, inorganic carbon and total nitrogen for <2 mm soil samples has been conclusively demonstrated across the 20 195 samples analysed. Measurements for all four analytes can be obtained from a single finely ground sample rapidly and cost effectively. Pretreatment with acid to remove inorganic carbon is not required provided adequate calibration of the MIR instrumentation has occurred. A 13C nuclear magnetic resonance (NMR) approach to quantify the content of resistant organic carbon (ROC) present in a soil was developed. This key development supported the calibration of the MIR/PLSR.
www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods　　　　　　　　　**NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Facilitation of improvement in systems modelling capacity for Carbon Farming Futures*

Project leader(s): Andrew Moore; CSIRO

Project period: 2012 - 2015

Description: This project aims to eliminate any inconsistencies in modelling activities across Filling the Research Gap. It will ensure that models are developed and applied consistently in the program and that they embody the best scientific understanding of methane, nitrous oxide and soil carbon fluxes. A series of workshops and comparative studies will result in more robust and consistent abatement predictions and increased human capacity for modelling.

www.daff.gov.au/climatechange/australias-farming-future/climate-change-and-productivity-research/nitrous-oxide-research

R&D Program: DAFF - Nitrous Oxide Research Program

TOPIC: Industries & livelihoods　　　　　　　　　**NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Improved measurement and understanding of soil carbon and its fractions*

Project leader(s): Jonathan Sanderman; CSIRO

Project period: 2012 - 2015

Description: This project will build on the research started in the Soil Carbon Research Program focused on developing techniques for rapidly and routinely measuring numerous soil properties at a lower cost. This research is to provide proof of concept to measure soil carbon fractions using visible near-infrared (vis-NIR) spectroscopy.

www.daff.gov.au/__data/assets/pdf_file/0009/2274408/soil-carbon-research-program-summary.pdf

R&D Program: DAFF - Soil Carbon Research Program

TOPIC: Industries & livelihoods　　　　　　　　　**NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Measuring methane in the rumen under different production systems as a predictor of methane emissions*

Project leader(s): Chris McSweeney; CSIRO

Project period: 2012 - 2015

Description: This project progresses the development of an intra-ruminal capsule developed under the Reducing Emissions from Livestock Research Program (2008–2012) to measure rumen methane concentrations. This project will validate the use of an intra-ruminal capsule to determine methane yield by the animal under a range of feeding systems. Measurement of methane yield and concentration will allow emissions intensity, total emissions and efficiency of rumen fermentation and will provide important data for modelling and emerging policies under the Carbon Farming Initiative.

R&D Program: DAFF - National Livestock Methane Program

TOPIC: Industries & livelihoods　　　　　　　　　**NRM RELEVANCE SCORE:** ★☆☆☆☆

SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)

REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Marginal

Project Title: *Metagenomic analyses of feed utilisation and hydrogen balance in Australian livestock for lower methane emissions*

Project leader(s): CSIRO

Project period: 2008 - 2012

Description: Rumen microbes govern rumen digestion and methane production processes, but the vast majority of them are 'unknown'; so our ability to productively manipulate these processes has been limited. This project developed and used new approaches in microbiology, referred to as 'metagenomics', to better understand how feed utilisation and hydrogen balance might be affected to reduce methane emissions. The outcomes of the project include: • producing the genetic "blueprint" of rumen microbiology in northern beef cattle • identifying "new" bacteria in these cattle relevant to feed digestion and/or hydrogen utilisation without methane formation • new resources that can be used to track and/or quantify the abundance of these bacteria • the isolation of some of these bacteria for the first time. The project has developed some of the resources needed to monitor how the rumen microbiota might be changed via diet and supplementation to reduce methane emissions and ideally, improve feed utilisation.

R&D Program: DAFF - Reducing Emissions from Livestock Research Program

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Processes/Concepts **PLANNING RELEVANCE:** Marginal

Project Title: *Global space-time soil carbon assessment*

Project leader(s): Alexander McBratney; University of Sydney
Project period: 2012 - 2014
Description: Soil carbon is a key component of functional ecosystems and is crucial for food, water and energy security, and for climate change mitigation. The project will contribute to global understanding of soil carbon and its management for sustainable wellbeing.
R&D Program: ARC - Discovery **– Project code:** DP120104335

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Activation of small molecules using redox‐ and pH‐stable polyoxometalate molecular clusters as catalysts*

Project leader(s): Christian Ohlin; Monash University
Project period: 2011 - 2013
Description: Anthropogenic carbon dioxide has been linked to global climate change, and several approaches to reducing emissions have been proposed. This project aims to develop systems that convert carbon dioxide into useful raw materials for the chemical industry and fuel, reducing the need to use additional non‐renewable resources for these purposes.
R&D Program: ARC - Discovery **– Project code:** DP110105530

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Conservation of tropical forests for their carbon and biodiversity values*

Project leader(s): Oscar Venter; James Cook University
Project period: 2011 - 2013
Description: International efforts to save tropical forests for the carbon they store could help mitigate climate change and biodiversity loss. This project will aid these efforts by developing methods to model future deforestation and extending decision theory for the new challenges presented by international carbon‐payment schemes.
R&D Program: ARC - Discovery **– Project code:** DP110102872

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Modelling the dynamic and anisotropic permeability of coal under CO2 geo‐sequestration conditions*

Project leader(s): Guoxiong Wang; University of Queensland
Project period: 2011 - 2013
Description: CO2‐sequestration enhanced coal gas recovery provides clean energy supply and greenhouse gas control. This project tackles the key issues in this field by developing novel models of gas flow in coal associated with the process. It underpins predictable, sustainable and economic recovery of coalbed methane and storage of carbon dioxide into coal.
R&D Program: ARC - Discovery **– Project code:** DP110103229

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Carbon and ecosystem services (terrestrial & marine)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Woodland response to elevated CO2 in free air carbon dioxide enrichment: does phosphorus limit the sink for Carbon?*

Project leader(s): David Ellsworth; University of Western Sydney
Project period: 2011 - 2013
Description: This project will determine if growth of Australian woodland trees is limited by phosphorus, and if that limitation means the woodland carbon sink is constrained from responding to rising atmospheric CO2. Assessing the CO2 sink capacity of native eucalypt woodland is central to meeting Australia's domestic and international carbon accounting commitments.
R&D Program: ARC - Discovery **– Project code:** DP110105102

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Indigenous land & sea management
REGION: Northern Australia **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Indigenous Natural Resource Management and livelihoods*

Project leader(s): Jon Altman; Australian National University; Sue Jackson; Griffith University
Project period: 2011 - 2014
Description: This project will improve understanding of the full-range of private and public benefits derived from community-based natural resource management. It will identify the information, incentives and support required to improve community based land management. It will also identify the barriers that are currently constraining Indigenous land management.
www.nerpnorthern.edu.au/research/projects/21

R&D Program: NERP Northern Australia **– Project code:** NERP NA 2.1

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Indigenous land & sea management
REGION: Northern Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Partnerships and tools to support biodiversity monitoring by Indigenous land and sea managers*

Project leader(s): Rod Kennett; North Australian Indigenous Land & Sea Management Alliance
Project period: 2011 - 2014
Description: This project will develop tools that support scientifically robust, community-based biodiversity monitoring programs for Indigenous land and sea managers, and foster partnerships that promote the development of sustainable Indigenous livelihoods based on caring for country. By enhancing and expanding the biodiversity monitoring tools available, Indigenous rangers and the wider community will benefit from capacity building through skills transfer during workshops and field-based training. Locally-based projects will work towards development of long-term monitoring programs that can be carried out by rangers utilising tools developed during the project.
www.nerpnorthern.edu.au/research/projects/51

R&D Program: NERP Northern Australia **– Project code:** NERP NA 5.1

TOPIC: Industries & livelihoods   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Indigenous land & sea management
REGION: Northern Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Direct

Project Title: *Terrestrial biodiversity monitoring*

Project leader(s): Graeme Gillespie; Northern Territory Department of Land Resource Management
Project period: 2011 - 2014
Description: This project involves a high level of engagement and consultation with Traditional Owners. Traditional Owners manage vast areas of northern Australia. Their knowledge of their land and the plants and animals found there can add tremendous value to traditional scientific monitoring approaches. The success and long-term sustainability of monitoring programs on country is dependent on their support and involvement. Programs need to be relevant to their social and environmental values. Indigenous land managers are increasingly involved in delivering biodiversity conservation activities such as feral animal control. This project will give the Traditional Owners involved increased practical knowledge about scientific monitoring, assessment and reporting that they can use in managing their land and communicating with agencies.
www.nerpnorthern.edu.au/research/projects/52

R&D Program: NERP Northern Australia **– Project code:** NERP NA 5.2

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Indigenous land & sea management
REGION: Northern Australia **FORMAT:** Methodology **PLANNING RELEVANCE:** Direct

Project Title: *Indigenous biodiversity management*

Project leader(s):
Project period: 2011 - 2014
Description: The project builds on existing work to further establish how well the monitoring and evaluation frameworks of Caring for Our Country and Working on Country can be adapted to the broader work plans and aspirations of local communities. Researchers are working with two Traditional Owner groups in central Cape York to adapt the frameworks to their own work plans and develop recommendations for application in other areas. This will support Indigenous livelihoods while providing significant benefits for the local environment.
www.nerpnorthern.edu.au/research/projects/22
R&D Program: NERP Northern Australia **– Project code:** NERP NA 2.2

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Tourism
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Beach and surf tourism and recreation in Australia: vulnerability and adaptation*

Project leader(s): Mike Raybould; Bond University
Project period: 2010 -
Description: 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 sea-change 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.
www.nccarf.edu.au/content/beach-and-surf-tourism-and-recreation-australia-vulnerability-and-adaptation
R&D Program: NCCARF, FRDC **– Project code:** FRDC 2010/536

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Other industries
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Adaptation in industry and business: Climate change adaptation for Australian minerals industry professionals - best practice guidelines*

Project leader(s): Damian Giurco; University of Technology, Sydney
Project period: 2012 -
Description: The minerals industry generates 50% of Australia's export earnings, yet research into its ability to adapt to climate change is limited. In a recent study, stakeholders identified the major challenges as use of scarce resources such as water and energy; impacts on the environment and community; hazards and workforce issues; impacts on infrastructure; and mine planning and design. This project will evaluate industry awareness, and existing strategies, and develop best practice guidelines for climate change adaptation and planning by minerals industry professionals.
www.nccarf.edu.au/content/adaptation-industry-and-business-climate-change-adaptation-australian-minerals-industry
R&D Program: NCCARF

TOPIC: Industries & livelihoods **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Other industries
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Communication: Climate change adaptation in the boardroom*

Project leader(s): Gareth Johnston; Future Ready Pty Ltd
Project period: 2012 -
Description: This project aims to support Australian businesses to include climate change impacts and adaptation in their decision making processes by increasing climate awareness and capacity at the executive level. It will explore climate change risks to the supply chain to help inform directors about possible impacts on their business, and will develop and disseminate a climate change adaptation guide for the boardroom.
www.nccarf.edu.au/content/communication-climate-change-adaptation-boardroom
R&D Program: NCCARF

TOPIC: Industries & livelihoods
SUBTOPIC: Other industries
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★ ★ ★ ☆ ☆

Project Title: *Extractive resource development in a changing climate: learning the lessons from recent weather events in Queensland, Australia*

Project leader(s): Vigya Sharma; University of Queensland
Project period: 2012 -
Description: Researchers will examine the devastating impacts of extreme weather events on mining operations, including the 2010-2011 floods that cost Queensland more than $2 billion in export earnings. By applying the lens of the recent floods the project aims to understand the impact on mining operations and the flow-on socio-economic and ecological impacts on the wider region. It will identify measures needed to get operations back on line after a disaster, and strategies to limit impacts from such events in the future across other Australian mining operations.
www.nccarf.edu.au/content/extractive-resource-development-changing-climate-learning-lessons-recent-weather-events
R&D Program: NCCARF

TOPIC: Industries & livelihoods
SUBTOPIC: Other industries
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

NRM RELEVANCE SCORE: ★ ★ ★ ☆ ☆

Project Title: *Adaptation in industry and business: Climate change adaptation – a framework for best practice in financial risk assessment, governance and disclosure*

Project leader(s): Jason West; Griffith University
Project period: 2012 -
Description: This project will deliver a consolidated framework for Australian industry to integrate risk management and governance principles in relation to climate change adaptation with existing governance principles. It will identify a matrix of financial disclosure principles to act as guidance for Australian industry to use for information disclosures relating to climate change risk and adaptation costs. These outcomes will be developed in conjunction with representatives from industry, regulators and corporate governance bodies.
www.nccarf.edu.au/content/adaptation-industry-and-business-climate-change-adaptation-%E2%80%93-framework-best-practice
R&D Program: NCCARF

TOPIC: Industries & livelihoods
SUBTOPIC: Other industries
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

NRM RELEVANCE SCORE: ★ ☆ ☆ ☆ ☆

Project Title: *Market segmentation methodology: attacking the 'Too Hard' basket*

Project leader(s): Sara Dolnicar; University of Wollongong
Project period: 2011 - 2013
Description: Businesses embrace market segmentation to identify and target clients. However, poor segmentation analysis leads to poor segment choice. This project will develop tools to improve segmentation analysis and will test the resulting tools in tourism, foster care and climate change mitigating behaviours, and produce usable, transferable recommendations.
R&D Program: ARC - Discovery **– Project code:** DP110101347

TOPIC: Industries & livelihoods
SUBTOPIC: Other industries
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

NRM RELEVANCE SCORE: ★ ☆ ☆ ☆ ☆

Project Title: *Nanostructured non-precious metal and metal-free catalysts for sustainable clean energy generation*

Project leader(s): Shizhang Qiao; University of Adelaide
Project period: 2013 - 2015
Description: The innovative technologies for substitution of precious metal catalysts will be developed and used in fuel cells for clean energy generation in a highly efficient and sustainable form. This effort will lead to the reduction in carbon dioxide emissions and the alleviation of environmental and climate change problems.
R&D Program: ARC - Discovery **– Project code:** DP130104459

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: General
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Infrastructure Investment Priorities in Northern Australia*

Project leader(s): Office of Northern Australia
Project period: 2012 - 2012
Description: The resource sector is a key driver of economic growth across the north and critically important in determining investment priorities, not only in hard economic infrastructure such as ports; roads; rail; energy; and water, but also for investments in education and skills training, social and community infrastructure, and Indigenous employment and development. Through the Infrastructure Priorities Working Group, the Office of Northern Australia has commissioned work on the outlook for bulk resource commodities (iron ore, coal, LNG) and what this means for infrastructure additions.

www.regional.gov.au/regional/ona/iipna.aspx

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: General
REGION: Northern Australia **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Historical Case Studies: Adaptation lessons from Cyclone Tracy*

Project leader(s): John McAneney; Macquarie University
Project period: 2012 -
Description: This case study reviewed the impact of the December 1974 Tropical Cyclone Tracy on the city infrastructure and people of Darwin, and examines the engineering, institutional and regulatory responses that it invoked and the relevance of these lessons for future events.

www.nccarf.edu.au/content/historical-case-studies-adaptation-lessons-cyclone-tracy-0

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: General
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Development of tools that allow local governments to translate climate change impacts on assets into strategic and operational financial and asset management plans*

Project leader(s): Jacqueline Balston; University of South Australia
Project period: - 2012
Description: This project aims to identify key council assets vulnerable to climate change; determine the likely impacts of climate change on council assets; undertake an extensive financial risk modelling exercise including full life-cycle economic analysis of options for councils to reduce climate change asset risk, and develop the necessary modifications to asset management and financial sustainability tools so councils may evaluate climate change action scenarios at the management planning level.

www.nccarf.edu.au/content/development-tools-local-governments-assets

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: General
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *A study of pull-through failures of thin steel battens to improve building safety and resilience during extreme wind events*

Project leader(s): Mahen Mahendran; Queensland University of Technology
Project period: 2012 - 2014
Description: This project will develop innovative light gauge steel roofing systems with considerably increased wind resistance and reliable design rules for cold-formed steel codes worldwide. It will contribute to the Australian government's goal of increasing building resilience against future extreme and more frequent wind events caused by climate change.
R&D Program: ARC - Discovery **– Project code:** DP120103366

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: General
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Advancement of cohesive crack approach to model shrinkage and load induced cracking in multi⬚phase soils*

Project leader(s): Jayantha Kodikara; Monash University
Project period: 2011 - 2013
Description: Soil cracking affects many engineering applications and infrastructure. It is also recognised that the impending climate change can affect the severity of soil cracking. Despite this, there is lack of progress in this area and significant knowledge gaps exist. This project will provide new knowledge and better design and management tools.
R&D Program: ARC - Discovery **– Project code:** DP110104808

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Coastal
REGION: East Coast Catchments **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Past, present and future landscapes: understanding alternative futures for climate change adaptation of coastal settlements and communities*

Project leader(s): Philip Morley; University of New England
Project period: - 2013
Description: 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
www.nccarf.edu.au/content/past-present-and-future-landscapes-understanding-alternative-futures-climate-change
R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Coastal
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

Project Title: *A model framework for assessing risk and adaptation to climate change on Australian coasts*

Project leader(s): Colin Woodroffe; University of Wollongong
Project period: - 2012
Description: Coastal planners and managers urgent 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.
www.nccarf.edu.au/content/model-framework-assessing-risk-and-adaptation-climate-change-australian-coasts
R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Coastal
REGION: General/Global **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

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

Project leader(s): Ryan McAllister; CSIRO
Project period: - 2013
Description: 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.

www.nccarf.edu.au/content/costs-and-coasts-empirical-assessment-physical-and-institutional-climate-adaptation-pathways

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Coastal
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Enhancing the resilience of seaports to a changing climate*

Project leader(s): Darryn McEvoy; RMIT University; Jane Mullet; RMIT University
Project period: - 2012
Description: 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'.

www.nccarf.edu.au/content/enhancing-resilience-seaports-changing-climate

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Coastal
REGION: General/Global **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Historical Case Studies: Storm tides*

Project leader(s): Rodger Tomlinson; Griffith University
Project period: 2012 -
Description: This case study examined the socio-economic vulnerability and adaptation responses to extreme coastal storms that result in severe erosion and coastal inundation. It reviews past technical, planning and regulatory responses to extreme tide events, erosion and flooding and their effectiveness for future events. It seeks to identify alternative and additional strategies to improve management of future events.

www.nccarf.edu.au/content/historical-case-studies-storm-tides

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Urban centres
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Flooding in Australia: Damage to buildings during the 2010-2011 Eastern Australia flooding events*

Project leader(s): Matthew Mason; Macquarie University
Project period: 2012 -
Description: Insured losses from the 2010-11 floods approached $3 billion. When accounting for damage to essential infrastructure, lost productivity and the under- or non-insured, the true cost is several times this value. Many affected properties have a history of flood damage, which shows there are clear deficiencies in our ability to adapt to or mitigate the impact of this hazard. This research will detail the extent of damage to buildings during the recent Eastern Australia flooding and explore the role planning and design/construction regulations played in these failures. It will highlight weaknesses in the current systems and propose effective solutions to mitigate future damage and financial loss under current or future climates.

www.nccarf.edu.au/content/flooding-australia-damage-buildings-during-2010-2011-eastern-australia-flooding-events

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Urban centres
REGION: Queensland **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Reforming Planning Processes Trial: Rockhampton 2050*

Project leader(s): Penelope Fry; Rockhampton Regional Council
Project period: -
Description: Rockhampton Regional Council will form an alliance of neighbouring small regional councils to determine and demonstrate how existing urban planning principles and practices could accommodate climate change and the uncertainty of climate impacts for a "sea-change" region. It will develop and apply spatial information to trial planning approaches in a 'real world' situation involving all levels of government and community engagement. It aims to influence other Councils to take action by producing a mechanism and process to enable the mainstreaming of climate change adaptation within local government.
www.nccarf.edu.au/content/reforming-planning-processes-trial-rockhampton-2050

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Urban centres
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Adaptation of the built environment to climate change-induced increased intensity of natural hazards*

Project leader(s): David King; James Cook University; John Ginger; University of Tasmania
Project period: - 2013
Description: This project will examine the likely impacts on the built environment of increased intensities in weather-related natural hazard events, and identify possibilities for the adaptation of regulatory mechanisms in building construction, housing and planning. It will analyse climate change impacts on the built environment, and review existing regulatory mechanisms and their effectiveness. It will then model policy recommendations that provide for improved emergency management preparations and response capabilities across a wide range of agencies and organisations.
www.nccarf.edu.au/publications/planning-building-insuring-adaptation

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Urban centres
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Pathways to climate adapted and healthy low income housing*

Project leader(s): Guy Barnett; CSIRO Climate Adaptation Flagship
Project period: - 2013
Description: This project aims to model the vulnerability of public housing assets and tenants to selected climate change impacts. It will scope the potential co-benefits of climate adaptation action for human health and well-being and identify and evaluate key engineering, behavioural and institutional climate adaptation pathways applicable to other low income housing.
www.nccarf.edu.au/content/pathways-climate-adapted-and-healthy-low-income-housing

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★☆☆☆☆
SUBTOPIC: Urban centres
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Strata Title in a world of climate change: Managing greater uncertainty in forecasting and funding common property capital expenditure*

Project leader(s): Chris Guilding; Griffith University
Project period: 2011 -
Description: This project will determine the extent to which uncertainty of climate change-induced building damage is built into strata and community title capital expenditure forecasts, and whether insurance specialists are equipped with tools that can factor in uncertainty and flexibility when projecting capital expenditure.
www.nccarf.edu.au/content/strata-title-climate-change-managing-greater-uncertainty

R&D Program: NCCARF

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆

SUBTOPIC: Population growth and distribution
REGION: General/Global **FORMAT:** Methodology **PLANNING RELEVANCE:** Indirect

Project Title: *New methods for improving active adaptive management in biological systems*

Project leader(s): Nigel Bean; University of Adelaide
Project period: 2011 - 2013
Description: Understanding population dynamics is critical in many areas of national importance to Australia, such as protection of biodiversity, management of invasive species and prediction of the possible effects of climate change. This project will develop a collection of state of the art methods enabling optimal ecological management.
R&D Program: ARC - Discovery **– Project code:** DP110101929

TOPIC: Infrastructure   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆

SUBTOPIC: Population growth and distribution
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Forty million Australians: the future of our biodiversity*

Project leader(s): Ralph MacNally; Monash University
Project period: 2012 - 2014
Description: Many countries have experienced rapid increases in human numbers and natural-resource use. The project will use measured effects on biodiversity from such countries, combined with models of potential changes in Australia's population and climate, to forecast how our biodiversity may be affected up to 2050, and then to plan how to minimize negative impacts.
R&D Program: ARC - Discovery **– Project code:** DP120100797

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆

SUBTOPIC: General resources
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *New paradigms for urban public transport planning in Australia: assessing the capacity of institutions and infrastructure*

Project leader(s): Terry Burke; Swinburne University of Technology
Project period: 2011 - 2013
Description: Current urban transport policies cannot be sustained in the face of climate change, peak oil and economic instability: dramatic increases in public transport use will require new standards of service delivery. This project will use international experience to shape new approaches to planning public transport in our largest cities.
R&D Program: ARC - Discovery **– Project code:** DP110104738

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆

SUBTOPIC: Land (tenure & use)
REGION: Queensland **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Rural Land in Queensland: Spatial Patterns of Ownership Change: Aggregation and Fragmentation*

Project leader(s): Melissa Neave;
Project period: - 2012
Description: This report provides detailed data on rural land ownership change in Queensland over the period 2004-08. It is intended to complement the nation-wide analysis of this issue presented in RIRDC publication 12/038 "Rural Land in Australia: A framework for the measurement and analysis of nationwide patterns of ownership change, aggregation and fragmentation". This report examines individual trends for 56 rural Local Government Areas (LGAs). Results for each LGA are compared against regional and state trends.
https://rirdc.infoservices.com.au/items/12-125
R&D Program: RIRDC

TOPIC: Resource access & cost　　　　　　　**NRM RELEVANCE SCORE:** ★★★★☆
SUBTOPIC: Land (tenure & use)
REGION: Australia-wide **FORMAT:** Strategy development **PLANNING RELEVANCE:** Indirect

Project Title: *An assessment of the vulnerability of Australian forests to climate change Part V: Synthesis and final report*

Project leader(s): Roger Kitching; Griffith University
Project period: 2012 -
Description: Forests and the industries associated with them are vulnerable to the impacts of climate change. Australia has 149 million hectares of forest managed for conservation and heritage areas and for production of forest products. This project summarises the four parts of the assessment into a succinct report for policymakers and forest managers. It identifies region-specific vulnerabilities and critical gaps in the knowledge needed to improve adaptive management of forests.

www.nccarf.edu.au/content/assessment-vulnerability-australian-forests-climate-change-part-v-synthesis-and-final-report

R&D Program: NCCARF

TOPIC: Resource access & cost　　　　　　　**NRM RELEVANCE SCORE:** ★★★☆☆
SUBTOPIC: Land (tenure & use)
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *An assessment of the vulnerability of Australian forests to climate change Part I: Establish needs and consult with key stakeholders*

Project leader(s): Helen Wallace; University of the Sunshine Coast
Project period: 2012 -
Description: Forests and the industries associated with them are vulnerable to the impacts of climate change. Australia has 149 million hectares of forest managed for conservation and heritage areas and for production of forest products. This part of the project identifies key issues to be addressed in the forest vulnerability assessment, determines the extent to which climate change adaptation is being considered in current planning and management, and what type of information forest managers and policy makers will need.

www.nccarf.edu.au/content/assessment-vulnerability-australian-forests-climate-change-part-i-establish-needs-and

R&D Program: NCCARF

TOPIC: Resource access & cost　　　　　　　**NRM RELEVANCE SCORE:** ★★☆☆☆
SUBTOPIC: Land (tenure & use)
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Econometric modelling of housing prices and their relationship to climate adaptation issues*

Project leader(s): Alicia Rambaldi; University of Queensland
Project period: 2012 - 2014
Description: The path to climate adaptation in urban communities is directly related to housing infrastructure. The project develops improved and new econometric methods for the prediction of property prices and their components, land and structure, and it will provide estimates of the interplay between flooding risk and property values.
R&D Program: ARC - Discovery **– Project code:** DP120102124

TOPIC: Resource access & cost　　　　　　　**NRM RELEVANCE SCORE:** ★★★★★
SUBTOPIC: Water
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *North Queensland Irrigated Agriculture Strategy*

Project leader(s): Office of Northern Australia
Project period: 2013 -
Description: The Strategy will deliver a comprehensive assessment of sustainable water resource development and the potential for new irrigated agriculture in the Flinders and Gilbert catchments of north Queensland. It will also include an independent assessment of the viability of establishing new meat processing facilities in north-west Queensland.

www.regional.gov.au/regional/ona/nqias.aspx

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ★
SUBTOPIC: Water
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

Project Title: *Northern Australia Local Government and Household Water Management Initiative*

Project leader(s): Office of Northern Australia
Project period: 2013 -
Description: This project is focused on developing initiatives to address priority water challenges facing communities across northern Australia. The initial phase of the project reviewed available data on household water use in northern Australia; assessed the role of local governments in the delivery of water services across northern Australia; and assessed existing water programs in remote, rural and Indigenous communities in northern Australia. Phase two built on this initial research to identify options for improving water delivery in northern Australian communities, focusing on the role of Local Governments in managing water services.
www.regional.gov.au/regional/ona/nalghwmi.aspx

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Energy
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Analysis of institutional adaptability to redress electricity infrastructure vulnerability due to climate change*

Project leader(s): John Foster; University of Queensland; Deepack Sharma; University of Tech, Sydney
Project period: 2011 -
Description: This project will examine the capacity of Australia's National Electricity Market to adapt to existing and predicted climate change conditions. It will identify potential issues and analyse climate change impacts on reliability in the Market under different climate change scenarios to 2030, particularly what adaptation strategies the power generation and supply network infrastructure will need.
www.nccarf.edu.au/content/institutional-adaptability-electricity-infrastructure-climate
R&D Program: NCCARF

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Energy
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Marginal

Project Title: *Production, processing and combustion of an innovative slurry fuel for high efficiency distributed power generation*

Project leader(s): Dongke Zhang; University of Western Australia
Project period: 2011 - 2013
Description: This project will advance the science underpinning the development of an innovative technology for energy production (with carbon capture) and use in remote regions. The outcomes of this research will help meet the great challenges of climate change and contribute to the development of an environmentally sustainable Australia.
R&D Program: ARC - Discovery **– Project code:** DP110103699

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ★ ★ ☆
SUBTOPIC: Food security
REGION: Australia-wide **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Direct

Project Title: *Australian Food Security: Impact of Climate Change for Risk Management: How prepared are food industry leaders?*

Project leader(s): David Michael; Wondu Business & Technology Services
Project period: 2012 -
Description: The combination of a drier and more volatile climate, limited arable land, subsidised competition from biofuel crops and a growing population suggests food availability and prices will become more volatile in Australia and offshore. The Project examines the preparedness of food industry leaders for riskier operating scenarios, and the implications of climate change for risk management.
www.nccarf.edu.au/content/australian-food-security-climate-change-risk
R&D Program: NCCARF

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ★ ☆ ☆
SUBTOPIC: Food security
REGION: Queensland **FORMAT:** Case studies **PLANNING RELEVANCE:** Indirect

Project Title: *Creating a climate for food security: the business, people & landscapes in food production*

Project leader(s): Angela Wardell Johnson; Curtin University
Project period: 2012 -
Description: This project will identify and interview stakeholders including producers, businesses, community and government in agricultural areas in south-west WA and south east Qld to identify risks, current productivity and approaches to adaptation related to climate change in agricultural production, and test approaches to strengthening resilience in agriculture in these areas.

www.nccarf.edu.au/content/creating-climate-food-security-business-people-landscapes-food-production

R&D Program: NCCARF

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Food security
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Indirect

Project Title: *Climate change, trade policies and food security: implications for Australia*

Project leader(s): Kym Anderson; University of Adelaide
Project period: 0 -
Description: The project seeks to examine empirically the relative importance of drivers of Australia's agricultural production and bilateral trade patterns over the next four decades. The project will use an applied general equilibrium model of the global economy to project national food and other production and trade to 2030 and 2050, providing a pair of baselines representing low and higher global farm productivity growth over the next four decades. Those baselines will be compared with scenarios involving (a) differential impacts of climate change on national agricultural sectors and labour forces, (b) alternative farm productivity assumptions in emerging economies, including those receiving foreign direct investments in farming and agribusiness, and (c) endogenous changes to agricultural and other trade/industry assistance policies in different parts of the world. This will be reported in a series of three core papers, along with its consequences for Australian agricultural production and bilateral trade patterns.

http://www.rirdc.gov.au/research-project-details/custr10_GC/PRJ-006579

R&D Program: RIRDC - Global Challenges **– Project code:** PRJ-006579

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ★ ☆ ☆ ☆
SUBTOPIC: Food security
REGION: General/Global **FORMAT:** Project proposal only **PLANNING RELEVANCE:** Direct

Project Title: *Governing food security in Australia in an era of climate change: a sociological analysis*

Project leader(s): Geoffrey Lawrence; University of Queensland
Project period: 2012 - 2014
Description: We know very little about the ways food security is governed in Australia. This study - the first social-science based study of food security in the nation - will allow us to understand how a multiplicity of agencies come together to ensure the delivery of food, especially at a time of climate change impacts.
R&D Program: ARC - Discovery **– Project code:** DP120101949

TOPIC: Resource access & cost   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆
SUBTOPIC: Food security
REGION: General/Global **FORMAT:** Situation analysis **PLANNING RELEVANCE:** Marginal

Project Title: *Urban food security, urban resilience and climate change*

Project leader(s): Paul Burton; Griffith University
Project period: 2012 -
Description: This project will extend knowledge of the diversity of agriculture in urban areas. It will identify the social, economic and political barriers to urban agriculture and explore the potential for extending its practice in the climate change-affected future. The results of this work will provide a much-needed commentary on the public health, nutritional and environmental benefits of greater urban food production and to make a valuable contribution to the development of the federal government's national food plan.

www.nccarf.edu.au/content/urban-food-security-urban-resilience-and-climate-change

R&D Program: NCCARF

TOPIC: Data, resources & tools
SUBTOPIC: Mapping & regional planning
REGION: Northern Australia **FORMAT:** Strategy development **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★ ★ ★ ★ ★

Project Title: *Catchment to coast planning*

Project leader(s): Bob Pressey; James Cook University
Project period: 2011 - 2014
Description: This research will create a decision framework to guide catchment managers in making decisions about natural resource investments to achieve multiple objectives. This framework will allow land managers to draw together available environmental, social and economic information and to compare investment strategies to explicitly assess trade-offs between objectives. It will also consider development trajectories, cost, feasibility and effectiveness of alternative policy tools.
www.nerpnorthern.edu.au/research/projects/11

R&D Program: NERP Northern Australia **– Project code:** NERP NA 1.1

TOPIC: Data, resources & tools
SUBTOPIC: Mapping & regional planning
REGION: WT Cluster **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Direct

NRM RELEVANCE SCORE: ★ ★ ★ ★ ★

Project Title: *e-Atlas*

Project leader(s): Eric Lawrey; Australian Institute of Marine Science
Project period: 2011 - 2014
Description: This project will develop and populate a website for accessing spatial data about the Great Barrier Reef and Torres Strait. It will be a useful tool for climate change adaptation planning.
www.nerptropical.edu.au/project/e-atlas

R&D Program: NERP Terrestrial Ecosystems **– Project code:** NERP TE 13.1

TOPIC: Data, resources & tools
SUBTOPIC: Mapping & regional planning
REGION: Northern Australia **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Indirect

NRM RELEVANCE SCORE: ★ ★ ★ ☆ ☆

Project Title: *Northern Australia Data Development*

Project leader(s): Office of Northern Australia
Project period: 2013 -
Description: This project focuses on the development of data and metrics that better inform decision making and improve capacity to profile regions in northern and remote Australia. Phase one of the project included a desktop analysis of Regional Development Australia (RDA) roadmaps to identify gaps and issues with the evidence base used to inform RDA regional Plans. Additionally, a scan of data sources currently used by RDAs was undertaken and a wide range of potential demographic, economic, social and environmental data sources were identified. This included information and data that could be sourced from Commonwealth, State, and Territory Governments, local research and industry sources.
www.regional.gov.au/regional/ona/nadd.aspx

TOPIC: Data, resources & tools
SUBTOPIC: Mapping & regional planning
REGION: General/Global **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Marginal

NRM RELEVANCE SCORE: ★ ☆ ☆ ☆ ☆

Project Title: *New approaches to predictive modelling of high-dimensional count data to study climate impacts on ecological communities*

Project leader(s): David Wharton; University of New South Wales
Project period: 2012 - 2014
Description: This project will lay methodological foundations for future studies of potential impacts of climate change on ecological communities. A flexible new toolset of predictive modelling approaches will be developed, capable of handling all common data types, which fit easy-to-interpret models, and which are more powerful than currently used methods.
R&D Program: ARC - Discovery **– Project code:** DP120100882

TOPIC: Data, resources & tools   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆

SUBTOPIC: Mapping & regional planning

REGION: General/Global **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Marginal

Project Title: *Atmoscape: the aesthetic reformulation of the atmosphere using intelligent imaging systems*

Project leader(s): Denis Del Favero; University of New South Wales

Project period: 2012 - 2014

Description: The proposed research provides Australia with an opportunity to advance its understanding of atmosphere and climate by building the world's first remote sensing visualisation system networked across three continents.

R&D Program: ARC - Discovery **– Project code:** DP120102243

TOPIC: Data, resources & tools   **NRM RELEVANCE SCORE:** ★ ☆ ☆ ☆ ☆

SUBTOPIC: Mapping & regional planning

REGION: General/Global **FORMAT:** Maps/Datasets **PLANNING RELEVANCE:** Marginal

Project Title: *The reformulation of landscape as a user generated interactive aesthetic*

Project leader(s): Dennis Del Favero; University of New South Wales

Project period: 2011 - 2013

Description: This project seeks to provide Australia with an opportunity to advance its understanding of landscape and climate change by building the world's first networked landscape visualisation system.

R&D Program: ARC - Discovery **– Project code:** DP110101146