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Australian Climate Change Adaptation Research Network for Settlements and Infrastructure (ACCARNSI)

PORTFOLIO OF CASE STUDIES OF CLIMATE CHANGE ADAPTATION TOOLS AND APPLICATION PROCESSES USED BY LOCAL GOVERNMENT PRACTITIONERS

Research and evaluation conducted in collaboration with the Australian Local Government Association and State and Territory counterparts

May 2012 – Philip Booth and Ron Cox

Mapping output from Moreton Bay Regional Council's Floodplain Database

ISBN: 978-0-7334-3202-6

PORTFOLIO OF CASE STUDIES AND STATE-WIDE SYNOPSES

This portfolio accompanies ACCARNSI's STAGE 1 REPORT: Case Studies of Climate Change Adaptation Tools and Application Processes used by Local Government practitioners. Eighteen case studies were gathered from councils and regional organisations across the States and Territories. In addition, synopses of adaptation tools and processes commonly used in Victoria, Western Australia, South Australia and NSW were provided.

The case studies and synopses are grouped alphabetically state by state.

NEW SOUTH WALES:

1 - Synopsis of adaptation tools and processes
2 - Clarence Valley Council: corporate risk assessment – in-house workshop program facilitated by Echelon
3 - Gosford City Council: identifying options and developing a Business Case to manage adaptation
4 – Sutherland Shire Council: vulnerability assessment and systems approach to regional climate change adaptation

QUEENSLAND:

1 - Moreton Bay Regional Council: regional floodplain database - boundary conditions, joint probability and climate change adaptation
2 - Cairns Regional Council: incorporating climate change adaptation in the Sustainability Assessment tool and report card
3 - Redland City Council: risk assessment and climate change adaptation Action Plan

SOUTH AUSTRALIA:

1 – Synopsis of adaptation tools and processes
2 - Sector-wide key learnings from facilitated risk assessments - foundations for Climate Adaptation Plans
3 – Campbelltown City Council: urban risk management through a Climate Adaptation Plan
4 – City of Port Adelaide Enfield: localised metropolitan flood risk assessment - spatial mapping and risk/adaptation costing
5 – Eyre Peninsula Natural Resources Management Board: climate change vulnerability assessment - region-wide pilot study
6 – Cities of Burnside, Marion and Onkaparinga: 'first pass' risk assessments - are risk identification and prioritisation processes the most important outcomes?

TASMANIA:

1 - Launceston City Council: LAPP funded risk assessment
2 – Devonport City Council and Cradle Coast Authority: coastal and regional risk assessments and adaptation action plans
3 – City of Clarence: comprehensive coastal vulnerability study of climate change impacts & adaptive responses - integrated spatial mapping, assessments of social & economic impacts, cost-benefit analyses and risk communication strategies

VICTORIA:

Sector-wide review of LAPP funded risk assessment projects in Victorian councils: learning from applications

WESTERN AUSTRALIA:

1 – Overview of case studies of adaptation tools and processes
2 – City of South Perth: 'first pass' risk assessment report - facilitated by Echelon with LAPP funding
3 – Eastern Metropolitan Regional Council: 'future proofing' risk assessment for a Regional Climate Change Adaptation Action Plan
4 – Mandurah City Council: coastal risk assessment and adaptation project

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New South Wales

Synopsis of adaptation tools and processes

Organisation:	Local Government and Shires Associations of NSW (LGSA)
Councils:	152
Web Address:	www.lgsa.org.au
Contact:	Amy Lovesey, Climate Change Training Project Manager amy.lovesey@lsga.org.au 02 9242 4128

Predominant tools

NSW councils are responding to the need to adapt to climate change by undertaking or commissioning climate change risk assessments, hazard assessments and vulnerability assessments. In 2010, a survey by the LGSA found that 72% of NSW councils responding (76 of 106 responses) had started or undertaken a climate change risk assessment (LGSA, 2010). This equated to half of all NSW councils. It is estimated that around 85 NSW councils (56%) have now completed a risk assessment. Most of the Local Government risk assessments have been qualitative with the scope covering councils' operations, services, assets and personnel.

A common approach to risk assessment has been to use the guidelines produced by the (then) Australian Greenhouse Office (AGO) in 2006 (AGO, 2006) as a tool through either (or both) the:

- Statewide Mutual Climate Change Risk Assessment Workshop Program
- Local Adaptation Pathways Program funded projects

Statewide Mutual Climate Change Risk Assessment Workshop Program

Statewide Mutual (a Liability and Property Mutual for NSW Councils) recognizes that climate change exposures may impact directly on the Mutual and engaged Echelon Australia to deliver a series of climate change risk assessment workshops to individual member councils. The facilitated workshops have been offered at no cost to member councils since 2009 (following pilot workshops with Comma-Monaro Shire Council, Great Lakes Council and Wagga Wagga City Council). Around 61 NSW councils will have completed the Statewide Mutual climate change risk assessment workshop program by 30 June 2011 (pers. comm., Ron Barnes, General Manager, Echelon, 20 May, 2011). The risk assessment workshops and resultant reports provided by Echelon help councils to prioritise which risks to address and may offer a prompt and impetus for subsequent adaptation planning by councils.

Commonly, councils have sought to address asset management planning, tree management strategies, community expectations, maintenance programs, stormwater and drainage infrastructure, flood plans and funding 2011 (pers. comm., Steve Broom, Divisional Manager, Echelon, 13 May, 2010). Some councils are incorporating the climate change risks into their Corporate Risk Register and climate change actions into an Environmental Management Plan or existing corporate plan or creating a climate change adaptation plan or strategy.

Local Adaptation Pathways Program funded projects

In total, 22 NSW councils received funding through the Commonwealth Government's Local Adaptation Pathways Program (LAPP) (rounds 1 and 2). The competitive funding was provided from 2008 to assist councils to work with consultants on risk assessments and/or adaptation plans using the AGO (2006) guidelines. These councils worked with various consultants (for example Blue Mountains City Council engaged Climate Risk Pty Ltd, Kiama Municipal Council engaged Sinclair Knight Merz and Port Stephens Council engaged BMT WBM Pty Ltd). There are some examples of the plans or reports produced by NSW councils with LAPP funding at: www.lgsa-plus.net.au/www/html/3105-examples-of-policies-and-plans.asp and a full list of councils that received LAPP funding can be found at: www.climatechange.gov.au/government/initiatives/lapp.aspx

Some of the NSW councils that completed LAPP projects also completed the Statewide Mutual Climate Change Risk Assessment Workshop Program.

Other tools

Other tools that NSW councils have utilised for climate change adaptation include the:

- LGSA Climate Change Action Planning for Local Government Workshop Package
- ICLEI Local Governments for Sustainability (ICLEI) Local Government Climate Change Adaptation Toolkit

There are also various tools offered by consultants or research agencies for climate change adaptation including hazard and vulnerability mapping and modelling and multi-criteria analysis.

LGSA Climate Change Action Planning for Local Government Workshop Package
The Climate Change Action Planning for Local Government Workshop Package (the Workshop Package) is designed to assist NSW councils to undertake climate change risk assessments and plan actions for adaptation. The Workshop Package is based on the AGO guidelines (AGO, 2006) and a literature review of other tools including the various tools mentioned in this synopsis.

The Workshop Package includes a template for a climate change action plan and encourages councils to also consider integrating climate change actions into existing corporate plans.

The Workshop Package offers:

- step by step guidance for preparing for and facilitating a series of structured workshops and meetings
- risk assessment tools and templates
- technical guidance and references
- PowerPoint presentations
- details for group activities and facilitation techniques
- evaluation forms
- a template for a climate change action plan

The modular format of the Package means councils can select relevant modules and tailor a program to suit their particular needs. Eight NSW councils have used components of the Workshop Package along with facilitation and support from the LGSA as part of their adaptation planning. The development and application of the Workshop Package was funded by the NSW Government through its Environmental Trust. Further details about the Workshop Package and its use by NSW councils can be found at: http://www.lgsa-plus.net.au/www/html/3063-climate-change-action-planning-for-local-government.asp

ICELI Local Government Climate Change Adaptation Toolkit
This Local Government Climate Change Adaptation Toolkit was developed by ICELI with funding from the (then) Australian Government Department of Climate Change and was piloted with five local Councils from around Australia. The Toolkit is based on the AGO guidelines (AGO, 2006) and the capacity building frameworks that ICLEI has developed over the years of supporting councils subscribed to the Cities for Climate Protection Program (CCP).

Four NSW councils had partnered with ICLEI to complete the ICLEI Adaptive Resilient Communities Program (ARC) using the Toolkit. However, this program has now ceased. The Toolkit can still be accessed online.

New tools

There are several tools proposed and/or currently in development in NSW, including:

1. Guide to Climate Change Risk Assessment for NSW Local Government by the NSW Office of Environment and Heritage (OEH). This is a guidance document designed for councils in the Sydney Metropolitan Area and Extended Regulated Area paying the waste and sustainability levy to the NSW Government. The OEH is encouraging these councils to undertake qualitative climate change risk assessments to inform adaptation planning (where they have not already). The draft guide broadly follows the AGO guidelines (AGO, 2006).
2. The OEH is undertaking Integrated Regional Vulnerability Assessments (IRVAs) around the State with some local council involvement. The outputs of the IRVAs may be of use to councils.
3. Tools under development by consultants or research agencies.

References

AGO, 2006, Climate Change Impacts and Risk Management - A Guide for Business and Government. http://www.climatechange.gov.au/en/what-you-can-do/community/~/media/publications/local-govt/risk-management.ashx

ICLEI Oceania, 2008, Local Government Climate Change Adaptation Toolkit. Australian Government Department of Climate Change. http://www.iclei.org/index.php?id=adaptation-toolkit

LGSA, 2010, Local Government Needs in Responding to Climate Change in New South Wales, Australia. http://www.lgsa-plus.net.au/www/html/3637-needs-of-local-government-.asp

LGSA, 2011, Climate Change Action Planning for Local Government Workshop Package, http://www.lgsa-plus.net.au/www/html/3063-climate-change-action-planning-for-local-government.asp

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NSW - Case Study 2

Clarence Valley Council: Corporate Risk Assessment – in-house workshop program facilitated by Echelon

Council:	Clarence Valley Council
Web Address:	www.clarence.nsw.gov.au
Size:	10,440 square kilometres
Population:	49,422
Classification:	Coastal and Inner Regional
Program:	Statewide Mutual Climate Change Risk Assessment Workshop Program
Tools:	Australian Greenhouse Office (2006) Climate Change Impacts and Risk Management - A Guide for Business and Government Australian and New Zealand Standard for Risk Management AS/NZS 4360:2004 (Now ISO 31000:2009)
Function:	Climate Change Risk Assessment for corporate risks
Consultants:	Echelon
Contacts:	Simon Roberts Manager Corporate Governance 02 6641 7232 simon.roberts@clarence.nsw.gov.au Scott Lenton Environmental Planning Coordinator 02 6643 0234 scott.lenton@clarence.nsw.gov.au

1. OVERVIEW OF PURPOSE

In December 2009 to February 2010, Clarence Valley Council completed a series of five (5) climate change risk assessment workshops over a 12-week period. The climate change risk assessment workshops were offered by Statewide Mutual (NSW Local Government "mutual self insurance" program) who contracted Echelon to facilitate the workshops.

The Statewide Mutual *Climate Change Risk Assessment Workshop Program* aims to assist NSW councils to **identify their corporate risks** from projected climate change and to **explore future adaptation actions** to reduce potential exposures for Council. The program was not designed to assess community or environmental risks apart from where they have direct relevance to council's operations, services, assets or personnel.

The Statewide Mutual program was based on:

- *Climate Change Impacts and Risk Management - A Guide for Business and Government*, Australian Greenhouse Office 2006
- *Australian and New Zealand Standard for Risk Management AS/NZS 4360:2004* (Now ISO 31000:2009)

At the completion of the series of five workshops, Echelon provided Council with a report on the climate change risks identified, risk ratings, current controls and potential adaptation options. Council is now using the report by Echelon as a basis for the development of adaptation actions and a local climate change action plan, which Council will prepare over the coming months.

2. ASSESSING THE TOOL

Background:
When Clarence Valley Council undertook community consultation to develop its Strategic Plan Vision 2020, the community identified actions to address climate change impacts in future planning as a significant issue. Council had already made several achievements in climate change mitigation and sought opportunities to progress with preparing for climate change to assist in achieving key strategies in Council's Vision 2020. Council allocated $20,000 in the 2009/2010 financial year for developing a local climate change action plan.

In November 2009, Clarence Valley Council worked with the Local Government and Shires Associations (LGSA) to use the LGSA *Climate Change Action Planning Workshop Package* as part of Council's process to prepare a climate change action plan. Together with the LGSA, Council held a two day workshop for staff and Councillors to provide an introduction to climate change and a brief **introduction to risk assessment**. Council liaised with the LGSA to ensure that this introductory workshop on risk assessment would **lead into more detailed risk assessment** work with Echelon as part of the Statewide Mutual Program. Thus the preliminary workshop would not duplicate nor contradict the follow-on process with Echelon.

The LGSA and Statewide Mutual were supportive of Council's plan to undertake both programs, as this approach offered a chance to test and demonstrate how the two programs could be used concurrently and in a complementary and consolidated manner. Module 3 of the Workshop Package – *Assessing Climate Change Risk*, is consistent with Statewide Mutual's approach as both are based on AS/NZ 4360:2004, ISO 3100:2009 and the guide, Climate Change Impacts and Risk Management: A Guide for Business and Government (AGO, 2006).

2.1 Drivers for using the tool to assess corporate risks

Intended outcomes/benefits:
The Statewide Mutual sponsored *Climate Change Risk Assessment Workshop Program* delivered by Echelon was attractive to Clarence Valley Council as it was offered for free and would provide an experienced Echelon facilitator to run the process. Although staff resources would need to be devoted to attend the workshops and subsequently review workshop outputs, the offer of the Workshop Program represented **good value to Council**. Furthermore, the workshops would be offered on location at Council rather than staff members needing to attend workshops in Sydney or elsewhere.

Another benefit Clarence Valley Council identified in the Statewide Mutual program was that it **offered a methodology and format** that would be **consistently applied by numerous councils** across NSW. This means that Council could choose to compare its risk assessment results with other councils that have undertaken the program. Furthermore, Statewide Mutual has compiled a ***risk library* or database** of risks that other councils have identified and can share these risks to member councils (without identifying individual councils).

When Statewide Mutual wrote to Clarence Valley Council and offered the workshops it was relatively good timing to commence a climate change risk assessment. Council was making good progress in addressing climate change due to the work of motivated staff members and had recently drafted a Climate Change Policy. The Policy identified, among other things, the need to develop the resilience of Council and the community.

2.2 IMPLEMENTATION METHODOLOGY

Statewide Mutual and Echelon provided the risk assessment spreadsheets and briefing materials. Council was only required to provide a venue and staff members' availability for participation and follow-up.

Between 10 and 20 staff members from various functional areas of Council were involved in each of the five risk assessment workshops, including members of Council's multi-disciplinary and cross-functional 'Climate Change Action Planning Team.' Staff participants were mostly at Executive or manager level with all three staff of Council's Executive team participating in one or more of the risk assessment workshops. Council's

Governance Manager coordinated the project and staff attendance at the workshops, and Echelon facilitated the workshops.

The sources of information used included:

- CSIRO, 2007, Catchment Scenario Reports (for 2030) http://www.environment.nsw.gov.au/climateChange/nswreports.htm
- NSW Government, 2010, Sea Level Rise Policy Statement (for 2050 and 2100) http://www.environment.nsw.gov.au/climatechange/sealevel.htm

Over 470 climate change risks were identified as part of the risk assessment process including 134 which were rated as extreme or high risks.

2.3 EVALUATING OUTCOMES

Outcomes achieved and critical success factors:
The Statewide Mutual Climate Change Risk Assessment Workshop Program was utilised by Council to progress its adaptation agenda by:

- ✓ providing **decision support;** and
- ✓ assisting with **corporate planning of risk management responsibilities**.

The risk assessment tool and process led to four more good outcomes for Clarence Valley Council. The best two outcomes head this list:

- ✓ completing the risk assessment workshops prompted collective thinking and action; and
- ✓ contributed to building knowledge of climate change risks among Council staff;
- ✓ resolved a need to strategically adapt to climate change; and
- ✓ encouraged collaboration across council.

Challenges and limitations:
Two challenges with the workshop process are that it requires: firstly, staff motivation and buy-in to attend all five workshops; then secondly, complete all tasks involved in reviewing the **risk statements** and the follow-on **risk ratings** identified after the workshops. These challenges were surmounted by the Executive's commitment to complete the workshops and a directive for relevant staff, selected from management and administrative roles, to participate. Outdoor staff members were not involved and so this limited opportunities to build their capacity and to raise awareness across Council by learning from their on-ground knowledge.

Another limitation of the risk assessment tool and process was the broad scale of the Catchment Scenarios (CSIRO, 2007). The data did not reflect local variations in the landscape and a finer resolution data set would have provided more detailed information and enhanced reliability. For example, hot days above 35 degrees Celsius may have been underestimated in the 2030 climate change scenario since in some locations in the Local Government Area presently the number of hot days per year exceeds the projection for 2030. This is a limitation that would apply to several other tools as well, since there is a dearth of reliable local scale information about future climate scenarios. Notwithstanding that, for smaller local government areas where topographic and climatic variation is less pronounced this data limitation would be less of a concern.

To assist the risk identification process, Echelon provided Council with a list of risks that other councils had identified in common. Although this was more time efficient than a longer brainstorming process, it may have stymied their lateral thinking. In addition, some risks relevant to Council's context that were not on the list may have otherwise been identified by participants if the brainstorming process had continued.

Potential improvements for the program:
These could include:

- ➢ More time allocated in the workshops to enable discussion and deliberation by participants and to ensure all work was completed in a timely fashion. At times the workshops were a little too rushed in order to adhere to a pre-determined schedule.
- ➢ Work that was not completed in the workshops was assigned to relevant individuals to complete afterwards. This resulted in some gaps in the report Echelon provided to Council where busy staff members were unable to commit the time resource to complete their outstanding tasks.
- ➢ Involving outdoor staff as well would have been an opportunity to build their capacity and raise awareness across Council and also benefit from their on-ground knowledge.

Adaptive learning:

Key lessons that Council staff members learnt from completing the risk assessment workshops included:

- climate change will affect all parts of Council's operations in some way, directly or in-directly;
- different landscapes will be affected in different ways; and
- there is variability and uncertainty in climate change projections.

Staff members also realised that some of the actions Council is already undertaking are assisting to address climate change risks although they weren't implemented for the primary purpose of climate change adaptation.

The work will continue to provide beneficial outcomes for Council including:

- ✓ enabling informed decision-making;
- ✓ enabling improvements to strategic planning practices;
- ✓ promoting systems thinking in climate change adaptation and sustainability; and
- ✓ driving innovative approaches to urban and regional planning;

The risk assessment process that Council undertook, and the resultant outputs, can be reviewed and adapted over time to changing needs for example as improved standards for risk assessments, or new climate change information, becomes available.

3. FUTURE DIRECTIONS

Clarence Valley Council recommends the *Statewide Mutual Risk Assessment Workshop Program* to other councils and would suggest that they start preparing for the likely impacts of climate change now. From Council's experience, its key advice to other councils is:

- not to rush the risk assessment process;
- try to identify as many climate change risks as possible from the local context, before deferring to risks articulated by other organisations; and
- use risks identified by others as a means to enhance thinking rather than stymie ideas.

Council received a Climate Change Risk Assessment Adaptation Report from Echelon, which includes identified risks, current controls and potential future adaptation actions. Council is reviewing the Report and its priority is to prepare a corporate climate change action plan for itself as **an organisation and business**, with adaptation actions that align with Council's Sustainability Framework. Meanwhile, it's community-based Climate Change Committee is concurrently considering the role of the wider community in mitigation and adaptation actions to combat climate change.

The corporate climate change action plan will give Council an understanding of where to invest resources in the future, particularly as the organisation increases its focus on adaptation responses. The adaptation actions in the plan will improve the level of certainty and resilience for Council, the community and industry in terms of settlement planning, infrastructure and habitation within the Clarence Valley.

4. REFERENCES

Australian Greenhouse Office (2006) *Climate Change Impacts and Risk Management - A Guide for Business and Government* www.climatechange.gov.au/en/what-you-can-do/community/~/media/publications/local-govt/risk-management.ashx

Australian and New Zealand Standard / International Standards Organisation *ISO 31000:2009 Risk Management – Principles and Guidelines*
http://infostore.saiglobal.com/store/Details.aspx?ProductID=1378670

CSIRO, 2007, *Catchment Scenario Reports* www.environment.nsw.gov.au/climateChange/nswreports.htm

NSW Government, 2010, *Sea Level Rise Policy Statement*
www.environment.nsw.gov.au/climatechange/sealevel.htm

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NSW - Case Study 3

Gosford City Council: identifying options and developing a Business Case to manage adaptation

Council:	Gosford City Council
Web Address:	http://www.gosford.nsw.gov.au
Size:	1,029 square kilometres
Population:	Estimated Residential Population of 166,626
Classification:	Coastal City
Program:	Gosford City Council's Climate Change Program
Tool:	Business Case for Managing Climate Change Adaptation
Function:	Inform decision making and enhance internal communication of Council's adaptation program
Contact:	Ann Stewart Senior Environment Planning Officer 02 4325 8885 ann.stewart@gosford.nsw.gov.au

1. OVERVIEW OF PURPOSE

In early 2010, Gosford City Council's Manager of Integrated Planning suggested that staff should develop a business case to outline Council's existing climate change adaptation initiatives and gaps, and provide a roadmap for future strategic direction.

Gosford City Council's *Business Case for Managing Climate Change Adaptation* shows how various *'pieces of the puzzle'* fit together (for example risk assessments underway, sea level rise plans and flood maps) and charts a way forward in relation to the sequencing and financing actions. It also assists internal communication of Council's climate change adaptation initiatives, particularly to senior managers, and ensures a common understanding among all staff members.

An excerpt from the Business Case is provided below:

> *The purpose of this business case is to provide justification of Council capital works expenditure (both already budgeted and future funding requests) for addressing climate change adaptation impacts in the Gosford LGA. It combines an assessment of the level of impact that Gosford LGA can expect to encounter through the 21st century and investigates how Council needs to shift its services and activities to manage these impacts.*

Gosford City Council's Business Case is available on the Local Government and Shires Associations Climate Change Action Pack website at: www.lgsa-plus.net.au/www/html/3105-examples-of-policies-and-plans.asp

2. ASSESSING THE TOOL

The Business Case was needed as Council had a lot of work on climate change adaptation underway including the development of a policy and concurrent risk assessments with different scopes and different partners (ICLEI Local Governments for Sustainability, Echelon/Statewide Mutual and Hunter Councils). There was a need for a **tool to provide a framework** for aligning these initiatives and to provide a logic for investment in both adaptation and mitigation actions.

As Gosford City Council is ranked third of NSW councils at risk from sea level rise, staff had a **sense of urgency** to commence developing and implementing actions to address climate change impacts. Many sections of Council were already noticing climate change impacts affecting their service delivery.

2.1 DRIVERS FOR USING THE TOOL

The Business Case was designed for use by the Senior Managers Group and other staff across council including those responsible for land use planning, floodplain management, social planning and corporate planning. It is both an internal corporate document and a living document to which new information and research can be added.

Rather than adopt an existing template for the Business Case, staff decided to **tailor a framework** that would be suitable for Council's needs. Staff analysed various frameworks for business cases and selected certain elements that would be useful from different business case models. Although Council had a standard template for business cases that is successfully utilised by the water and sewer team, it is designed for outlining a rationale for individual projects rather than for charting the key elements and potential directions of a program.

2.2 IMPLEMENTATION METHODOLOGY

The Business Case was prepared by two staff members and required 1.5 full time equivalent staff over three months. Staff had experience in preparing Council reports but not developing detailed Business Cases and needed to formulate an appropriate methodology for the development of the Business Case.

In February 2010, a Climate Change Adaptation Working Group was developed to help inform the development of the Business Case. The Working Group of 55 staff members was led by the General Manager and comprised all Senior Managers within Council.

One-on-one interviews were undertaken with 41 members of the Climate Change Adaptation Working Group and a survey was undertaken to assess staff members' levels of understanding of climate change using a three page questionnaire with 15 questions. The survey was created for Council's needs and drew on questions from questionnaires developed by ICLEI Local Governments for Sustainability and the Hunter Councils Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) for similar purposes. Excerpts from the results of the survey were included in the Business Case to highlight the gaps in Council's adaptation actions and build the rationale for further action.

Intended outcomes:
The Business Case presented three options for managing climate change adaptation: '**Leading**', '**Collaborating'** and '**Following'**. A summary of the costs, benefits and risks of each option are also outlined in the Business Case along with the preferred option, which is a combination of elements from all three options but with emphasis on 'Leading' and 'Collaborating'.

The Business Case proposed a 12 month project involving the employment of a Project Officer to drive organisation wide action including:

- Mapping to identify 'hot spots' of risk from climate change impacts to communities and Council infrastructure
- Addressing the extreme and high risks identified through the Echelon/Statewide climate change risk assessment process.
- Participating in the HCCREMS Regional Climate Change Risk Assessment and Adaptation Planning Initiative

- Partnering with other stakeholders for potential adaptation projects

The Working Group meets twice a year to review the Business Case and provide continued endorsement.

2.3 EVALUATING OUTCOMES

Outcomes achieved:
The Business Case has assisted in:

- ✓ Decision support and corporate planning, including planning investment in research projects and informing land use planning and decision making.
- ✓ It has also encouraged collaboration by staff members across various business units of Council.

Critical success factors:
One of the strengths of the Business Case is that the information provided is referenced from several different reputable sources including from all levels of government including the Council of Australian Governments (COAG), and it provides an outline of how each level of government is addressing climate change.

Importantly, the Business Case presents a strong rationale for climate change adaptation by **providing information from various perspectives** and this is a critical success factor:

- ✓ scientific data, as well as information on insurance and liability risks is included from Statewide Mutual and other credible research; and
- ✓ community perceptions are outlined, based on the submissions Council received on the draft Climate Change Policy and the NSW Government survey *"Who Cares about the Environment in 2009?"* (DECCW, 2010).

Another critical success factor was **securing the support of the General Manager**, as this leadership promoted buy-in from other staff members as well as providing a top down driver. The Business Case was very well received by the General Manager as it provided qualitative descriptions of costs and benefits of different approaches and presented a range of options as flexible pathways.

Challenges and limitations:
A challenge in using this kind of tool was ensuring staff members actually read through the Business Case. A Power Point presentation was made to the Senior Managers' Group so that the important information was conveyed to them.

An ongoing challenge will be allocating time to review and update the document. One noted limitation is that the Business Case is not linked to a prompting system for reporting and relies on the relevant staff member to take the initiative to review the currency of the document, update the progress of the climate change adaptation program and decide on the need for any modifications to the program and document.

3. FUTURE DIRECTIONS

The Business Case is currently being reviewed and a revised business case incorporating outcomes of the proposed project will be presented to the Senior Managers' Group for continued endorsement.

Gosford City Council would recommend the use of a Business Case to other councils.

4. REFERENCES

Department of Environment, Climate Change and Water (DECCW) (2010) *"Who Cares about the Environment in 2009?"* www.environment.nsw.gov.au/community/whocares2009.htm

Gosford City Council's *Business Case for Managing Climate Change Adaptation* on the Local Government and Shires Associations Climate Change Action Pack website: www.lgsa-plus.net.au/www/html/3105-examples-of-policies-and-plans.asp

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NSW - Case Study 4

Sutherland Shire Council: Vulnerability Assessment and systems approach to regional climate change adaptation

Council:	Sutherland Shire Council
Web Address:	www.sutherlandshire.nsw.gov.au
Size:	370 square kilometres
Population:	202,000 (in 2006)
Classification:	Coastal City
Program:	Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises
Tools:	Vulnerability Assessment
Function:	Assess vulnerability of the Local Government Area
Contact:	Justin Sauvage Sustainability Educator/Environmental Scientist 02 9710 0820 JSauvage@ssc.nsw.gov.au

1. OVERVIEW OF PURPOSE

In 2007, Sutherland Shire Council was one of 15 councils invited to participate in the project "Systems Approach to Regional Climate Change Adaptation Strategies in Metropolises" (the project). As the project developed, Council was later invited to be one of three case study councils for the final phase of the project.

The project delivered a vulnerability assessment of Sutherland Shire and 14 other Local Government Areas (LGA) to five climate change impacts. It also investigated the drivers and barriers for the 15 councils in preparing for the impacts of climate change.

The project was undertaken collaboratively by the Sydney Coastal Councils Group (SCCG), CSIRO and the University of the Sunshine Coast (USC). The SCCG is a voluntary Regional Organisation of Councils (ROC) established in 1989 to promote co-ordination between member councils relating to the sustainable management of the urban coastal environment. The Group consists of 15 Councils adjacent to Sydney marine and estuarine environments and associated waterways. These 15 councils collectively cover 1,346 square kilometres and represent over 1.3 million Sydneysiders.

2. ASSESSING THE TOOL

Council was involved with this project during 2007 and 2008.

2.1 DRIVERS FOR USING THE TOOL

When the SCCG invited Sutherland Shire Council to become involved in the project, Council was willing to participate as it was keen to see the results of a vulnerability assessment of the LGA and to identify any climate change issues which it needed to address. At that point in time, Council's previous work on climate change adaptation was limited to flood studies). Council saw benefits in participating in this cost-free project and the involvement of CSIRO gave it additional credibility. CSIRO is regarded as a trusted agency and the involvement of a university also gave the project further standing.

2.2 IMPLEMENTATION METHODOLOGY

The SCCG, CSIRO and USC completed the project with funding from the then Australian Greenhouse Office (AGO) National Climate Change Adaptation Program, Sub program *Integrated Assessment*.

Council's role in the project was in the provision of information via its documents and through a workshop and one-on-one interviews conducted by the researchers. Council also reviewed project outputs and provided feedback to the SCCG.

The three-phase project began by SCCG, CSIRO and USC using climate change projections and socio-economic data to conduct a vulnerability assessment and mapping exercise for the SCCG region focusing on five areas of potential climate change impacts:

- extreme heat and human health;
- sea level rise and coastal hazards;
- extreme rainfall and stormwater management;
- bushfire; and
- natural ecosystems and assets.

The project team defined vulnerability in accord with the Intergovernmental Panel on Climate Change (IPCC): *"the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes"* (IPCC, 2001) (CSIRO*, et al.*).

Spatial estimates of vulnerability were determined through the integration of multiple indicators representing the three components of vulnerability: exposure, sensitivity and adaptive capacity.

The SCCG, CSIRO and USC presented the vulnerability assessment and mapping to the 15 local councils involved in the project at a workshop held at each of the 15 councils. A one day workshop was conducted at Sutherland Shire Council on 4 September 2007 which was attended by approximately 15 staff, councillors and a community representative. The workshops with each council were designed to enable the researchers and the councils to jointly consider the nature of vulnerability and think about the local environment as a complex system comprised of multiple drivers, responses and interactions (Preston *et al.*). In particular, the workshops aimed to identify and discuss key barriers and opportunities to managing climate change vulnerability in the Sydney region.

The results of each of the 15 workshops were combined by the project team to provide an overall indication for the Sydney region of priority issues, and to identify to all levels of government barriers that Councils in Sydney face in adapting to climate change.

Context - identity and diversity:

In the culminating phase of the project, three councils were selected as case studies, one of which was Sutherland Shire Council. The three councils were selected based on the barriers identified in the workshops and various other characteristics of the council and LGA, to obtain a sample representative of the diversity of perspectives in the region. The case studies aimed to identify factors that influence councils' capacity to

respond to climate change. At the case study councils, one on one interviews with selected council staff were held by one of the researchers. For Sutherland Shire Council the interviews were conducted in early May 2008.

A process requiring external expertise and facilitation:

Staff did not need prior experience or expertise in vulnerability assessment or climate change to attend the workshops and interviews. However, the vulnerability assessment **could not have been undertaken independently** by council as it required expertise, software and time to obtain optimum effectiveness.

This type of project could be undertaken by other regional organisations of councils if they had access to the financial resources required, such as a similar grant funding, and suitable project partners.

2.3 EVALUATING OUTCOMES

The project was an opportunity for council to explore the concept of vulnerability and consider Council's role in adapting to climate change. The project also provided Council with information about the barriers and opportunities associated with adaptation at the Local Government level. Importantly, the project also offered Council an excellent opportunity for collaboration with the other SCCG councils and project partners.

Critical success factors:

Particular features of the project that suited Sutherland Council included that it:

- ✓ was a facilitated process;
- ✓ based on a methodology developed by experts;
- ✓ required minimal Council staff resources;
- ✓ was offered and delivered as a well-facilitated process by credible agencies; and
- ✓ provides a solid basis for further exploration of the issues.

The project identified that Sutherland Shire Council's LGA had a relatively low degree of vulnerability overall, but diversity in the landscape resulted in differing degrees of vulnerability across the LGA. In comparison to other LGAs in the SCCG region, Sutherland was not considered to be highly vulnerable to any of the potential impacts examined. However, the assessment found that the coastlines, particularly around Botany Bay, would likely be significantly affected by sea level rise and urban development in the north of the LGA would increase the risk of urban stormwater flooding. The urban areas in the north were considered to have particularly low adaptive capacity.

The report contains a range of recommendation to improve the adaptive capacity of Councils to deal with climate change including:

- increased funding and resourcing of Councils to implement adaptation strategies;
- government investment into research into climate change exposure and adaptive capacity;
- that State and Federal Governments articulate responsibilities for climate change adaptation; and
- Council and other tiers of government amend policies, planning controls, regulations and legislation to facilitate climate change adaptation.

The project also identified key barriers to adapting to climate change including:

- lack of funding;
- development pressures; and
- lack of direction from State and Federal Government.

Challenges and limitations:

Participating in the SCCG project **did not result in any outcomes that significantly influenced Council business**. However, it did raise awareness of the issues and built knowledge and awareness among managers and directors of the need for Council to explore key issue in climate change adaptation. The project may also have contributed to assisting Council identify the need for further adaptation projects. Experts in this field have suggested that the process of completing vulnerability assessments can be useful for providing a platform for reflection (Preston, at al., 2010). Yet the project **did not lead to follow-on significant discussions** or deliberation among Council staff, beyond the workshops**. Nor did it facilitate a sense of urgency to act** on climate change. Following the project, it remained unclear whether there should be a strong imperative to commence adaptation planning apart from addressing sea level rise.

It would have been useful for Council staff to engender more information on how their day-to-day operations could be affected by climate change vulnerabilities. Staff members consider that the reports on the project were quite theoretical and did not provide enough detail on the potential consequences of climate change and the consequences for Council of adopting various adaptation responses including 'do nothing' options. This is perceived as a **limitation** of vulnerability assessments **in comparison to other tools** such as risk assessments (Preston, *at al.,* 2010).

Adaptive learning:

Preston *et al (* 2010) acknowledge that vulnerability assessments and mapping **often generate more questions than answers**, particularly as users are challenged to identify key factors that contribute to observed spatial patterns of vulnerability. The lack of specific outcomes or consequences creates challenges for applying information about vulnerability to the strategic design and delivery of adaptation responses. In particular, a vulnerability assessment **does not indicate the likely costs and benefits of potential adaptation actions** to manage vulnerability (Preston *et al.* 2010).

Nonetheless, for Sutherland the vulnerability assessment was a suitable **initial** tool for achieving the goals of the project team, which included demonstrating that different Local Government Areas in Sydney will experience context-specific climate changes, in different ways depending on their geographic location, demographics, and their capacity to respond to future climate change risk.

The three case study councils and the 12 other councils in the region may have derived varying degrees of value from the project as a learning opportunity and catalyst for action. The project team noted that the project has:

- ✓ enhanced Council employees' understanding of the need for adaptation and their role;
- ✓ generated interest and commitment for action across council and the media; and
- ✓ helped facilitate learning by the broader community (Preston, *et al.,* 2010).

3. FUTURE DIRECTIONS

In late 2008, staff put a report to Council on the project. The report and appendices provided Council with:

- A brief summary of the finding
- Results of the mapping
- Relevant fact sheets in the appendix

The report recommended that Council note the report and *continue to build on the findings of this study, at the local level to determine risks and adaptive responses to climate change in the Sutherland Shire.* Council adopted this recommendation to investigate risks and adaptation responses.

In 2010, Council undertook a climate change **risk assessment** offered through the Statewide Mutual Climate Change Risk Assessment Program to systematically identify potential risks for Council. As part of the risk assessment **an adaptation plan was developed**. The outcomes of the risk assessment and the adaptation plan are currently being considered by Council.

Council has already been addressing fire risks in the LGA and is now investigating whether additional risk controls are need to treat an increased risk of fire under climate change conditions. However, it is possible that for additional effort there may be diminishing returns given the suite of measures Council already has in place. Council is currently liaising with Ku-ring-gai Council about the tools Ku-ring-gai Council has applied to assess the costs and benefits of various adaptation options and prioritise adaptation actions.

The SCCG project was one of several factors that led Council to engage a consultant to undertake a sea level rise risk assessment in 2009. This risk assessment was partly funded by the NSW Office of Environment and Heritage. The risk assessment is still being completed and some mapping has been undertaken.

Council is also working on another collaborative project with SCCG and CSIRO looking at the impacts of sea level rise across all SCCG member councils. This has stemmed from the SCCG project, however the maps produced as part of the SCCG CSIRO project will not be as detailed as the maps Council has commissioned. In addition to the sea level rise maps this project aims to produce guidance and resources to assist councils to communicate risks to the community.

The SCCG project identified a range of recommendations to improve the adaptive capacity of councils in the region and through the SCCG Sutherland Shire Council will pursue these matters, with SCCG lobbying on behalf of Councils for assistance and change (Smith *et al.,* 2008).

4. REFERENCES

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Smith, T.F., Brooke, C., Measham, T.G., Preston, B., Goddard, R., Withycombe, G., Beveridge, B., Morrison, C., (2008) *Case Studies of Adaptive Capacity: Systems Approach to Regional Climate Change Adaptation Strategies* prepared for the Sydney Coastal Councils Group. http://www.sydneycoastalcouncils.com.au/sites/default/files/systapproachphasethreereport.pdf

LOCAL GOVERNMENT ASSOCIATION OF QUEENSLAND INC.

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network SETTLEMENTS AND INFRASTRUCTURE

Moreton Bay Regional Council

Queensland - Case Study 1

Moreton Bay Regional Council: regional floodplain database - boundary conditions, joint probability and climate change adaptation

Council:	Moreton Bay Regional Council
Web Address:	http://www.moretonbay.qld.gov.au
Size:	2037 km^2
Population:	371,000
Classification:	Coastal/Metro
Program:	Moreton Bay Regional Council Regional Floodplain Database
Tools:	Boundary Conditions, Joint probability & Climate Change
Function:	Flooding Risk Assessment
Consultants:	SKM Consulting
Contact:	Steve Roso Steve.Roso@moretonbay.qld.gov.au 07 3205 0555

1. CASE STUDY OVERVIEW

The tool offered is an investigation document entitled *"MBRC Regional Floodplain Database – Boundary Conditions, Joint probability & Climate Change (SKM, August 2010)"*. The report documents procedures for application of standard flood model boundary conditions, joint probability considerations and climate change

scenarios for detailed flood modelling and mapping across the region to be adopted for use in Council's Regional Floodplain Database Project[1] (RFD Project).

The RFD Project involves a three-year/three stage program for the development of comprehensive river and creek flood mapping across the Moreton Bay Regional Council Local Government Area. ***A key focus for the project is the standardisation of methods and procedures so as to ensure consistency in the flood information produced***.

Following test application, Council will be refining the recommended procedures. This is anticipated to be completed towards the end of 2011.

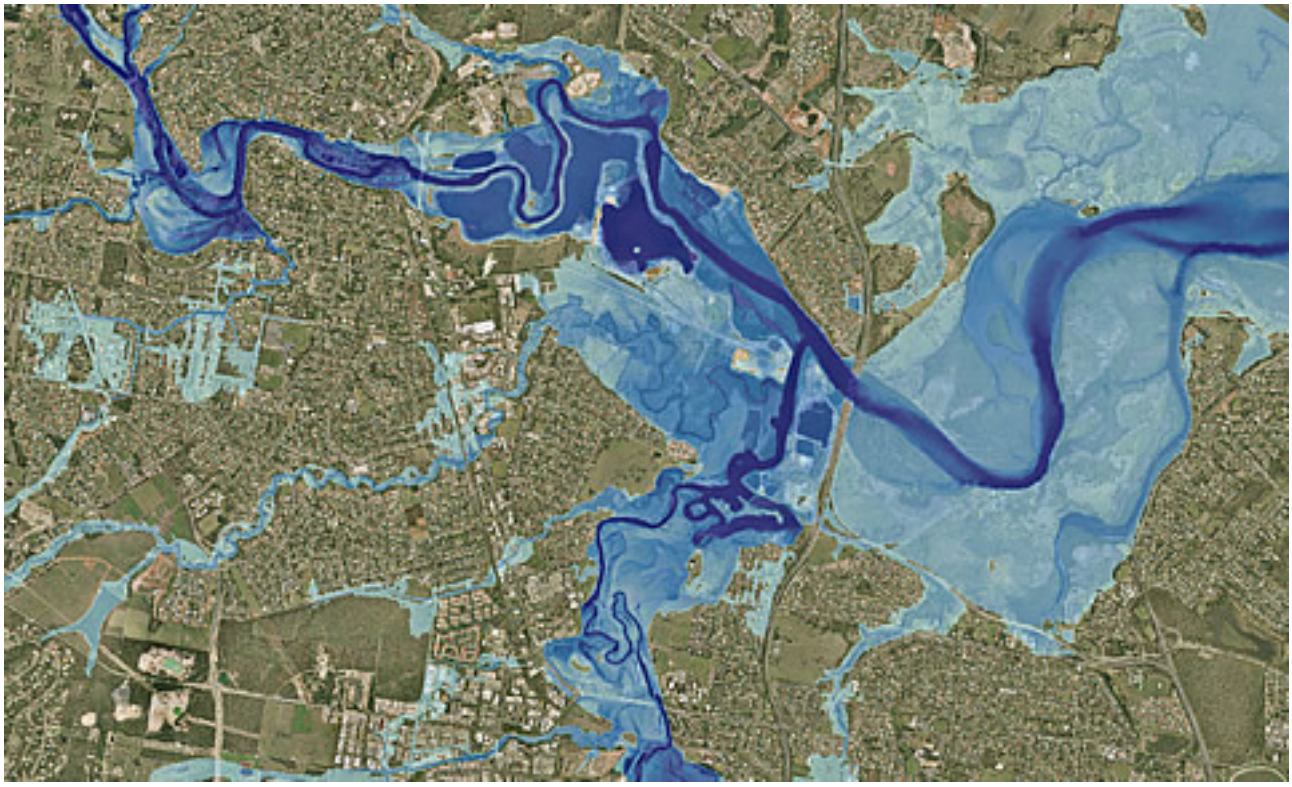

Figure 1: Example of mapping output from Moreton Bay Regional Council's Regional Floodplain Database

2. DRIVERS FOR USING THE TOOL

There is currently limited guidance available on how to incorporate climate change into flooding assessments, including a lack of consistency of risk assessment across a large spatial domain. The aim of the overall project is to have a consistent and standardised approach to the hydrological and hydraulic modelling used to determine flood behaviour across the region. The important benefits of standardisation in flood modelling are:

- ✓ regional data consistency;
- ✓ consistency of interaction between data storage and data analysis tools;
- ✓ facilitate targeted data capture that relates specifically to the models being employed;
- ✓ enhanced understanding of changes in model behaviour due to changes in their underlying parameters, allowing Council to develop a more robust and accurate parameter set over time;
- ✓ provide an opportunity for Council to develop a stronger understanding of the modelling tools being used by their consultants (difficult when a large number of different modelling packages are being used). This will enable a more thorough and critical assessment of the methodologies being employed; and
- ✓ achieve economies of scale when researching and deriving new approaches.

This project is part of a larger flood mapping exercise with 20 sub-projects addressing different facets of flood risk assessment. **This tool is the only one that specifically addresses climate change**. This particular

[1] http://www.moretonbay.qld.gov.au/floodproject

project attempts to differ from traditional flood mapping studies in that it aims to make data quality and data storage a focus. It aims to provide a leading edge methodology for using and processing information to complete mapping in a short time frame. The absolute precision of flood estimation is a secondary objective, whereas the ability to achieve relative comparisons for flood plains in the region is seen as being integral. That is, **assessing the greatest risks** and, therefore targeting these properties for flood mitigation.

The study was co-funded through Natural Disaster Resilience Program (NDRP) with Emergency Management Queensland (EMQ) and Emergency Management Australia (EMA), who each co-funded one-third contributions. EMQ and EMA were essentially silent partners, providing document review and funds.

Benefits:
The **document and process provided a decision support tool** for Council. The main stakeholder is Council's Drainage, Waterways and Coastal Planning (DWCP) Unit, which provides flood information and advice to the community and other areas within Council. The assessment is Council specific and will be primarily used by Council and its consultants during preparation of flood risk assessments. A study advisory group was formed by DWCP Unit's Infrastructure Planning Team, including engineers, data management and floodplain management specialists.

The tool is used internally as a reference that Council currently asks consults to apply. Other Council staff and the broader community may look at the document, but it is of a fairly technical nature. As such, the project team is likely to be just called upon to provide advice. The tool is **aimed at addressing the lack of detailed guidance** related to application of climate change in flood risk assessments, and the need for consistency.

Various sources of baseline data were used. These included data relating to joint probability of tributary and main-river flooding found in Book VI of Australian Rainfall and Runoff (Nathan and Weinmann, 2000[2]). Historic pluviograph data was obtained from the Bureau of Meteorology. Details on astronomical tides are available from Marine Safety Queensland (MSQ) on their website and in their annual publication, *Queensland Tide Tables*. Predicted and recorded tide data for Moreton Bay was also sourced from MSQ. An investigation of storm tide (storm surge + astronomical tide) levels within Moreton Bay, *Storm Tide Hazard Study – Moreton Bay Regional Council* (Cardno), was completed in 2009. This study provided estimates of storm-tide levels and time of inundation for a range of annual exceedance probabilities (AEP's) at a series of locations along the MBRC coastline.

3. IMPLEMENTATION METHODOLOGY

Critical success factors:
The document is primarily an in-house, stand-alone technical guideline that requires some basic understanding of flood risk assessment methodologies in order to grasp and apply the recommendations. This tool gives confidence for integrating climate change into a flood risk assessment in a consistent manner. The consultants were asked to consider efficiency of applying the guidance provided across a large spatial domain and documenting the methodology to provide a 'how to' guide. The document is a stand-alone decision support tool for one aspect of flood risk assessments. Typically a flood risk assessment requires multiple other tools including software (e.g. hydrologic and hydraulic models) and guidelines (e.g. Australian Rainfall and Runoff [2]) dealing with different aspects of the investigation.

Challenges and limitations:
The use of the tool could be learnt through *Active Learning* with a mentor, but there may be a need for someone internal to Council to interpret results. As a worst-case scenario, non-MBRC users could get assistance from the MBRC team or engage the services of a suitably qualified consultant to assist.

Additional software is not needed for the use of the document. That being said, flood risk assessments will require other tools and resources. The tool is **an off-the-shelf resource** that can be provided at no cost once it is completed. However, Moreton Bay Regional Council can provide only limited technical support for application of the product.

While some things are specific to Moreton Bay such as coastal inundation, the tool is generally applicable within Queensland. Other Councils that are undertaking flood risk assessments can use the tool. It is **not a**

[2] Nathan, R.J. and Weinmann, P.E. (2000) Book VI, Estimation of Large to Extreme Floods, in National Committee of Water Engineering (Ed.) *Australian Rainfall and Runoff: A Guide to Flood Estimation*, Institute of Engineers Australia, Canberra.

web-based tool, and so can be shared with other Councils on demand. However, it should **only be applied after site specific consideration by a suitably experienced flood risk assessment specialist** who is able to interpret the report and adjust the recommendations to account for the local environment and any relevant or more up to date information (e.g. new sea level rise estimates).

4. EVALUATING OUTCOMES

Climate change science is evolving rapidly. The report generated by the flood risk assessment tool and the guidance it contains will need to be reviewed regularly.

Outcomes achieved:
The report **resolves a deficiency** in current guidance for application of climate change in flood risk assessments, thereby **contributing to informed decision-making** and **enables improvements to strategic planning practices** by ensuring consistency in risk assessments.

The tool also provides a basis for well-researched and rigorous flood risk assessments incorporating the impacts of climate change. Rainfall intensity increase and sea level rise are the two main primary influences. Further work is required to ensure consistency with State Government Guidance[3], released after the tool was prepared, including comparison between guidance provided on climate change related rainfall intensity increase.

Broader learnings associated with this tool are limited, as it is currently in the process of being applied by consultants acting on behalf of Council.

5. FUTURE DIRECTIONS

The tool is currently being applied as part of Council's Regional Floodplain Database project. Once adopted by Council this document is likely to be released publicly. Ultimately the flood risk assessments undertaken will influence Council strategic land use and infrastructure planning direction.

It is expected that a regional approach will then be taken to adapt to major risks.

MBRC encourages other Councils to consider the importance of consistency when undertaking flood risk assessments. Consistency ensures that strategic decision-making targets in those areas where climate change impacts on the floodplain are likely to be greatest. MBRC are keen to share the material developed as opportunities arise.

[3] Increasing Queensland's resilience to inland flooding in a changing climate: Final report on the Inland Flooding Study

LOCAL GOVERNMENT ASSOCIATION OF QUEENSLAND INC.

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Queensland - Case Study 2

Cairns Regional Council: incorporating climate change adaptation in the Sustainability Assessment tool and report card

Council:	Cairns Regional Council
Web Address:	www.cairns.qld.gov.au
Size:	4,135 km2
Population:	150,000
Classification:	Coastal/Metro
Program:	Cairns Regional Council
Tools:	Sustainability Assessment Tool
Function:	Sustainability Report Card
Consultants:	NA
Contact:	Maree Grenfell m.grenfell@cairns.qld.gov.au 07-40443312

1. OVERVIEW OF PURPOSE

Cairns Regional Council (CRC) has developed and implemented an intranet based Sustainability Scorecard to improve and report on sustainability outcomes across the organisation. The project was developed in collaboration with ARUP Pty Ltd and engaged staff in developing an innovative sustainability assessment framework. This Sustainability Assessment tool has resulted in the holistic consideration of sustainability and adaptation issues in decision making and project planning, while driving improvement in four areas within Council's sphere of influence: Improving Resource Efficiency, Conserving Biodiversity, Enhancing Community Health and Wellbeing and Delivering Sound Governance and Economic Sustainability. The tool is a **change**

management process that assists Council to communicate sustainability and adaptation in consistent and meaningful ways, and has involved a shift in organisational culture plus significant financial commitment.

2. ASSESSING THE TOOL

The Sustainability Scorecard was launched in July 2010 when Council adopted the first version of the tool as an Excel workbook and officers were encouraged to use the tool for Council Reports and project development. From July to December 2010 the Excel workbook was updated to an **intranet-based tool** with interactive functionality and automated reporting features. During this period staff training was administered and opportunities for updating templates such as Capital Works submissions, Procurement Policy, General Council Report were identified.

The online tool was 'soft' launched in mid December 2010 to give Council staff time to become familiar with the new technology and was used 150 times voluntarily from mid December to March 2011 as staff began including their Sustainability Reports in Council Reports, memos and project development. Then the Sustainability Assessment tool was formally launched in March 2011 and a Sustainability Assessment is now required in every Council Report, every Capital Works submission, in every project scope over $15,000 and in procurement decisions over $15,000. It has been used over 330 times from March to July 2011 and additional staff training has also been provided.

2.1 - Drivers for using the Tool

Implementation of the Corporate Sustainability Policy provided the first key driver for developing this project, in addition to demonstrating Council's strong commitment to sustainability and adaptation. The need to undertake the Sustainability Scorecard became apparent during the 1st round of LAPP funding to externally facilitate a **Climate Adaptation Risk Assessment and Action Plan,** when it was realised that Council's 1,500 staff did not share a common understanding or terminology for sustainability and climate change. Developing key sustainability criteria involved creating a matrix of goals in the Corporate Plan and intents in the Corporate Sustainability Policy, which included considerations to reduce impacts associated with climate change.

A second key driver for this project was to create a change management tool to **promote systems thinking** and encourage different styles of thinking - longer term strategic - which will assist Council to address climate adaptation issues and solutions. This is having positive repercussions (better than expected) across the organisation.

Critical success factors:

The development of the Scorecard involved setting a strong foundation of internal capacity and creating a shared understanding of sustainability and adaptation in the Council context. The Project Reference Group (PRG) comprised representatives from each area of Council and the Project Team ensured the participatory workshops were inspiring, challenging, relevant and thought provoking. Increased uptake of sustainability measures in projects and operations was witnessed early on, as the Scorecard raised the profile of sustainability and initiated thoughtful and active conversations about climate change.

The inclusive process used to develop and implement the Scorecard has been a **catalyst for organisation wide change**. All staff have been trained in the use of the tool, and are now using it in their daily work. As a change management tool, the Sustainability Assessment teaches Officers what questions to ask to improve sustainability performance. Each question relates to a sustainability indicator. The aim is that these questions will steadily become 'thinking as usual' and not require further prompting.

2.2 - Implementation methodology

The initial stages of the project involved research of existing case studies of 'scorecards' to learn from previous successes and mistakes and achieve new outcomes without reinventing the wheel.

The project was implemented and delivered by using this integrated, three part framework:

1. Sustainability Assessment of projects and activities
2. Monthly/project sustainability snapshots to Council
3. Annual scorecard report for the community

The Sustainability Assessment tool has been built within Council's Information Services environment with a server and database enabling easy access to Council's active staff directory. A Sustainability Assessment can be completed easily with one correct answer selected out of three choices for each question. Care has been taken to word the questions succinctly and the online tool offers "hover over" and "more information" functions. This technology reduces time taken to use the tool.

Value for money:

The Sustainability Report generated from the Scorecards provides a graphic output of responses quantified against each sustainability theme/outcome with a score out of 100. This output can then become a communication tool with minimal additional resource requirements. The additional time required to implement the Administration Instruction is 50 minutes per day across all of Council. Given the advantages that the tool brings, in terms of compiling and communicating quantifiable sustainability improvements, the tool is exceptional value: it improves resource efficiency, offers cost savings, contributes to reduced environmental impact, provides leadership to the community, and demonstrates best practice.

Demonstrating ease of use - the Sustainability Assessment tool

2.3. Evaluating Outcomes

The project has successfully embedded sustainability into Council's operations in an efficient, timely and measurable way. The Sustainability Assessment tool has utilised innovative Information Technology (IT), which empowers Officers to assess their own projects by providing interactive functionality for use and reporting, reducing resource implications and time for completion.

The **reporting function** of the tool enables reporting on individual assessments and also compilation of assessments over periods of time. Graphic outputs indicate the potential to compare performance based on the Sustainability Assessments completed either per date range, per department, per branch, per budget allocation etc (i.e. the reporting functionalities are numerous). A general improvement has been made across each theme of sustainability except for *Governance*, which has remained fairly similar.

In addition to implementing change, based on teaching the important questions to ask, the reporting element of the Sustainability Assessment tool **encourages continuous improvement** based on a natural competitive drive. It has been observed that officers dislike receiving negative scores, encouraging them to research ways to optimise their results.

Beneficial impacts on Council:

The consideration of sustainability has become integral in every Council report, project scope and procurement decision. The impacts on Council have been meaningful, diverse and sometimes controversial. This project has sparked a change management process which is a significant outcome, given that there is often opposition to change. Overall, the positive outcomes of implementing the Sustainability Scorecard include the following:

- √ Awareness and understanding of what sustainability means to Council across different business areas;
- √ Understanding how to improve sustainability performance by optimising results when undertaking a Sustainability Assessment;
- √ A shared language to discuss Sustainability internally and externally;
- √ Increased sense of value working for a Council who values and demonstrates sustainability;
- √ Ability for Councillors to make informed decisions based on Sustainability Assessment inclusion in reports;
- √ Identification of gaps in industry where optimisation of results is not possible (i.e. the purchase of materials with sustainability certification);
- √ Improved performance across the four themes of sustainability;
- √ Tangible tool to communicate sustainability (of projects, operations, events) to the community;
- √ Leading by example and driving improvement across the region (Council's industry and community).

As an **adaptation tool**, the Scorecard is effective in increasing the *resilience* of the organisation as it encourages staff to think creatively and consider wider reaching impacts of decision making and sustainability. Council employs 1% of the regional population of 150,000 and its employees increase the region's understanding of climate change and increase stewardship and leadership by setting good examples.

***Outcomes will continue to be measured*:**

A **report** is currently being prepared to analyse the outcomes of each milestone of the Sustainability Scorecard project.

To track sustainability performance and progress, a **snapshot** will be presented to Council's Executive Team each month. This report will form part of the existing reporting process and will provide snapshots – department-by-department and overall - to indicate results and numbers of Sustainability Assessments completed.

An **annual** Sustainability Scorecard will be produced as an external reporting mechanism on Council's sustainability performance. It will be calculated using the sum of lead indicators from Sustainability Assessments and lag indicators including GHG emissions. The number of lag indicators will increase as data sets can be established against criteria. This will provide quantifiable results to benchmark performance with other Councils.

Adaptive learning:

The Sustainability Scorecard tool is building an increased and more consistent understanding of sustainability across Council, while empowering staff to apply this understanding to their area of work.

The work undertaken in developing the Sustainability Scorecard has also provided a strong foundation to build awareness about climate adaptation and its importance in strategic decision making.

Ongoing data maintenance to create 'a living tool':

The Sustainability Officer will maintain the Scorecard system as a 'living tool' through monthly and annual reporting. An Energy and Emissions Data Management System is currently being developed which will interact with the Sustainability Scorecard and will be housed on the same IS server and database.

3. FUTURE DIRECTIONS

Expanding the Scorecard to measure climate adaptation performance and resilience:

Cairns City Council is currently working though adaptation actions as documented in the Climate Change Strategy. It is anticipated that the Sustainability Scorecard could be expanded to include broader criteria especially as a methodology is developed to measure climate adaptation performance and resilience.

The IT architecture of the tool could easily be applied to ensure climate change adaptation considerations are taken into account in the context of Council business. This could include particular criteria to measure climate change adaptation **response** and **implementation**.

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Queensland - Case Study 3

Redland City Council: risk assessment and climate change adaptation action plan

Council: Redland City Council

Web Address: http://www.redland.qld.gov.au

Size: 537 km^2

Population: 144,000

Classification: Peri-Urban

Program: Local Adaptation Pathways Program Risk Assessment and Climate Change Adaptation Action Plan

Tools: "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) and the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009)

Function: Risk Assessment

Consultants: Marsden Jacob & Associates and Broadleaf (who together authored the above tool)

Contact: Helena Malawkin, helena.malawkin@redland.qld.gov.au, 07 3829 8207

1. OVERVIEW OF PURPOSE

The purpose of the risk assessment was to explore the ways in which climate change may impact on Redland City Council's assets and services, and to obtain a prioritised register of risks that could be used for spatial and other assessments to develop the Climate Change Adaptation Action Plan (CCAAP). The *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO 2006) tool/process was selected as the industry standard, because it follows AS/NZS 4360:2004 – now AS/NZS 31000:2009 - and was seen as an improvement on previous approaches.

2. ASSESSING THE TOOL

2.1 DRIVERS FOR USING THE TOOL

1. Background/context:

Redland is a coastal Council, and consequently faces coastal infrastructure, transport and building related risks. The risk assessment and action plan was funded through the Federal Governments Local Adaptation Pathways Program (LAPP). The LAPP addressed gaps in identifying Council's climate change risks and understanding how to manage them, with the intention of informing decision-making as well as planning and strategy development. The main driver of the risk assessment and action plan was to ensure all risks and opportunities were objectively assessed and planned for, including the identification of priority risk to Council's assets, operations and services.

Council's adaptation risk assessment and planning is in recognition that not all potential impacts from climate change can be mitigated. The Project Brief explained that the risk assessment should encompass all of the roles and responsibilities of Council that might be affected by climate change, including:

- Provision of infrastructure including management and maintenance;
- Provision of services to the community;
- Operational works;
- Planning and management of development and land use; and
- Land and water management.

The tool provided a high standard of assessment of these potential risks, ensuring that Council takes full responsibility for its operations and service provision that may be impacted on by climate change. Otherwise, this comprehensive assessment may not have happened at this stage, without the LAPP funding.

Redland City Council's adaptation planning options were divided into six broad categories, providing a useful means of understanding the range of potential adaptation options available to the Council for a particular risk or group of risks. In practice, effective adaptation to a particular risk or group of risks is likely to entail a mix of adaptation measures, across a number of these categories:

- Structural works and design
- Statutory planning
- Strategies, plans and internal procedures
- Research and knowledge building
- Education and awareness raising
- Spreading or displacing risk

Water was excluded from the risk assessment, as the Queensland State Government SEQ water reforms would transition most of Redland Water and Waste (RWW) i.e. wastewater bulk supply, transport, or distribution into new State operated businesses.

There were no ***extreme*** risks identified and most medium and high risks identified were associated with infrastructure, especially with respect to short-term risks. Many of the risks that change most over the differing time scales relate to issues over which Redland has little or no scope for adaptive control, over-and-above measures that are already at work, for example the risks associated with **algal blooms** or **burgeoning mosquito populations**. The process also reiterated the need to lengthen strategic planning horizons (from say 5-10 years to 20-30 years).

The assessment focused on impacts and adaptation measures by Council at a **corporate** level. Extensive communication and consultation has occurred through the adaptation planning process, involving close to 40 Redland City Council staff and centered on several workshops. Even though this assessment was internal, further communication and engagement with external stakeholders, including the community and State government agencies and departments (where responsibilities overlap with or impact upon Council functions) has been recommended as part of the next adaptation response phase.

Council has an extensive and highly developed library of spatial data and existing spatial assessments. This includes a fine detail digital terrain model (DTM), which provides a 2m gridded representation of elevation across the City. In

addition, Council has access to a range of Australian topographical and other baseline datasets, as well as the Cardno Lawson Treloar (Cardno) storm tide modelling study for Redland and Logan City Councils. This storm tide modelling study considered inundation depths across the City, given 1:20, 1:50, 1:100, 1:1,000, and 1:10,000 year storm tides. Nonetheless, data gathering has been identified as a **gap**, especially in terms of storm water and corporate services. As such, more detailed coastal modelling is expected to follow the CCAAP.

2.2 IMPLEMENTATION METHODOLOGY

The methodology for the risk assessment and planning comprised a 3-stage approach:

- Stage 1 consisted of a climate change risk assessment.
- Stage 2 involved preliminary spatial and others assessments relevant to a number of the risks.
- Stage 3 involved a climate change adaptation planning process.

The adaptation planning process itself entailed five major steps, with steps 1 and 2 being undertaken prior to the workshop, and steps 3 to 5 being completed at several workshops. The workshops held for the risk assessment process scoped priority risks, then identified adaptation actions for these priority risks.

1. 21 'priority risks' were identified from an initial list of 53 risks and all risks were entered onto the climate change risk register.
2. The primary criterion for selecting priority risks was the risk **rating**, although other factors were also considered including **uncertainty** about the risk and/or the need for further research.
3. The priority risks were grouped into four major areas and 14 subsets.
4. Existing controls (policies, programs and measures) relevant to each priority risk subset were identified.
5. Controls were reviewed with the purpose of establishing whether there are gaps or deficiencies with respect to treatment of the climate change risk subset. Gaps identified included the:
   - Building Code of Australia;
   - Redland Planning Scheme;
   - funding for road upgrades and marine infrastructure;
   - State Government regulations with regards to Council's maintenance and planning (e.g. for sea walls;
   - management issues with storm water and waste water, biodiversity, parks and coastal management impacts and measures; and
   - speed and flexibility of control measures and management with respect to corporate services.

6. Additional or revised measures necessary to overcome gaps or shortcomings with the current treatment of priority climate change risks were identified. The 21 priority risks are summarized in Redland City Council's Climate Change Strategy - *Confronting Our Climate Future.*

2.3 EVALUATING OUTCOMES

The AGO tool and the LAPP process addressed the gaps in identifying exactly what are Redland's climate change risks and how to prioritise and manage them. Climate Change Adaptation outcomes, such as amending planning schemes and improving building codes, have been put into context through the risk registrar. Informally, many climate change related decisions made through land use planning and development approvals are now better informed.

As a result of the adaptation workshop and subsequent analysis, Redland has already made significant advances towards **addressing** many of the priority climate change risks. It is also clear that there is ample opportunity to advance its approach to climate change adaptation. The three most useful outputs of the AGO tool and LAPP process are:

Firstly, the **risk register** which includes several measures to respond to the priority risks. Infrastructure risks tended to dominate the High Priority bracket across all three time-periods. The risk register is to be reviewed every 12 months, which means assigned risk 'owners' apply the risk assessment methodology, evaluate controls and mitigating actions, and determine if the risk level has changed. There is also a corporate reporting process that will flag any significant negative changes in risk.

Secondly, the **Climate Change Adaptation Action Plan** (CCAAP) which lists several measures to address priority risks, in particular to land use planning and infrastructure asset management. The risk register and action plan measures enable greater consistency in decision-making about future assessments and more informed decisions over short (up to 2010), medium (up to 2030) and long-term (up to 2070) time frames. Thinking beyond 2030 and up to 2070 could be seen as

beyond scope, however long-term strategic planning decisions made now will affect impacts and options available beyond 2030.

Thirdly, all of the above greatly informed the development of Redland's climate change and energy transition strategy– *Confronting our Climate Future*. Communication and engagement with external stakeholders, including community and State government agencies and departments (where responsibilities overlap with or impact upon Council functions) has been recommended as part of the adaptation response phase. These have been incorporated in the 5-year rolling action plans as part of *Confronting Our Climate Future*.

Lastly, there is support from the community through the community plan consultation process for more preparation and awareness raising for expected impacts on climate change, now seen in the Redland 2030 Community Plan, under Green Living, Goal 3 – *a community prepared for climate change*.

Critical success factors:

Councils could potentially undertake a risk assessment with in-house expertise, although this would be an onerous task. Redland already had a good risk assessment, asset management and risk management approach built into the organisation but it did not have the human resources to adequately address all of the emerging issues of adaptation. Marsden Jacob Associates and Broadleaf consultants led the risk assessment and action plan process and catalysed the organisation to think more deeply about developing adaptation action plans. Consequently, the well-facilitated workshops extended the adaptation actions to address 21 prioritised risks.

It is important that adaptation options are assessed (at least qualitatively) against criteria that provide a reasonable understanding of their overall suitability and effectiveness. For the development of Redland's **Climate Change Adaptation Action Plan** a range of criteria were used to assess existing controls and revised and new adaptation measures including:

- effectiveness in treating the risk or groups of risks;
- adequacy of resourcing;
- clarity of roles and responsibilities;
- flexibility;
- cost to Council; and
- barriers to implementation.

The consultants assisted Redland to make great use of the tool, which was relatively easily applied and the consistency of approach in the AGO tool allowed adaptation risks to be recognised and used throughout the organisation in planning, strategy and service provision. It helped that the organization already had a risk register and an adaptive and risk-based approach to management of Council operations and assets. Furthermore, Council's officers currently benefit from the support of elected members and executive staff in addressing climate change.

Challenges and barriers

The tool itself has no significant challenges or barriers – just challenges in terms of process and application of the tool as follows:

- The size and number of workshops – and getting the right people to the workshop from middle management and above – i.e. the decision makers.
- There are many steps to the process, which means spreading the activity over time and several workshops – challenges being the continuity of people attending from beginning of process to the end.
- Grouping like risks together and structuring workshops around appropriate people for the topic – infrastructure, transport and buildings as one group, natural environment, parks and coastal management as another group, and corporate governance and services as another group. This maximized participant engagement.

Given the approach is built into the organization there was minimal risk of acquired skills and competencies atrophying without ongoing use. The process is continually being refined in the broader context and not necessarily this specific tool, but whole-of -organization ongoing improvements i.e. an in-built adaptive management approach.

Adaptive learning

The benefits for Redland came from having a third party to facilitate the process – with a very good content knowledge - and constantly prompt questioning whether staff had chosen the priority risks and actions correctly. In this process, the facilitator also becomes the check and balance for internal competing interests. The workshops component of the tool has greatly improved the level of understanding of climate change adaptation risks, as well as raised awareness of the urgency of the issue at the officer level, i.e. it has led to the support of staff members beyond the Environmental Management Group, thereby creating a new *'social norm'* for Council staff to consider climate change in their own work. Climate change adaptation has moved from being an environmental interest to a key Council management concern. Many of the actions of the LAPP, are now actions of the Climate Change Strategy. These actions are reviewed through the Audit Committee.

Furthermore, while this was a Redland City Council program, support was gained through officer level meetings through the informal Greenhouse Energy Network Professional Officers Group (GENPOG), as well as though the South East Queensland Council of Mayors.

Further improvements to tool/process design

The AGO tool could be improved with the development of a set of procedures and visual tools i.e. checklists to follow and flow charts to assist smaller councils and trainers/facilitators to help councils through the process. The AGO Guide is not a stand-alone tool, given the high level list of other tools and techniques that can assist the risk assessment. In-house knowledge and data gathering is necessary, which involves other tools such as databases, community and corporate plans and other strategies with key performance indicators and targets. The AGO Guide is thus part of a suite of tools and, if anything, has been superseded by the Corporate Risk Register, the Corporate Climate and Energy Policy, the 2030 strategy Confronting Our Climate Future and the five year action plan. While no specific software was required by Redland to undertake the risk assessment, Councils corporate intranet and sharepoint is now assisted with tracking of implementation of actions.

3. FUTURE DIRECTIONS

The recommended measures will require full engagement and coordination with other agencies and councils, if they are to be effectively implemented. This is particularly true of the measures proposed for biodiversity protection and coastal management. As well as undertaking direct dialogue with relevant stakeholder agencies at the local level, Redland needs to be mindful of climate change adaptation priorities identified by federal and state governments, particularly the Queensland Department of Environment and Resource Management (DERM). While the Queensland Coastal Plan mandates coastal Councils to undertake risk assessments, more resources are needed for Councils to adequately plan for climate change and fund any adaptation measures. Redland should consider undertaking further coastal modelling with other regional councils, seeking financial support from the State or Federal government.

Several of the recommended measures are specifically geared towards community education and information and all measures will require, to a lesser or greater extent, community engagement to achieve effective implementation.

The climate change Strategy –Confronting our Climate Future has been developed since the LAPP was undertaken. The adaptation risks and actions identified and developed through the LAPP have been integrated into the strategy, which will be tracked through an audit committee and the implementation performance reported to Council annually. The following list of actions from *Confronting Our Climate Future* are to be implemented in the first 5 years:

Climate and Energy Action Plan 2010 – 2015.

Redland City Council commits to:

1. **Life, health and safety.**
    a. Update Disaster Management Planning with additional risks from climate change to ensure Council is prepared and ready to respond to disasters.
    b. Understand the new risks to community health and respond where there is Council responsibility, e.g. mosquito management.
2. **Property, assets and infrastructure.**

a. Generate spatial information layers onto RediMap from existing studies, (e.g. Cardno work for sea level rise), and generate a prioritised inventory of Council infrastructure, buildings and assets that are vulnerable and threatened.
b. Produce new Q100 level flood mapping for the whole City, to identify nature and extent of coastal flooding and most vulnerable locations.
c. Understand coastal processes and threats to Council foreshore assets.

3. Essential Services.

a. Investigate options and costs to ensure Council's operations and maintenance continues to deliver in the face of fuel shortage and volatile prices.
b. Develop Contingency Plans with contractors and service providers to ensure services are maintained to NSI and SMBI during and following disasters and in response to shortage of fuel supplies.

4. Greenhouse Gas (GHG) Reduction

a. Reduce corporate greenhouse gas emissions by 5% per year to achieve the target of 75% reduction by 2050 (on 1998 levels).
b. Invest significantly in corporate greenhouse gas reductions for the next 10years.
c. Produce bi-annual Council-wide carbon audits to measure progress of GHG reductions against the target.
d. Engage and lead the community to improve conservation and energy efficiency and use less carbon intensive and renewable energy sources.

5. Natural Areas Management

a. Understand risks and threats to species, habitats and ecosystems.
b. Manage and protect natural areas and cultural heritage consistent with community desires.
c. Advocate to science and government bodies the value and importance of managing natural areas and cultural heritage.

6. Planned Development

a. Update the Redland Planning Scheme RPS codes etc.
b. Advocate to state government for better planning support in response to sea level rise, public and environmental health issues, liability and compensation.

7. Resilient Community

a. Engage and lead community through a diversity of contact to build up community resilience to and knowledge of climate change.
b. Advocate to State and Federal government for greater access to funding initiatives.
c. Promote and support local food production and markets to reduce dependence on fossil fuels.

8. Tracking Performance

a. Develop a system for tracking success of implementation, and publish bi-annually on progress.

A regional approach in SEQ is yet to be undertaken. There is no lead group or driver for this to happen yet. Councils would like to see the Queensland Department of Infrastructure and Planning lead this through the SEQ Regional Climate Action Plan.

South Australia

1- Synopsis of adaptation tools and processes

Organisation: Local Government Association of South Australia [LGASA]
LGs: 68 Local Government Organisations
Web Address: http://www.lga.sa.gov.au
Contact: adam.gray@lga.sa.gov.au
08 8224 2055

Predominate Tools

To date the climate change adaptation tool that has been used by most Councils in South Australia is "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) in accordance with the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004].

60 of the 68 Councils have used this tool through the Local Government Association Mutual Liability Scheme [LGAMLS] Climate Adaptation Plan [CAP] program. In this program both the Council staff and the consultant used the tool.

Three of the 68 Councils (Marion, Onkaparinga, and Burnside) have used this tool for Climate Change Risk Assessments funded by the Local Adaptation Pathways Program [LAPP] in the first round. The LAPP funding is administered by the Australian Government Department of Climate Change and Energy Efficiency, and the use of this tool was a requirement of the funding. There were no South Australian Councils in receipt of funding in the second LAPP round.

This tool is preferred because many Councils already use it for general risk management, and because it is recommended by the Commonwealth Government.

Other tools

The City of Port Adelaide Enfield commissioned the use of a complex suite of modelling tools: RAM, ANUFLOOD, TUFLOW and ILSAX. These tools were chosen and used exclusively by external consultants. Phase 1 of this project – Port Adelaide Seawater Stormwater Flooding Study - received funding from what is currently known as the Natural Disaster Resilience Program.

Three Regional Councils (DC of Yorke Peninsula, DC of Copper Coast, and DC of Barunga West) were involved in the Commonwealth initiated and funded study - *National Climate Change Coastal Vulnerability Assessment - Yorke Peninsula Case Study* (2009). The study incorporated spatial coastal vulnerability mapping and economic impact modelling. As results of this study have yet to be released, it is not known what specific tools were used to undertake the assessment.

The City of Tea Tree Gully engaged consultants to prepare a Climate Action Plan. This plan is predominately about mitigation strategies. The tool used in developing the plan was tailored by the consultants and this project was fully funded internally by the Council.

Some Councils/groups of Councils have obtained funding but have not currently selected tools and/or completed their projects.

New tools

There are several tools proposed and/or currently in development in South Australia, including:

1. LGA / NCCARF tool (framework) to assess and quantify the financial implications of climate change on key assets and infrastructure
2. Methodology for undertaking Integrated Vulnerability Assessments and Adaptation Planning (supporting document for the State Government: State Adaptation Framework, refer http://www.climatechange.sa.gov.au/)
3. Climate Change Action Plan – Framework for Councils
4. EOI submitted, successfully, to the DCCEE for Coastal Adaptation pathways. This project aims to develop financial modelling for comparison of adaptation policies and identification of optimum trigger points for investment.

Local Government Association of South Australia

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network SETTLEMENTS AND INFRASTRUCTURE

South Australia

2 - Sector-wide key learnings from facilitated risk assessments - foundations for Climate Adaptation Plans

Sector:	Local Government Risk Services/JLTA/Echelon – Mutual Liability Scheme
Web Address:	http://www.lgrs.com.au
Program:	Climate Adaptation Plan [CAP]
Tool:	"Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009)
Function:	Risk Assessment
Consultant:	Tim Davis tim.davis@jlta.com.au 8235 6444

1. OVERVIEW OF THE PURPOSE

In 2007 the Local Government Association of SA Mutual Liability Scheme Board [LGAMLS] passed a motion to undertake a South Australian Local Government sector wide climate change risk assessment program. The Climate Adaptation Plan [CAP] program was developed by both the NSW and SA divisions of JLT and was initially trialled by three Councils in South Australia. The purpose of the program was to:

1. Identify the business and operational risks of Councils from the likely impacts of climate change; and
2. Reduce the risks and liability exposure of Councils

JLT Australia is the fund manager for all Local Government Risk Management Schemes including the LGA MLS. Echelon is the commercial arm of JLT.

The LGAMLS Board observed that many Councils were interested in climate change adaptation initiatives such as the Local Adaptation Pathways Program (LAPP), and decided that delivering a sector-wide program would ensure a co-ordinated approach and a consistent methodology. The program developed resulted in each participating Council completing a Climate Adaptation Plan [CAP].

The purpose of the program was to develop an understanding of the risks associated with climate change, create plans to manage those risks, and put in place policies to minimise future additional risks.

The program is compulsory for fund members and was scheduled for completion at the end of 2011. To date, of the 68 Councils in South Australia, all but eight have completed the program.

The Eastern Health Authority (EHA), a Section 43 authority under the Local Government Act 1999, has also undertaken the CAP program. EHA provides, as part of a joint service delivery arrangement, delivery of environmental health services to six constituent Council's at a combined population of 150 000 residents.

The CAP Program was also run in NSW through Statewide Mutual. However, this case study only discusses the program from the South Australian perspective.

2. DRIVERS FOR USING THE TOOL

To undertake the risk assessment the "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) tool was utilised. This tool adheres to the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009) and was chosen because:

- It is the tool recommended by the Department of Climate Change and Energy Efficiency;
- It is identified as an option in the *Climate Change in Australia: Technical Report 2007* (CSIRO & BoM)
- The Risk Management Standard is underpinned by a high level of technical expertise; and
- The Risk Management Standard is already used by some Councils.

The key focus of the CAP produced by Councils is an inventory of the locally applicable climate change risks to the core business of the Council. In concentrating on the core business, the plan only assesses impacts that would influence the ability of Councils to continue their "*public administration and governance functions*" (LGAMLS & LGA 2010: 4). Where a risk to the community is also a risk to the core business of the Council it was included in the assessment, however Community risks that do not/will not influence the ability of the Council to continue its core business were not included.

The "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) tool categorises risks under seven areas of Council responsibility: Maintain public safety; protect and enhance the local economy; protect existing community structures and the lifestyle enjoyed by the people of the region; sustain and enhance the physical and natural environment; ensure sound public administration; and governance.

There was no fee to Councils for undertaking the program. As stated the program is compulsory, and whilst there has been no direct action taken against the Councils who have yet to participate, these Councils are likely to receive a reduced annual rebate. Annually the MLS balances the insured risks with the money available in the fund from premiums. Any excess is returned to Councils as a rebate. The MLS allocates higher rebates to those who have performed well in their annual risk management assessment. This rebate will be reduced for those Councils who have not implemented the adaptation actions to reduce risks identified in their CAP.

The main external stakeholders on the program were the Bureau of Meteorology [BoM], Wallmans Lawyers, and the Coast Protection Board [CPB]. The LGAMLS made an effort to engage the DCCEE and the CSIRO Climate Adaptation Flagship as stakeholders however communication proved difficult with both organisations.

The IPCC A1B (medium emissions) scenario regional projections for 2030 in *Climate Change in Australia: Technical Report 2007* (CSIRO & BoM) were used to inform the program, in conjunction with advice from Darren Ray (BoM) regarding local specifics and the study *Bushfire weather in southeast Australia: recent trends and projected climate change impacts* (Lucas et al 2007). Together, these reports inform the baseline scenario for the program.

For some Councils, the CAP Program has built on existing action on climate change. However for many Councils in South Australia the CAP program has served to initiate dialogues on climate change.

3. IMPLEMENTATION METHODOLOGY

To begin the process a series of workshops were run with particular Councils. The involvement of CEOs, senior managers and elected members in these workshops varied. The identification of risks and adaptation actions was generated in the workshops, with the consultant externally collating them into the CAP format. The Council was then able to integrate the CAP data into existing risk management systems such as RiskeMap, Interplan or Excel model.

Although the Risk Management Standard could be used independently by Councils to assess risks associated with climate change, numerous adaptive learning benefits could be obtained by commissioning a single consultant (Tim Davis) to consistently undertake the same program with each Council. The most important of which was the opportunity for the consultant to learn-by-doing during the process and continuously adapt the delivery of the program to increase its effectiveness. The tool and the format of the outcomes remained fairly consistent through the three year process, but several improvements were made to their delivery.

Initially, climate change impacts were described using numerical projections. Midway through the program this was converted to less specific statements of risk for all changes apart from sea level rise, storm surge heights, and days per bushfire risk index e.g.

> Initially "17-23 days over 35 degrees annually by 2030"
> Became "An increase in extreme heat days annually"

There were several advantages to describing the risk in this manner, the foremost of which was that those involved were less likely to get 'hung up" on the science. It also reduced the load on Risk Managers to continually integrate every new piece of projection information as it arises. With the new approach, updated information can be added where applicable, annually.

It also became apparent after undertaking a number of workshops with Councils in the same region that the same risks and adaptation actions were being discussed. Again, midway through the program, delivery was improved to enable Councils to elect to undertake the initial workshops with neighbouring Councils. This was more efficient for the program delivery. Importantly, it also promoted shared learning and collaboration between Councils forging a community of practice.

The consultant also amended the way in which he related to and facilitated climate change sceptics in the workshop situations. Initially the topic was avoided where possible and some participants were "actively" not participating. However, by starting the process of talking as a group, and by canvassing each individual about their views, those sceptics were more likely to make positive contributions in identifying risks. This approach resulted in some individuals acknowledging that they had been misled by the media, and began making a commitment to planning for change in their Council area.

4. EVALUATING OUTCOMES

The success of the project arose from:

- ✓ collating and utilising relevant climate information;
- ✓ standardising the process across the sector;
- ✓ focusing the project on the core business of Councils; and
- ✓ aligning the assessment with Councils' strategic management plans.

In addition, councils with initial reluctance to undertake the program were more willing to do so when the business and operational risk framework were explained.

Some Councils developed more sophisticated and intricate CAPs than others. This was dependant on the number of services each Council provides and the level of commitment to adaptation at each organisational level.

Some further shared critical success factors included having:

- ✓ A "risk champion" within the Council;
- ✓ An "environmentally geared" community that expects Council to respond to climate change;
- ✓ Council Senior Management and Elected Members with a positive attitude and commitment towards the program; and
- ✓ A strong Strategic Plan with realistic vision, strategic directions and outcomes which lists the strategic objectives of the organisation, the timeframe for achieving those objectives and the means by which it sets out to achieve them.

Councils with diverse business interests had more climate change risks than those who operate within the boundary of core functions.

One additional element identified by the consultant that may have further improved the process, would have been the incorporation of a financial column in the risk matrix provided in the "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006). The financial column would require Councils to define what level of financial loss constitutes catastrophic as opposed to major, moderate, minor and insignificant.

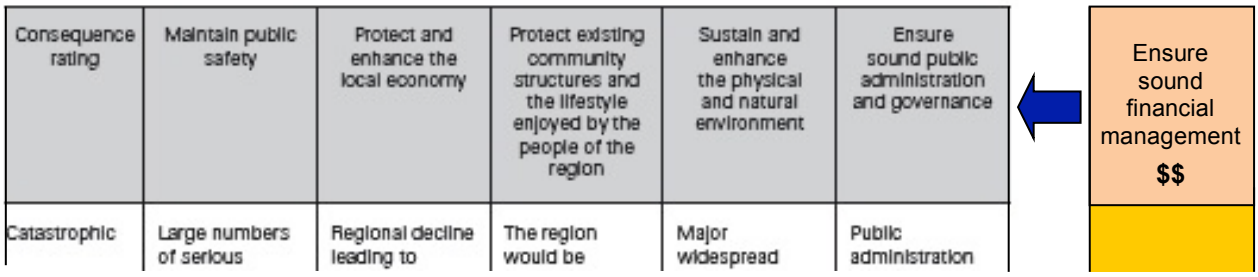


Diagram 1: Displays the top row of the risk matrix used in the SA CAP program. The criteria for assessing risks listed in this image are based on the criteria listed in Table 8 of the "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006). In this case study the consultant considers that the addition of a financial column to the matrix (as indicated in orange), might have been a benefit to the risk assessment process.

Many Councils and organisations are calling for a "business case" for climate change adaptation actions with $ values assigned. This is particularly relevant to a project with a strong focus on assets and infrastructure, an area in which Councils spend significant funds. However, dollar values would have to be agreed upon by the organisation prior to undertaking the process as each Council's revenue, liquidity and cost of insurable risk will ultimately determine the categories for dollar impact. Indirect costs may also become so ambiguous that placing a quantifiable figure would prove difficult.

5. FUTURE DIRECTIONS

The consultant recommends the consistent sector-wide approach used in this program.

Key learnings from the program, as seen from the consultant's perspective, include;

- *"Don't get hung up on discussions regarding the human induced aspect. Many people understand that the climate is changing – get them to focus on that."*
- *"Concentrate on getting policies in place. Policies ensure that risks in new projects are prevented."*
- *"Try to concentrate on realistic risks. Don't find risks that are not really there, you have enough to deal with as it is."*

As a next step, the MLS have agreed to do more region-based work in conjunction with stakeholders including the Country Fire Service and the SES.

The next steps for the Councils involved are to:

1. Work on gradually implementing the CAP, thereby reducing their risk; and
2. To consider the broader vulnerabilities of their community and their region.

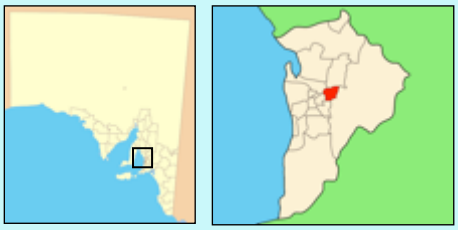
In conclusion , it should be noted that Climate Change is raising pertinent questions regarding where Local Government Organisations fit in the Regional perspective, and what level of duty of care they need to undertake for their community.

Local Government Association of South Australia

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network SETTLEMENTS AND INFRASTRUCTURE

South Australia - Case Study 3

Campbelltown City Council: urban risk management through a Climate Adaptation Plan



Council:	Campbelltown City Council
Web Address:	cityof@campbelltown.sa.gov.au
Size:	24.35 km²
Population:	49,716
Category:	Metro
Program:	Local Government Association Mutual Liability Scheme [LGAMLS] Climate Adaptation Plan [CAP]
Tool:	"Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009)
Function:	Risk Assessment
Contact:	Adrian Forster aforster@campbelltown.sa.gov.au (08) 8366 9245

1. OVERVIEW OF THE PURPOSE

In 2010 Campbelltown City Council developed a Climate Adaptation Plan [CAP] through a program delivered by the Local Government Association Mutual Liability Scheme [LGAMLS]. To undertake the risk assessment the "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) tool was utilised. This tool adheres to the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009) which Campbelltown Council was already using for general risk management. The CAP was the first initiative that the Council had undertaken to address climate change issues. The CAP that Campbelltown City Council produced is recommended by the LGAMLS, because it is well integrated with the Council's existing systems (a key strength).

2. DRIVERS FOR USING THE TOOL

Prior to undertaking the CAP Program there was general discussion at the Council on how climate change would affect elements of the organisation's operation, but no leadership emerged to address the issue. The Council had recently undertaken the South Australian Local Government Corporate Risk Management Module using Interplan, and was becoming more aware of risk management. The LGAMLS contacted the Council and explained how they could assist the Council in identifying the business and operational risks from the likely impacts of climate change; and reducing exposure to risks and liability. The CAP Program provided:

- ✓ Staff workshops to identify risks associated with climate change;
- ✓ Baseline information; and
- ✓ The compilation of the risks and adaptation options identified in the workshops in a CAP.

There was no fee to undertake the LGAMLS CAP Program as it was fully funded. City of Campbelltown Council had already realised the need to undertake a climate change risk assessment in the near future, so the CAP Program was a very cost-effective method to undertake it.

The main external stakeholders on the CAP program were: the Bureau of Meteorology [BoM]; Wallmans Lawyers; and the Coast Protection Board [CPB]. There were no additional stakeholders on the Campbelltown City Council CAP - the process was undertaken with Council staff only.

Although the CEO was very supportive of the project and received verbal reports about the process, neither the CEO nor any Elected Members attended the workshops.

The baseline information used for all of the MLS CAPs was the *Climate Change in Australia: Technical Report 2007* (CSIRO & BoM) based on the IPCC A1B (medium emissions) scenario regional projections for 2030, used in conjunction with advice from Darren Ray (BoM) regarding local specifics, and the study *Bushfire weather in southeast Australia: recent trends and projected climate change impacts* (Lucas et al 2007). Campbelltown City Council did not use any additional baseline information.

The CAP program took Campbelltown City Council 4 to 5 months to complete.

3. IMPLEMENTATION METHODOLOGY

The first CAP workshop with staff from Campbelltown City Council had limited attendance and a lack of focus on the Council's core business. This led to an unsurprising outcome: the workshop was not as successful as the Council had hoped. The CEO consequently shifted the responsibility for the program to a senior management level. From this point Risk Management Co-ordinator (Adrian Forster) drove the project.

A follow-on workshop was held at an external venue, early in the day, with breakfast included as an incentive. This workshop was fully attended.

Following this workshop, the LGAMLS compiled the CAP and returned it to Council. At this point Council undertook a stringent internal review process to further adapt the plan to their specific context. The Risk Management Co-ordinator and the Environment Manager individually met with the executives of each department to clarify and amend the sections of the plan for which they were responsible and to ensure ownership of the Plan.

The risks from the finalised plan now appear on the corporate risk register with review timeframes and allocation of responsibility. The Campbelltown City Council CAP has not been presented at a Council meeting. However, elements have been included in the recently updated Strategic Plan, which has been presented at Council and formally adopted. The CAP has also been applied to and integrated with all Council management practices.

The tool could have been used independently by the Council staff, but the program benefited from the knowledge and expertise of the consultant. Council staff members feel confident that when new baseline information becomes available they will be able to independently update the risks and adaptation options. However they will be looking to the LGAMLS for the updated baseline information.

4. EVALUATING OUTCOMES

The CAP program had good outcomes for Campbelltown City Council because the identified risks and adaptation actions were integrated into the corporate risk register resolving a gap in previously unaddressed risk.

However, the scope of this program was limited to risks that would influence the ability of Councils to continue their existing "*public administration and governance functions*" (LGAMLS & LGA 2010: 4). Thus this program does not **promote innovation**.

The critical success factors for the process of using the tool were:

- ✓ Ensuring participation across all departments;
- ✓ Ensuring that the draft plan was completed at the second workshop;
- ✓ An internal review process to increase Council ownership of the CAP; and
- ✓ The fact that the process was risk management focused/driven as opposed to environmentally focused/driven.

Council staff involved in the process became aware of:

- The importance of integrating Climate Change into policies and procedures to ensure the mitigation of new risks, and
- Thinking about the impact of climate change before making decisions, particularly ones that will have a long term result.

Campbelltown City Council liked the overall effectiveness of the process. If it could make one improvement to the process of using the tool, it would be to provide workshop participants with **more pre-workshop information**.

Comparative feedback from other councils on the Climate Action Plan process

All Councils agreed that the process generated a greater awareness of climate change issues, it was good to have a facilitator for the process, and the fact that there was no fee to undertake the project was an immense benefit. One Council spoke of the timeliness of the program, and the fact that it in a sense "fast tracked" a first pass scoping of climate change risks for many Councils.

Key criticisms to the program include:

- ➢ Introduction to the plans were not specific to the Council involved and provided little in the way of context;
- ➢ There was no executive summary of the Councils' specific priority risks;
- ➢ The wording of risks and adaptation options were not always consistent. It was sometimes difficult to identify and separate the risk, consequence and causes;
- ➢ The rating of risks and identification of adaptation options is subjective and varied in accordance with the knowledge and perspectives of staff members involved; and
- ➢ The program was limited in its focus on business and organisational risks, broader economic, environmental, and social risks which also have secondary and tertiary impacts on Councils.

Although all Councils undertook the same process, the outcomes of that process varied. The main factors that contributed to the variability appear to be commitment and capacity:

Commitment

It was critical to allocate staff resources to the CAP program and to ensure representation from all departments during the workshop development process. Diverse representation enabled systems thinking and integrated responses to be developed. Councils who took ownership of their final Climate Change Risk Management document, using the CAP as a foundation and modifying it to suit their context and preferences, were able to develop extremely useful documents.

Capacity

For Councils with a relatively low capacity, the CAP program enabled them to begin the process of addressing climate change issues and identify priority risks. The District Council of Lower Eyre Peninsula [DCLEP] is one such Council. Bushfire prevention and response was highlighted as a priority issue in the CAP and the Council has since undertaken additional sessions on bushfire risk through the LGAMLS. As a result of the program

DCLEP employed another Development Assessment Officer whose role includes bushfire compliance. This Council had limited capacity in risk management, with no corporate risk register. An additional benefit for DCLEP was that the staff were able to develop their skills in general risk management through the program.

Councils with a high capacity were more likely to comment on the limited scope of the project. One Council suggested that an additional priority risk document should have been included. This Council felt that as the CAP document was quite large, there was a low likelihood of their Elected Members reading and digesting the information. Where such Councils committed to undertaking additional work to address broader risks and deficiencies in the standard format of the CAP document, they were more satisfied with the outcome.

5. FUTURE DIRECTIONS

Campbelltown City Council recommends tools used in this study to Councils who have not yet addressed climate change risks to their organisation and its core business, and advises the following:

- "If you are aware of both the risk management process and your existing policies and procedures before the workshop, the process will be more effective."

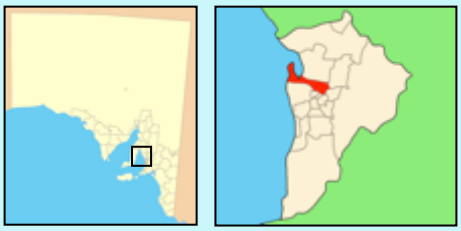
The next steps for Campbelltown City Council are to continue to integrate the climate change risks identified into all policies and procedures, and to monitor risks as they come up for review. Other Councils such as the District Council of Lower Eyre Peninsula have identified priority areas on which to focus.

Local Government Association of South Australia

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network SETTLEMENTS AND INFRASTRUCTURE

South Australia - Case Study 4

City of Port Adelaide Enfield: localised metropolitan flood risk assessment - spatial mapping and risk/adaptation costing



Council:	City of Port Adelaide Enfield
Web Address:	http://www.portenf.sa.gov.au
Size:	97 km2
Population:	101,000
Classification:	Coastal/Metro
Program:	Port Adelaide Seawater Stormwater Flooding Study: Phase 1
Tools:	Rapid Appraisal Method [RAM] for Floodplain Management (Victorian Department of Natural Resources and Environment 2000) ANUFLOOD (Australian National University Centre for Natural Hazards) TUFLOW (WBM Oceanics Australia and University of Queensland) 30m grid size model ILSAX (O'Loughlin, 1993) 2D/1D 30m grid size hydrological model
Function:	Flooding Risk Assessment
Consultants:	Tonkin Consulting, WBM Oceanics Australia & sub-consultants
Contact:	Verity Sanders verity.sanders@portenf.sa.gov.au 08 8405 6765

1. CASE STUDY OVERVIEW

In 2004 the City of Port Adelaide Enfield (the Council) commissioned a Flood Risk Management Study with funding obtained from the Commonwealth Government under the Natural Disasters Risk Management Studies Program. The aim of the Flood Risk Management Study was to identify the seawater and stormwater flooding risks related to future sea level rise and to develop and implement an inter-governmental strategy to address the vulnerable areas of the City. The study took into account projected sea level rise and land subsidence over the next hundred years. The purpose of the study was to enable informed design guidelines and informed public and private spending on additional protective infrastructure, or the application of non-infrastructure responses where appropriate, such as land use planning policy.

The Flood Risk Management Study has three phases. This in-depth case study reviews Phase 1, which was completed in 2005. The second phase was scheduled for completion in 2011 and is not yet concluded. In

Phase 1 the Council engaged consultants who utilised highly technical modelling tools to generate spatial mapping, damages value estimates, and preliminary adaptation option outputs. Significant inputs were required for the modelling tools including a Digital Elevation Model [DEM] with a 5m grid size.

The Council found the spatial mapping outputs to be extremely useful in many contexts. These maps were released both to the community and the media. The damages value estimates from this phase only encompass risks to **residential** development. Risks to industrial and Government development and infrastructure are currently being calculated in the Phase 2. Nevertheless, the residential damages value estimates were useful in giving the Council and stakeholders a realistic understanding of the scale of the risks.

Key learnings from Phase 1 include the need for Councils to ensure adequate internal and external resources, and the importance of clarity and ease of comprehension in process documentation and risk communication. This phase of the study also highlights the need for advances in the financial tools available for calculating risk estimates, and allocating responsibility for future investment via a 'beneficiary pays' or similar funding model.

2. DRIVERS FOR USING THE TOOL

The Port Adelaide Enfield local government area is unique in that it contains a number of key assets of State strategic significance. These assets include international shipping ports, electricity generation facilities, a National Naval precinct, major transport routes and logistical centres. In 2004 the area was also approaching a rapid development phase. The Council began receiving development applications for vacant areas around Inner Harbour and Gillman. It recognised that to achieve good long term development outcomes in these areas, it required more information on their vulnerability to storm water and tidal flooding with the projected impacts of climate change. Later, in 2009, the State Government identified Port Adelaide as an area for residential growth as one of five state-wide transit oriented development hubs in the 30-year Plan for Greater Adelaide.

A significant amount of the land that Council perceived as vulnerable is owned by the State Government. When the Council approached the State Government regarding their concerns on coastal vulnerability they were referred to the Coast Protection Board [CPB] State policy on sea level rise. Sea level rise projections have been acknowledged in the South Australian Planning System through this policy since 1991 when consideration of 0.3m sea level rise over the next 50 years and a further 0.7m rise in the 50 years thereafter was included in all Development Plans [DPs]. Noticeably, the CPB policy does not include a mechanism for preventing risks to **existing** development. The Council felt that the simplistic application of this policy to each new individual development would not result in an optimum comprehensive outcome for all development. It was felt that the planning and engineering policies at a State level were, and still are, inadequate to strategically address larger scale flooding vulnerabilities associated with climate change.

The Council was also very aware of existing seawater flood vulnerabilities. The images below were taken some years later on 25th May 2009, when a king tide occurred concurrently with a storm event in South Australia. Image 1 shows the level of the king tide at Harbourside Quay in Port Adelaide: Image 2 shows flooding in and around Fletcher Rd at Birkenhead, also in the Port Adelaide Enfield jurisdiction. The water in Image 2 is actually tidal sea water from the Port Adelaide River.

Image 1: Harbourside Quay.

Image 2: Fletcher Rd at Birkenhead.

The Council applied for funding through the Natural Disasters Risk Management Studies Program [NDRMSP] which allowed for the assessment of both tidal and stormwater flooding risks. The Council received $250,000 through the program to undertake the Flood Risk Management Study (the Study).

The study encompassed all areas of the City of Port Adelaide Enfield that are in proximity to the coast, Barker Inlet, and Port Adelaide River estuary. The Flood Risk Management Study has three phases, the first of which was completed in 2005. The second phase is scheduled for completion in 2011.

- Phase 1: Risk Assessment/Preliminary Treatment. Analyse and evaluate risk of seawater and stormwater flooding and identify concept strategies.

- Phase 2: Risk Treatment Study. Develop detailed strategies, including design and development of management measures and development controls.

- Phase 3: Treatment Implementation. Investment and Implementation Plan for control measures.

The information from the Study was to be used to make informed decisions about private and public expenditure on upgrades and additional infrastructure, and to formulate policies regarding new development. The Council was also very aware that the outputs could be used for decision-making based on a 100-year time frame. As such, the Digital Elevation Model [DEM] used in the process would need to be high resolution and the modelling process would need to incorporate systems interactions.

An advantage of obtaining funding through the NDRMSP was that there were **no specifications** regarding process or preferred consultants. The funding required the applicant to state what they wanted to achieve and how they would go about obtaining those outcomes. The Council put the project out for tender and asked prospective consultants to provide a methodology for achieving the outcomes. The specific tools with which to simulate and analyse the flood risks were therefore chosen and used exclusively by the consultant.

At the time of project inception (2004) climate change vulnerability studies and the interrelation between stormwater and tidal inundation were relatively new areas of work, and as such only a few consultants had the capacity to adequately address the combined storm water and tidal vulnerability. Approaches to this type of vulnerability analysis have now become more common and capacity has further developed as a key outcome of early adopters like the City of Port Adelaide Enfield.

The primary outputs of Phase 1 were: spatial maps illustrating vulnerability, damage estimates to residential property, preliminary suggestions for measures to reduce vulnerability, and estimated costings.

The project partners for Phase 1 were the Coast Protection Board, Flinders Ports, Torrens Catchment Water Management Board, Land Management Corporation and Transport SA. Both internal and an external steering committees were formed to oversee the Study. The external steering committee included Council staff, State Government representatives, the manager of the Coast Protection Branch, and a representative from the South Australian Fire and Emergency Services Commission [SAFECOM].

At the inception of the project the Council approached the neighbouring Council, the City of Charles Sturt, to be a partner. As the Port Adelaide River connects to the West Lakes system to the south, flood risk management would ultimately need to involve both constituencies. At that stage the City of Charles Sturt were unable to commit resources to the project. However, with the release of the Phase 1 findings from the project, and the subsequent release of the Commonwealth report *Climate Change Risks to Australia's Coasts: A First Pass National Assessment* in 2009*,* the City of Charles Sturt recognised its significant vulnerabilities and has since committed to further work with both the City of Port Adelaide Enfield and the City of West Torrens, in order to assess and address adaptation requirements on a regional and collaborative basis.

PROJECT METHODOLOGY

Datasets on drainage, bathymetry, tidal records, meteorological data, significant storm records, topography, aerial photography and digital terrain were obtained for baseline information. Selected data was used to create a Digital Elevation Model [DEM] with a 5m grid size. A literature review of localised land subsidence was also undertaken resulting in the SA Coastal Management Branch Levelling Survey 1982, 1985, 1987, 1994 being

used as the baseline. The following reports were used to establish the climate change projections that were modelled.

- Third Assessment Report, Climate Change 2001 (IPCC, 2001)
- Climate Change: An Australian Guide to the Science and Potential Impacts (Commonwealth of Australia, 2003); and
- Climate Change in South Australia (CSIRO, 2002).

The end users of the outputs from Phase 1 of the Study have been diverse:

- Internally, the Council has used the maps to inform assessment of development applications and what level of protection the Council requires;
- The Development Assessment Commission (State level planning authority) has used the maps when advising the Minister for Planning and Local Government regarding development applications that come under their jurisdiction
- Information from the study was used in the 2009 Commonwealth released *Climate Change Risks to Australia's Coasts: A First Pass National Assessment*; and
- The South Australian Fire and Emergency Services Commission [SAFECOM] have used the maps as a tool to inform their programs regarding emergency management, and community awareness and preparedness.

The issue of releasing information in a study like this is complex. The Council considers it has a responsibility to make accessible to the public information regarding *current* flooding risk (usually stormwater-related) – so that residents can make informed decisions. However as sea level rise projections are based on future scenarios, Council's responsibility or 'duty of care' in regard to publicising results of these studies is less clear, and the use of the information by land owners or developers may be subjective.

Council decided to release all maps to the community and the media as a Phase 1 project output and flagged that it would further investigate adaptation strategies in Phases 2 and 3. The main response from the community was "Good on you, this is something we need to know". The release of the maps did not cause panic in the community and had no recognisable effect on property values. The spatial maps enabled both Council and community to develop a stronger appreciation for the issues associated with climate change, as they could visualise the direct potential impacts in their area.

IMPLEMENTATION METHODOLOGY

The tools used in the study required the user (consultant) to have highly specific skills that were not present internally at the Council. Council staff members were therefore not users of the tools, but the **end users of the outputs**. Outputs of the economic damages simulations could be used in other financial risk management tools. However, in Phase 1 the economic simulations were preliminary and only included residential assets. The higher value assets in the area are in actual fact Government-owned or industrial. The Phase 1 residential estimates were achievable in terms of time and resources expended, and identified to all stakeholders the financial vulnerability associated with potential sea level rise. The same tools/process could be used to generate spatial maps and costings for a different area if the necessary inputs were available.

Phase 2 will involve the development and application of an overall funding and investment model, and a more detailed assessment of potential financial damages to Government and industrial assets, including identifying the roles and responsibilities of various organisations and individuals (private and public) in preventing flood damage via a co-ordinated investment and implementation program

Resourcing: Council staff resources required for this project were significant, and because the project utilised an integrated approach, the staff involved had to work with perspectives outside of their professional specialties: from highly technical engineering and modelling, to ecology and urban planning. To allow systems thinking and the identification of secondary impacts, staff also had to work together to identify issues and vulnerabilities. As a large Council that had identified the work as a priority, the City of Port Adelaide Enfield was able to allocate the necessary internal resources. However it is likely that smaller Councils may not have the resources to undertake a similar project, both in terms of staff for project management and to provide specific expertise.

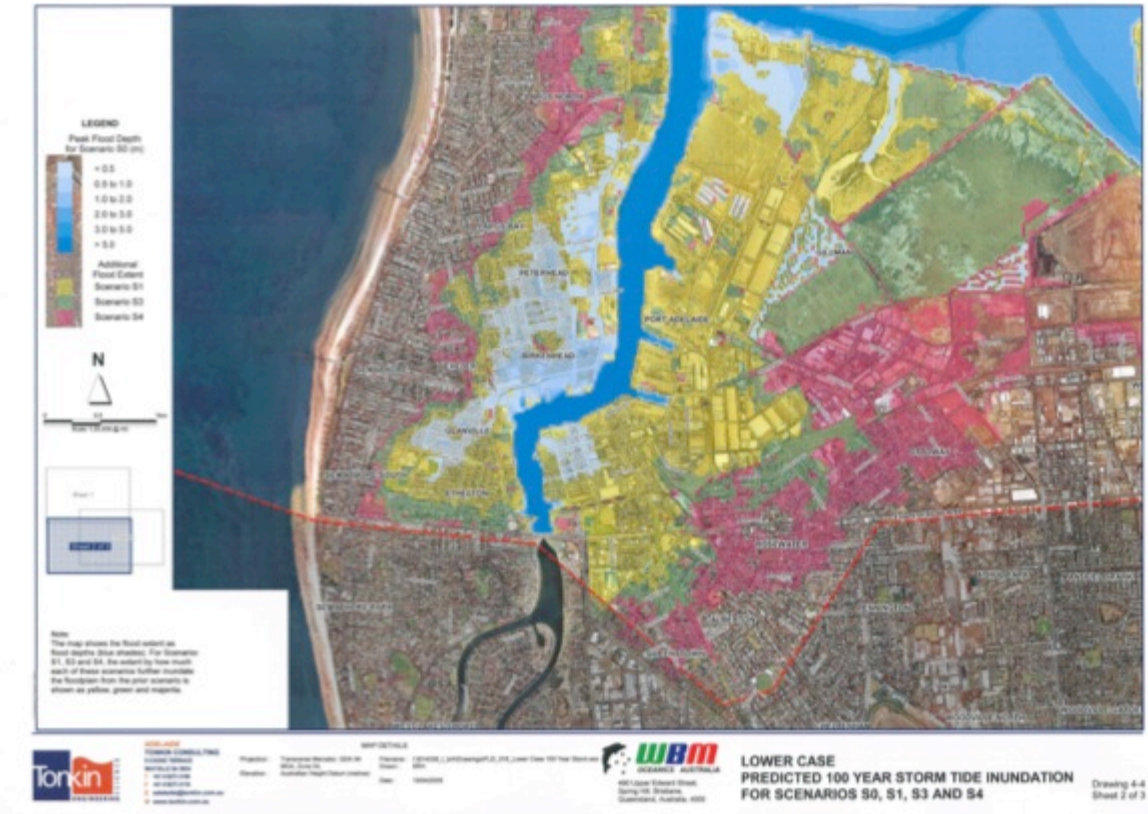
Updating the Phase 1 baseline climate change projections: In 2010, the Council commenced Phase 2 and concurrently began an update of the Phase 1 outputs in accordance with more recent climate change projections. The update of Phase 1 includes a sensitivity analysis. The sensitivity analysis is designed to enable Council to ensure that Phase 2 is based on the most current (agreed) sea level rise projections, as endorsed by the State Government.

In Phase 1, simulations of combined land subsidence, tidal water, and storm water on existing land use and infrastructure were undertaken. The Study analysed the ability of existing infrastructure to withstand 1, 5 and 100 year Average Recurrence Interval [ARI] events. The spatial map and costing outputs from these simulations presented 1) the existing case and three climate change scenarios, and 2) scenarios regarding on-land water storage areas. The existing case and four climate change scenarios are described in Table 4-4 below. Please note that Scenario 2 had a sea level rise value less than that in the state CPB policy and therefore was not modelled.

Table 4-4 Future Conditions Scenarios of Sea Level Rise and Land Subsidence

Scenario Condition	Sea Level Rise (m)	Period of Land Subsidence (years)	Description
S0	-	-	Existing case, no sea level rise or land subsidence
S1	0.30	50	Complies with current CPB requirements for infill development
S2 (not modelled)	0.10	100	Based on current IPCC projections for sea level rise over 100 years and using *low end* value in the range plus 100 years of land subsidence
S3	0.50	100	As for Scenario 2 but using *mid range* value
S4	0.88	100	As for Scenario 2 but using *high end* value

The on-land water storage scenarios are essentially a best case (described as *lower case*) and worst case scenario (described as *upper case*) for the amount of water already in non-tidal wetlands and ponding basins in the event of a storm tide event. The lower case scenario assumed that all non-tidal areas were dry (no ponding), and the upper case scenario assumed that all non-tidal areas were wet (ponding) resulting in less on-land storage available. Maps presented in the Phase 1 Report (see example below) were not easy to interpret for the non-specialist, and Council is addressing this communication issue in Phase 2.



Drawing 4-4 from Sheet 2 of 3, Phase 1 (above) is an example of the spatial mapping output of the study. This map indicates the depth of the flood extent for the existing case, and the flood extent for climate change scenarios 1, 3 and 4 in the event of a 100-year storm tide. The map presents the lower case scenario, where no-tidal wetland and ponding basins were empty.

The tables below are an example of the costings output for Phase 1 of the study. Table 4-9 indicates the 100 year ARI Flood damage estimates for all scenarios. Where existing systems were unable to withstand a 100 year ARI event, cost estimates for upgrades designed in accordance with each of the climate change scenarios were developed. Table 4-11 and 5-2 respectively indicate cost estimates for sea defence and stormwater drainage upgrades.

Table 4-9 100 year ARI Flood Damage Estimates

Scenario Condition	ANUFLOOD		RAM	
	Lower Case	Upper Case	Lower Case	Upper Case
S0 (Existing case, no sea level rise or land subsidence)	$7,900,000	$8,900,000	$26,000,000	$28,000,000
S1 (Complies with current CPB requirements for infill development, using a low end value sea level change and 50year period of land subsidence)	$54,000,000	$62,000,000	$65,000,000	$67,000,000
S3 (Based on current IPCC projections for sea level rise over 100 years using *mid range* value plus 100 years of land subsidence)	$112,000,000	$132,000,000	$90,000,000	$108,000,000
S4 (Based on current IPCC projections for sea level rise over 100 years using *high range* value plus 100 years of land subsidence)	$265,000,000	$310,000,000	$184,000,000	$200,000,000

Table 4-11 Concept Sea Defence Upgrade Cost Estimates

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Section 1	$13,000,000	$12,600,000	$14,400,000	$15,500,000
Section 2	$5,100,000	$4,900,000	$5,900,000	$6,700,000
Section 3	$2,800,000	$2,600,000	$3,500,000	$4,400,000
Section 4	$3,200,000	$3,200,000	$3,600,000	$3,900,000
Total	**$24,100,000**	**$23,300,000**	**$27,400,000**	**$30,500,000**

Table 5-2 Local Stormwater Drainage Upgrade Cost Estimates

Catchment	Existing Development, Existing Design Rainfall	Ultimate Development, Existing Design Rainfall	Ultimate Development, Increased Design Rainfall
Anthony Street	$720,000	$780,000	$1,120,000
Centre Street and Jetty Road - North	$880,000	$900,000	$1,370,000
Centre Street and Jetty Road - South	$2,890,000	$3,280,000	$5,170,000
Hamilton Avenue	$1,390,000	$1,500,000	$2,260,000
Osborne	$0	$0	$0
Port Adelaide Centre - East	$400,000	$400,000	$410,000
Port Adelaide Centre - Centre	$1,020,000	$1,020,000	$1,800,000
Port Adelaide Centre - West	$1,390,000	$1,390,000	$1,530,000
Semaphore - East	$650,000	$850,000	$1,310,000
Semaphore - West	$1,770,000	$1,910,000	$3,000,000
Total	$11,100,000	$12,920,000	$17,950,000

Valued outputs of Phase 1: Phase 1 of the Study has been extremely valuable. The outputs of this phase have resulted in internal policy changes, and the need to identify and address climate change impacts via sound adaptation research and planning have been incorporated into the Council's strategic planning process. A key outcome of the study has been increased awareness within Council regarding planning, infrastructure, environmental management and asset management. The spatial mapping outputs have enabled the Council to identify specific areas of vulnerability. The Study has also promoted systems thinking and innovative problem-solving.

Whilst the Phase 1 report from the Consultants primarily suggests engineering solutions, the Council is committed to exploring long term solutions with social, environmental and economic benefits. The risks of *maladaptation* (that is, a solution to one problem that creates others) must also be identified. For example the Barker Inlet is a grow-out area for fish stocks that are essential to the viability of the commercial fishing industry in SA. In current masterplanning and adaptation planning, it is therefore important to identify areas where the flooding and flushing of the intertidal ecosystems can not only continue but can be further facilitated, and are not adversely impacted on by inappropriate sea level rise 'solutions'. 'Climatic change' (heatwaves, intense storms, wind, and coastal flooding) is now included in the Council's risk register as an issue undergoing further investigation and preparedness planning.

Communicating the outputs: Externally the visual impressions generated by the spatial mapping tools resulted in a heightened awareness among State Government bodies, consequently the funding for Phase 2 is tripartite: from Local, State and Federal governments. The Study has not directly resulted in many policy and strategic planning changes at the State level but it is informing current policy reviews.

The Council feels that Phase 1 of the Study was definitely worth the time and money invested. Internally, there were no challenges in using the maps and the report. However on a broader level there were some challenges associated with interpretation.

Adaptive learning: There are some key aspects and areas of documentation in which the Council has required improvement in Phase 2. The Phase 1 report did not contain an executive summary, and although background technical information is necessary, chapter and key information summaries in simplified language would have improved general comprehension. Other important learning-by-doing considerations include:

1. Interim reports should be required at key milestones in the process, to ensure consistency and comprehension
2. The reports should clearly document how and why decisions were made
3. Continuity of key staff resources throughout the project is important.

The Council also felt that there was and still is very little available in the way of financial modelling tools for adaptation planning and investment.

Critical success factors: Two important factors in the Study's success were:

- ✓ allocating dedicated resources; and
- ✓ having someone in Council who was prepared to drive the project.

Challenges: One challenge in the process that was successfully resolved, eventually, entailed negotiation of project insurance figures with consultancies. Negotiations were prolonged because of the new nature of the work, and the inherent uncertainties of risk involved with climate change projections. There was also a significant gap between the completion of Phase 1 in 2005 and the commencement of Phase 2 in 2010. The reasons for the delay included the need to source further funding via a new submission to the NDRS program for Phase 2, and the need to get the complex brief correct because of the value (billions of dollars) of assets and infrastructure involved in the study scope.

5. FUTURE DIRECTIONS

The City of Port Adelaide Enfield strongly recommends the spatial mapping outputs from the Phase 1 tools in this study to other Councils with low-lying coastal areas containing significant assets. The Council is currently working through Phase 2 and updating Phase 1.

Key learnings from the Study provided by the Council include:

- "Ensure that dedicated resources are available internally, and the consultancies contracted have the right capabilities"
- "Get the initial project brief right"
- "The easiest solutions politically are usually engineering solutions – even if they cost more, but the long term solutions are often more complex. Try not to automatically choose the easiest option but work towards the option with the best environmental, social and economic co-benefits."

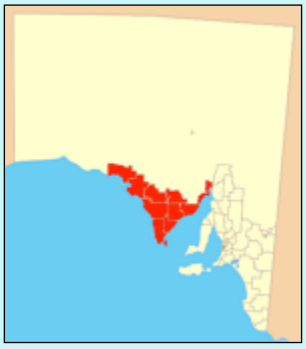
Council is also part of a joint project that has been successfully funded in 2011 through the Natural Disaster Resilience Grant Scheme [NDRGS] to develop a larger scale *Western Region Climate Adaptation Plan* with nearby Councils, the City of Charles Sturt and the City of West Torrens. This new project has three stages:

1. Regional Integrated Vulnerability Assessment
2. Concurrent issue-based studies (including social, environmental, assets, open space and biodiversity, and urban planning)
3. Regional Climate Change Adaptation Action Plan.

South Australia - Case Study 5

Eyre Peninsula Natural Resources Management Board: climate change vulnerability assessment - region-wide pilot study

Organisation:	Eyre Peninsula Natural Resources Management Board [EPNRMB]
Web Address:	http://www.epnrm.sa.gov.au
Program:	Eyre Peninsula Climate Change Vulnerability Assessment
Tool:	Tailored numerically scored framework Vulnerability = (Exposure + Sensitivity - Adaptive Capacity)/3 5 "Capitals" Assessed: Human; Social; Financial; Physical; and Natural
Function:	Vulnerability Assessment
Consultant:	PIRSA Rural Solutions
Contact:	mark.stanley@epnrm.com.au 08 8682 7506



1. OVERVIEW OF THE PURPOSE

In 2008 the Eyre Peninsula Natural Resource Management Board (EPNRMB) identified a need for locally specific integrated climate change vulnerability information for their region. A suite of projects investigating the vulnerabilities associated with the agricultural sector were being undertaken at the time, and the Eyre Peninsula Climate Change Vulnerability Assessment (the Assessment) was intended to be broader, integrated and encompassing the assessment of risks to all EP communities. The EPNRMB felt that a pilot vulnerability assessment, encompassing three diverse geographical/social/climatic types, would enable them to set short and long-term priorities for climate change adaptation in their region. The EPNRMB engaged the services of PIRSA Rural Solutions to deliver the project including selecting/developing the methodological approach to the Assessment.

2. DRIVERS FOR USING THE TOOL

In South Australia the EPNRMB was a leader in attempting to undertake specific work on climate change adaptation. A lack of action on climate change on the Eyre Peninsula was the primary driver for the EPNRM to begin work in that area. Eyre Peninsula has a significant social, economic and NRM reliance on the agriculture industry, and in 2008 had experienced drought for the last three years. Most of the peninsula was classified as being under Exceptional Circumstances (EC) and primary producers were relying on the benefits and subsidies associated with the EC declaration.

The Assessment was intended as a tool to collect the information that would enable informed strategic planning to be undertaken for the region. Both baseline information and information on vulnerability assessments has improved significantly since the project began.

Initially the project was intended to be undertaken over a 12 – 18 month period. However the EPNRMB identified funding for the project through the state NRM Council. Funding was conditional on expenditure by the end of that financial year, which was in 6 months time. Therefore, in order to obtain the significant funding that was needed to undertake the project the EPNRMB was required to insist that the consultancy complete the project in a comparatively short period of time.

The condensed timeframe resulted in many problems, not the least of which was the failure of EPNRMB to:

- Create a thorough brief complete with project outcomes;
- Release an appropriate call for tenders; and
- Establish a stringent project monitoring process.

CSIRO, BoM, the South Australian Research and Development Institute (SARDI), and the Australian Bureau of Agriculture and Resource Economics (ABARE) were all partners in the project and provided the baseline information. Unfortunately the relevant Councils – District Council of Franklin Harbour (Cowell), District Council of Kimba, and District Council of Lower Eyre Peninsula (Green Patch), and Coast Protection Board of SA were not partners on the project. It was intended that the Councils would be engaged as stakeholders, however like many intended aspects, because this was not stipulated in a brief it did not occur.

3. IMPLEMENTATION METHODOLOGY

The three areas chosen to represent diverse geographical/social/climatic types were;

1. Kimba – a very small inland township in marginal farming country with a economy based predominately on agriculture and a population in decline;
2. Green Patch – a high rainfall agricultural area with no township; and,
3. Cowell – a small coastal township with a comparatively diverse economy including tourism, aquaculture, agriculture and mining.

Baseline data on agricultural yields and weather was later found to be difficult to obtain for Green Patch and therefore data from nearby Cummins was used.

The assessment equation (Vulnerability = (Exposure + Sensitivity - Adaptive Capacity)/3) was derived from the Advanced Terrestrial Ecosystem Analysis and Modelling [ATEAM] project in 2004/5 at the Potsdam Institute for Climate Impact Research, where a function describing vulnerability [V] as a relationship between the variables S [Sensitivity], E [Exposure] and AC [Adaptive Capacity] was presented. The function was adapted by the Allen Consulting Group in 2005. PIRSA Rural Solutions developed an integrated systems assessment approach to accompany the equation, assessing vulnerability under five categorisations (described as capitals): Human; Social; Financial; Physical; and Natural. Table 22 below is an example of the presentation and calculation of numerical scores.

15.5 PHYSICAL CAPITAL

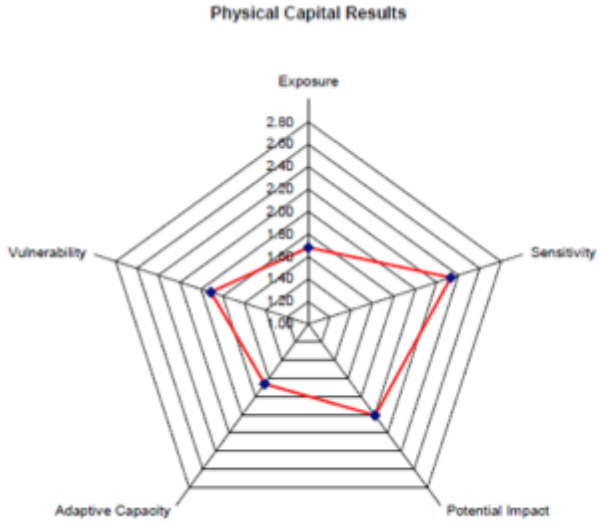
Table 22: Physical capital results summary table

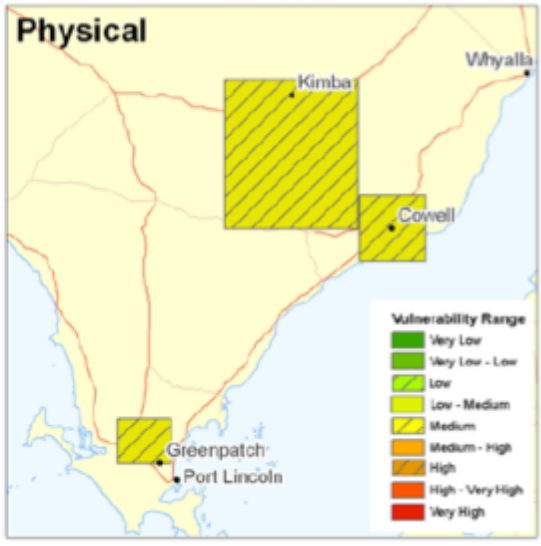
Indicator	Variable	Exposure	Sensitivity	Potential Impact	Adaptive Capacity	Vulnerability
Roads	Kilometres of roads	1.57	2.00	1.78	1.50	1.69
Roads Indicator Average		**1.57**	**2.00**	**1.78**	**1.50**	**1.78**
Rail	Kilometres of rail	1.57	1.83	1.70	1.50	1.70
Rail Indicator Average		**1.57**	**1.83**	**1.70**	**1.50**	**1.70**
Ports	Number of ports	2.00	2.00	2.00	1.50	2.00
Ports Indicator Average		**2.00**	**2.00**	**2.00**	**1.50**	**2.00**
Telecommunications	Telecommunications infrastructure	1.57	2.00	1.78	1.50	1.78
Telecommunications Indicator Average		**1.57**	**2.00**	**1.78**	**1.50**	**1.78**
Electricity supply	Demand constraints	1.85	2.50	2.18	1.50	2.18
	Renewable energies	1.00	2.50	1.75	1.50	1.75
Electricity Indicator Average		**1.43**	**2.50**	**1.96**	**1.50**	**1.96**
Farm infrastructure	Number of dams	1.60	2.50	2.05	2.00	2.05
Farm Infrastructure Indicator Average		**1.60**	**2.50**	**2.05**	**2.00**	**2.05**
Schools	Schools in the Region	1.85	2.50	2.18	1.75	2.18
Schools Indicator Average		**1.85**	**2.50**	**2.18**	**1.75**	**2.18**
Hospitals	Hospitals in the Region	1.85	2.50	2.18	2.00	2.18
Hospitals Indicator Average		**1.85**	**2.50**	**2.18**	**2.00**	**2.18**
Total Score for Physical Capital		**1.68**	**2.23**	**1.95**	**1.66**	**1.95**

The EPNRMB were happy for the consultancy to use the tool that they developed in this first instance, but there was an expectation that EPNRMB (perhaps internally) would then be able to utilise the tool to assess other areas. Whilst the mechanism developed for assessing vulnerability was strong in this project, there was an absence of methodology/process regarding the collection of relevant inputs for the assessment mechanism. Community consultation and engagement was limited to a phone survey with under 100 respondents. Without a clear methodology/process for collecting relevant inputs (particularly with regards to the human and social capitals), this tool is incomplete and could not be used independently by the EPNRMB to assess other areas as initially intended. The EPNRMB is also not able to update the baseline in the Assessment as new information becomes available. The lack of established process also caused difficulties for the consultancy, as the lead consultant left mid-way through the project, and the result was an ad-hoc approach to completing the Assessment.

4. EVALUATING OUTCOMES

Difficulties with the methodology and approach:
One failure of the Assessment was the aggregation of information to provide overall scores – rather than the identification and display of **elements** of vulnerability, the **level** of vulnerability and **adaptation actions to address** that vulnerability. A visual presentation of the aggregated information appears below. Summarily, the information in the Assessment report was not presented in a way that allowed priorities to be readily identified.





The Assessment was therefore not successful in addressing the aim of the project and is generally regarded as not particularly useful. The value for money of the project is a difficult issue: the amount of time spent on the project by the consultancy was substantially above that which was anticipated - however the project did not deliver useful outcomes.

Benefits derived from the project:

- Excellent baseline information from project partners such as CSIRO, which can be applied to other projects;
- EPNRMB now has a much more process-oriented approach to studies; and
- Climate Change has become a recognised issue on the Eyre Peninsula and a Regional Sector Agreement on Climate Change Adaptation in the Region has been signed with the South Australian Government.

Scope for further improvements to the assessment tool/methodology:
The Assessment could have been improved with more time, a defined process, monitoring, and desired outcomes clearly stipulated at the beginning of the process, as previously discussed. The scope of the project was, in retrospect too large, and the result was a disjunctive mixture of highly detailed and extremely superficial information.

The EPNRMB was also particularly disappointed with the community and stakeholder engagement aspect of the project. This engagement was highly biased towards the farming sector and selective members of the communities, and was not felt to be representative of the broader communities. There was also no follow up to the initial limited community engagement process.

The report was formatted for the EPNRMB's use, and no summary report for the community was issued. There is a concern that those who did participate were left with the feeling that their time was wasted. Such perceptions impede future successful community engagement processes.

5. FUTURE DIRECTIONS

The EPNRMB has learnt a lot from the Assessment process. Their advice for other organisations considering undertaking a vulnerability assessment is:

- 'Know what you want to happen.'
- 'Don't make your project too big'
- 'There is the risk of coming up with just another report that will sit on the shelf. Make sure the outputs specified are practical outcomes that help you to adapt.'
- 'It is easy to get lost in the science language. Ask for reports and community engagement information that is easy to understand.'
- 'Ask for the lifespan of decisions to be incorporated into the assessment of vulnerability and adaptation options'

The EPNRMB is still trying to get the vulnerability assessment process, methodology and tools right. They are now working on a project with the Department of Premier and Cabinet in South Australia to undertake a more focused study on coastal vulnerability in Whyalla. The brief (complete with intended/necessary outcomes) has gone out for tender, and the methodology and critical success factors that the EPNRMB is looking for in the next vulnerability assessment include:

- ✓ an adaptation action plan for the coastal section of Whyalla;
- ✓ a tested and methodologically robust process for community engagement that is successfully applied in the project, and

- ✓ a process that the EPNRMB are able to use for future projects.

Internally the EPNRMB are asking questions regarding the community engagement aspect such as:

1. How do you identify the segments of the community?
2. How do you connect with those segments? and
3. How do you give them sufficient information to have a meaningful dialogue?

Cities of Burnside, Marion and Onkaparinga: 'first pass' risk assessments - are risk *identification* and *prioritisation* processes the most important outcomes?

Program: Local Adaptation Pathways Program [LAPP]

Tool/function: Risk Assessment "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006)
Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004]
(Now AS/NZS ISO 31000:2009)

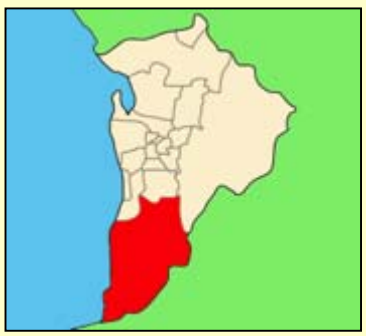
Consultancy: AECOM

Contact: Zafi Bachar
zafi.bachar@aecom.com
08 7100 6435

Council: City of Burnside
Web Address: http://www.burnside.sa.gov.au
Size: 27.5 km²
Population: 40,752
Classification: Metro
Contact: Steve West
swest@burnside.sa.gov.au
08 8366 4281

Council: City of Marion
Web Address: www.marion.sa.gov.au
Size: 55.5 km²
Population: 84,142
Classification: Metro/Coastal
Contact: Ann Gibbons
ann.gibbons@marion.sa.gov.au
08 8375 6857

Council: City of Onkaparinga
Web Address: http://www.onkaparingacity.com
Size: 518.4 km²
Population: 160,404
Classification: Peri-urban/Coastal
Contact: Maggie Hine
maghin@onkaparinga.sa.gov.au
08 8384 0618



1. OVERVIEW OF THE PURPOSE

In 2008 three South Australian Councils received LAPP funding to undertake climate change risk assessments and adaptation plans. This was the first round of funding through the Local Adaptation Pathways Program [LAPP] delivered by the Department of Climate Change and Energy Efficiency [DCCEE]. The objectives of LAPP are to enable Councils to identify and prioritise risks posed to their operations and responsibilities; to develop risk management, adaptation and resilience building strategies; and to identify knowledge gaps for further investigation.

As funding recipients the Cities of Burnside, Marion and Onkaparinga were required to select a consultancy from a list of DCCEE preferred providers, and to use the *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO 2006) in accordance with the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009) to undertake the risk assessments. All three Councils chose to use the consultancy AECOM. The function of AECOM was in the facilitation, identification, systematic categorisation and compilation of risks, existing controls and adaptation actions. The timeframe for the LAPP projects was set and strongly enforced by DCCEE. The Councils received notification of their funding in October 2008 and were required to finish the project by November 2009. This timeframe included the call for tenders, and review of all final documents by Council staff, the consultancy and DCCEE.

There are a few notable differences in the approach and outcomes for the three Councils. In particular the City of Burnside included a strategy to ascertain community perceptions and priority concerns. This case study discusses the Councils' different approaches in addition to evaluations by each of the Councils on both the process and the outcomes of the risk assessments and adaptation plans.

2. DRIVERS FOR USING THE TOOL

In 2008 all three Councils had already taken various steps towards responding to climate change, each having participated in the ICLEI Cities for Climate Protection [CCP] initiative. Both Burnside and Onkaparinga had also developed Council climate change strategies for 2008-2013. All three Councils have corporate risk registers and Marion has an environmental management system certified to ISO14001 since 2000.

City of Burnside context:
The City of Burnside's climate change strategy (*Climate Change Action Plan*) sits within their *Environment Action Plan* which is one of four themed strategic plans nested within the Council's broad strategic plan. The *Climate Change Action Plan* had two clear objectives, which were consistent with LAPP objectives:

1. *'Continue to develop a comprehensive understanding of climate change consequences on natural hazards in Burnside'*, and
2. *'Using the* ***Australian Government climate change and risk management guide****, review the possible social, economic and environmental impacts of climate change on Burnside. Ensure there are planning or management responses in place to address the risks identified*.'
   (City of Burnside 2008:17)

The City of Burnside therefore capitalised on the opportunity to fulfil these objectives through a funded program. The Council was looking to the LAPP to gain more detail, rigor and validity for determining the sorts of actions they should be taking to address climate change. The Council staff hoped that information from the LAPP report could be used to communicate and validate the budgetary allocation of funds to implement climate change adaptation actions, to both the community and elected members.

City of Onkaparinga context:
The City of Onkaparinga is the most populous Local Government area in South Australia and is continuing to grow. As a large Council the City of Onkaparinga has considerable capacity but it is also responsible for a large area and a significant stretch of developed coast. The Council has a dedicated climate change response fund with an annual allocation of 1% of general rates revenue. The fund is for resourcing Council's adaptation and mitigation planning and actions. In 2007 the City of Onkaparinga commissioned the study *The Impact of Climate Change on the Coastal Lands of the City of Onkaparinga* (Caton 2007). This study identified priority coastal planning, protection and monitoring responses for adaptation to the impacts of climate change. At the time, the City of Onkaparinga was also running an internally developed series of climate change education sessions for their Elected Members. In 2008 the Council developed the *Onkaparinga Climate Change Strategy 2008 – 2013*

and appointed an independent Science Panel who assisted in the preparation of the strategy. The strategy identified a need for a climate change risk assessment to be undertaken and an agreed adaptation plan with priorities and a clear implementation schedule to be developed. Similar to the City of Burnside, the City of Onkaparinga used the opportunity that the LAPP funding presented, to complete an identified but under resourced task.

When the City of Onkaparinga applied for LAPP funding, they were comparatively a very mature Council both in regards to understanding and responding to climate change, and understanding and managing risk. There was, and continues to be, a strong drive from the City of Onkaparinga's elected members to create a sustainable future for their constituency, and they are therefore committed to responding to climate change.

City of Marion context:
In 2008 the City of Marion had recently improved their risk management procedures and developed an Enterprise-wide Risk Management Framework. Council staff across the organisation were therefore familiar with the language of risk management through development of work area risk registers and action plans. However, the risk review had not covered risks associated with climate change and a review of these risks had not been scheduled. The LAPP funding presented an unprompted opportunity for the Council staff to think about climate change from a risk management perspective, across the whole organisation. The City of Marion also saw LAPP as a good opportunity to obtain the best available locally specific information on climate change impacts.

There is a strong political commitment to sustainability at the City of Marion, which underpins Council's Strategic Plan. Specifically, Council has a clear strategic commitment to a healthy environment and in particular to an 'Active response to climate change' (HE1).

All three Councils undertook calls for tenders, and all three Councils independently chose AECOM. An important consideration for the City of Marion when selecting a consultancy was to have the consultants locally based. The City of Marion saw the irony of undertaking a local climate change assessment project by having interstate consultants flown in to conduct workshops.

AECOM selected as service provider:
The confidential nature of the tender process meant there was no opportunity for the Councils to unite and leverage AECOM, however a small reduction in fees was achieved following the tender process when the three Councils discovered that they had all selected the same consultant. It is hard to postulate the pros and cons of AECOM undertaking all three assessments. As AECOM submitted the most competitive tender in each case, it may be that all Councils achieved the best result possible.

In an external review of the LAPP process by Walter Turnbull a high degree of variability in the way consultants facilitated the LAPP process was found, including their approach to identifying climate change risks and developing adaptation strategies (DCCEE 2011:11).

However, all reports produced by AECOM are similar with some standard sections. One primary consultant worked on all three plans which compounded with the tight timeframe required by the DCCEE could be seen as a disadvantage and possibly led to the over standardisation of the three reports.

The process of facilitation by AECOM varied slightly for each of the Councils. Below is a list of the key project milestones for each Council with variances between Councils highlighted. The City of Onkaparinga requested a **briefing session** for the Climate Change Risk Assessment Workshop. This briefing session was designed collaboratively by the City of Onkaparinga and the consultancy to enable participants to think about the issues before being required to identify and rate the risks, and it highlighted gaps in knowledge. Similarly Onkaparinga also requested a Climate Change Adaptation **Discussion Paper** be provided before the Adaptation Workshop. This discussion paper was an early draft of Climate Change Adaptation Plan without Council inputs. The City of Burnside included a series of **Community focus groups** in their project. This additional element was specified in their application for funding and call for tenders.

All projects began early in 2009 and their time frames from first workshop to receiving the final report varied from 7 months (Marion) and 10 months (Burnside). AECOM used the *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO 2006) in accordance with the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009) as required. A keypoint to note: AECOM also developed Excel based visual tools that were used during the workshops to

indicate how final risk ratings were calculated. These tools were developed with the City of Marion who found them to be extremely useful and are intending to adapt the tools for future use.

For the Cities of Burnside and Marion the cost of the consultant was fully covered by the LAPP funding, however the City of Onkaparinga contributed funding from its climate change response fund, for the preparation of a local climate change scenario and additional staff engagement. Council staff resources were contributed in kind to the project. All Councils contributed an additional $2,000 each to have the Draft Climate Change Scenario Identification Report reviewed by the City of Onkaparinga Climate Change Strategy Science Panel.

Key Project Milestones	Burnside	Marion	Onkaparinga
Draft Climate Change Scenario Identification Report submitted to Council staff	✓	✓	✓
Briefing Session for Climate Change Risk Assessment Workshop			✓
Climate Change Risk Assessment Workshop a) Brainstorming of all climate change related risks to Council's operations grouped by climatic variable. b) Rating expected risk consequences and likelihoods under two time horizons: i. near term (2030 – 2050) ii. long term (2070 – 2100)	✓	✓	✓
Community Focus Groups	✓		
Review of Draft Climate Change Scenario Identification Report by City of Onkaparinga Climate Change Strategy, Science Panel	✓	✓	✓
Climate Change Scenario Identification Report submitted to Council staff	✓	✓	✓
Draft Climate Change Risk Assessment Report submitted to Council staff	✓	✓	✓
Summary of Existing Controls and Residual Risk Ratings complete by Council staff	✓	✓	
Climate Change Adaptation Discussion Paper submitted to the Council staff			✓
Climate Change Adaptation Workshop a) Revision and validation of key climate change risks. b) Listing of "existing controls". c) Review of adaptation actions proposed by AECOM.	✓	✓	✓
Climate Change Adaptation Plan submitted to the Council Note: Only includes risks with a residual rating of high or very high.	✓	✓	✓

Through the LAPP project, the City of Burnside sought to *'identify the social as well as the physical impacts on family lives, networks, movement, physical and mental wellbeing, finances and lifestyle'* (City of Burnside 2009:7). To identify these impacts their process included a series of focus groups with residents to identify and rate risks, and to identify adaptation options. Five focus groups were undertaken, each targeting a defined segment of the community: Baby Boomers, Families, New Residents, Older Persons, and Young People. Participants were recruited through a random recruitment process and invited to attend by market research firm Truscott Research and the focus groups were facilitated by Strategic Matters. When recruited, participants were not told that the focus group would be on climate change. There were approximately 12-15 participants in each of the focus groups.

The approach to these focus groups was interesting in that '*community members who attended the focus groups were not initially informed of current climate change views or science to ensure they were not influenced and the process would be independent*' (City of Burnside 2009a:7). The outcomes from the focus group were therefore not necessarily based on informed risk identification, but reflected current perceptions on climate change within the community. The City of Burnside decided to take this approach in order to both identify specific concerns within the community that might be used to leverage climate change adaptation actions, and to ensure that risks from a community perspective were identified and included in the risk assessment. Qualitative information from the focus groups was included in the risk assessment report in addition to the likelihood ratings attributed to key social impacts, identified by the participants.

The intended user for the reports in all three Councils was Council staff – the "risk owners". Of the three Councils only Onkaparinga has had the LAPP project reports formally adopted by their Elected Members. The Cities of Marion and Burnside's LAPP reports are not publically available. The City of Marion has used the LAPP reports internally to inform the formally adopted *Healthy Environment Plan 2010-2014*. Although Burnside have not yet updated their *Climate Change Action Plan* to reflect the findings in the LAPP reports this will be done in the normal scheduled review process for that plan. Many of the findings of the LAPP report are already generically discussed in the Burnside *Climate Chance Action Plan*. One reason that the reports had not been formally adopted at the City of Marion is that Elected Members did not participate in the process, and without their 'ownership' of the plan they would likely take considerable time to review and amend the documents. At the City of Onkaparinga the LAPP reports are located under the umbrella of the *Onkaparinga Climate Change Strategy 2008 – 2013.* The funded projects that are listed in the LAPP Climate Change Adaptation Plan are contained within the relevant business units business plan for implementation.

At all three of the Councils the workshops were attended by Council staff but not elected members. The City of Onkaparinga included a few key state agency representatives in their workshop. Other than the Climate Change Scenario Identification Report for Marion and Onkaparinga, there was no review of the documents by additional stakeholders.

The IPCC A1FI (high emissions) scenario was used to inform the projected climatic parameters for each of the three LAPP projects. This scenario was chosen because global emissions were and continue to be tracking above the rates used for the high emissions scenario. Both 2030-2050 and 2070-2100 timeframes were used in the risk assessments.

Each Council received the same *Climate Change Scenario Identification Report* [the Scenario]. Current climatic parameters for the Scenario were based on an average of data from four metropolitan Bureau of Meteorology [BoM] weather stations. Current and projected bushfire weather information was sourced from the study *Bushfire weather in southeast Australia: recent trends and projected climate change impacts* (Lucas *et al* 2007). The baseline for storm surge was the highest storm surge in Metropolitan Adelaide (1.4m) recorded at Port Adelaide in 1981. Baseline sea levels were obtained from the National Tidal Centre, Bureau of Meteorology *Australian baseline Sea Level Monitoring Project* (2007). The climate change scenario used for the study *The Impact of Climate Change on the Coastal Lands of the City of Onkaparinga* (Caton 2007) was reviewed in the preparation of the *Climate Change Scenario Identification Report* and was used by the City of Onkaparinga to inform the risk assessment.

Projected climatic parameters for both the 2030-2050 and 2070-2100 timeframes were sourced from the *Climate Change in Australia - Technical Report 2007* (CSIRO 2007). Sea level rise predictions were formed from three sources: *Climate Change in Australia – Technical Report 2007* (CSIRO 2007), *A semi-empirical approach to future sea-level rise* (Rahmstorf 2007), and *Climate Change under enhanced greenhouse conditions in South Australia* (Suppiah *et al* 2006). Storm surge predictions were sourced from *Estimating Sea-Level Extremes in a World of Uncertain Sea-Level Rise* (Hunter 2008). Information on predicted storm surge and sea level rise was not spatially mapped in the LAPP projects. Unfortunately for both the City of Marion and the City of Onkaparinga, the DCCEE commissioned study (available on OzCoasts website) of projected sea level rise and coastal inundation mapping for built up areas stops just short of the two constituencies and was therefore not available as an input.

3. IMPLEMENTATION METHODOLOGY

All three Councils acknowledged the benefit of using AS/NZS 4360:2004 (Now AS/NZS ISO 31000:2009) to undertake the assessment because it is a tried and tested methodology, it is adaptable to all organisational contexts, and many staff were already familiar with the standards. The three Councils also acknowledged that whilst they could have undertaken a risk assessment internally by following the process outlined in *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO 2006), the benefits of the LAPP process included an **independent perspective** from the consultant, **decreased pressure on internal resources**, and the commitments to propelling the project that the funding grant initiated.

The LAPP projects were in general stand-alone risk assessments. However the assessments were able to incorporate outputs from other tools where information was available, such as *The Impact of Climate Change on the Coastal Lands of the City of Onkaparinga* (Caton 2007). The overall strength of the assessments was in many ways dependent of the quality of the information inputs, and these inputs were predominately the knowledge and expertise of the Council staff who participated in the workshops and internal review processes.

The risk assessments were therefore based on informed and contextualised subjective perceptions (local knowledge).

At the City of Marion the main staff working on the project management were the Sustainability Planner (Ann Gibbons) and the Risk Manager. The project required both of these staff members to have a strong understanding of risk management. Approximately 30 staff were involved in the workshops and review processes. Finance staff were also involved in the processing and acquittal of the grant funds. It is estimated that the total in-kind staff costs at the City of Marion for the LAPP project was approximately $25,000. The City of Burnside estimated that the project management would have been at least 0.25FTE for a six month period. At the City of Onkaparinga the project staff was also estimated as being at least 0.25 FTE but for a ten month period. Approximately 30 staff where involved in the City of Onkaparinga's workshops and the review and approval process.

As mentioned in the list of key project milestones, the Councils received three formal report outputs:

1. Climate Change Scenario Identification Report
2. Climate Change Risk Assessment Report
3. Climate Change Adaptation Plan

The Climate Change Scenario Identification Reports described the best available projections for climate change impacts on the areas at a regional scale.

The Climate Change Risk Assessment Reports categorised risks by operational area and climatic variable, applied a risk consequence rating to each operational risk performance criteria, and rated the likelihood of the risk. This resulted in a single risk rating that is a function of the highest consequence rating multiplied by the risk likelihood value. The matrix below indicates risk ratings as used by the City of Burnside. Please note that the risk ratings applied to the various cells within the risk matrix varied between Councils and will be discussed later.

		Risk Consequence				
Risk Likelihood		Insignificant	Minor	Moderate	Major	Catastrophic
		1	2	3	4	5
Certain	5	5	10	15	20	25
Likely	4	4	8	12	16	20
Possible	3	3	6	9	12	15
Unlikely	2	2	4	6	8	10
Rare	1	1	2	3	4	5
		Key to Risks	Low	Medium	High	Extreme

Table 1: City of Burnside risk matrix.

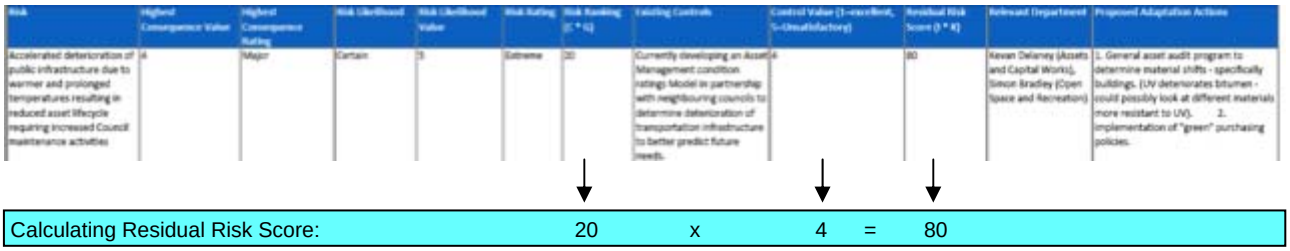
The Councils each prepared tables listing the parameters of what constituted an insignificant consequence as opposed to a minor consequence, what constituted certain likelihood as opposed to likely likelihood, and so forth. An example of the format of the listing of risks in the City of Burnside Climate Change Risk Assessment report is shown below. Also listed in the table below is the **sum** of the risk ratings which informed a **prioritisation** process proposed by Burnside as a way to sort risks within the high and extreme categories. All risks categorised in this Climate Change Risks Assessment were inherent risks. Existing controls and residual risks are included in the Climate Change Adaptation Plans.

2030 – 2050				Operational Risk Performance Criteria											
Tag	Risks	Operational Area	Climatic Variable	Financial	Environment	Health	Social	Legal	Political	Highest Consequence Rating	Risk Consequence	Sum of Ratings	Risk Likelihood	Risk Likelihood Value	Risk Rating
W1	Increased drying of vegetation and fuel loads due to reduced rainfall and drought resulting in increased litigation due to failure to clear	Council Administration	Drought & Reduced Rainfall	Moderate (3)	Insignificant (1)	Insignificant (1)	Insignificant (1)	Moderate (3)	Moderate (3)	3	Moderate	12	Possible	3	High (9)

Calculating Risk Ratings: 3 x 3 = 9

The Climate Change Risk Assessment reports also contained graphs that illustrated cumulative information on risks such as the percentage of cumulative (weighted) risk to the Council by climatic variable, the number and extremity of risks by climatic variable in the near term and the long term scenarios, and the cumulative (weighted) risk to Council by operational area.

The Climate Change Adaptation Plans contained all high and extreme risks. Existing controls for each risk were listed and a *control value* was applied to the *existing controls* in relation to the individual risk. These values ranged from 1 (excellent) to 5 (unsatisfactory). The *residual risk* was calculated by multiplying the risk rating by the control value. Residual risks were then ranked and proposed adaptation actions were listed. An example of the format of the listing of risks, existing controls and adaptation actions from the City of Burnside Climate Change Adaptation Plan is shown below.



Risk	Highest Consequence Value	Highest Consequence Rating	Risk Likelihood	Risk Likelihood Value	Risk Rating	Risk Ranking (C * L)	Existing Controls	Control Value (1=excellent, 5=Unsatisfactory)	Residual Risk Score (I * K)	Relevant Department	Proposed Adaptation Actions
Accelerated deterioration of public infrastructure due to warmer and prolonged temperatures resulting in reduced asset lifecycle requiring increased Council maintenance activities	4	Major	Certain	5	Extreme	20	Currently developing an Asset Management condition ratings Model in partnership with neighbouring councils to determine deterioration of transportation infrastructure to better predict future needs.	4	80	Kevan Delaney (Assets and Capital Works), Simon Bradley (Open Space and Recreation)	1. General asset audit program to determine material shifts - specifically buildings. (UV deteriorates bitumen - could possibly look at different materials more resistant to UV). 2. implementation of "green" purchasing policies.

Calculating Residual Risk Score:	20	x	4	=	80

The City of Onkaparinga had an unmistakable objective for a clear implementation schedule to be incorporated in the Climate Change Adaptation Plan. They provided the consultancy with their corporate template for implementation plans. This template differed to the template used by AECOM in that actions were assigned to a financial year period, as opposed to the allocation of a “timing” value (e.g. 2 years).

4. EVALUATING OUTCOMES

City of Burnside:
The City of Burnside staff believes that due to the additional information from the LAPP reports, they are in a better position to argue the case for budgetary allocations to climate change adaptation initiatives. However, to date this has not been reflected in actual budget allocations. The City of Burnside had a full change of elected members at the last Local Government elections. It appears that Elected Members have not yet had sufficient briefing for the LAPP reports to have a significant impact on Council priorities. Ultimately, how successfully the proposed climate change adaptation strategies compete with other priorities for staff resources and budgetary allocations, is up to the Elected Members.

The LAPP reports may be used more by the staff at the City of Burnside when they next update their strategic plan. Overall the LAPP project benefitted awareness raising and promoted systems thinking within the Council through the multi-departmental workshops.

For the City of Burnside the **most important feature** of the LAPP project was the **five community focus groups**. The Council feel that in going beyond the literature and the perceptions of Council staff, a more holistic understanding of the context and issues for their constituency was achieved. The outcomes of the LAPP project were felt to be good value for the staff resources expended.

The **primary lesson** learnt at the City of Burnside was that there is genuine concern within their community about climate change and that there are people who want to take adaptive and mitigative action. The City of Burnside feel that there is a role for Council to provide information to their community about climate change, as they are responsible for informing about natural hazards and there is both a demand and a need for this key information.

City of Marion:
The City of Marion found the adaptation action outputs to be useful, and many of the priority actions were incorporated into their *Healthy Environment Plan 2010 – 2014*. Actions were incorporated into the *Healthy Environment Plan* rather than having the *Climate Change Adaptation Plan* adopted by Council as a separate document in line with Council’s approach to integrated ‘joined-up’ planning.

The City of Marion is also currently working on incorporating the climate change risks identified, into their corporate risk register and the work area risk profiles. The LAPP reports have informed the Stormwater Management Plan currently in the last stages of development which the City of Marion is undertaking with neighbouring Council the City of Holdfast Bay. The City of Marion has also found the *Climate Change Scenario Identification Report* to be an important output, and it is continuing to be used as an input for a number of projects such as coastal planning at Hallett Cove.

The City of Marion also felt that the LAPP project was good value for staff resources expended. Although they found the LAPP reports useful and the information to some extent contributed to informed decision making, the most important element was the **process** of risk identification and prioritisation. The workshops supported risk based thinking and the acknowledgement and understanding of differing perspectives from the various departments. In this way the project also promoted internal collaboration between departments. Like the City of Burnside, Marion observed the importance of the information in the LAPP reports for enhancing its ability to develop cases for particular projects/directions.

Interestingly the City of Marion risk identification process was also enhanced by the heat wave that struck Adelaide in late January/early February 2009. The heatwave saw Adelaide endure 13 consecutive days with an average temperature of over 33°C, and within that span there were six consecutive days when the average temperature exceeded 40°C, and four consecutive days when the average temperature exceeded 43°C. During this period the City of Marion had undertaken some adaptive initiatives including: increasing the opening hours of the swimming centre, and providing bottled water at no cost at Council customer service centres. Both initiatives had budgetary implications and provided perfect examples for the Council staff in thinking about climate change adaptation actions.

City of Onkaparinga:
The City of Onkaparinga felt that, in the first two years following completion, the LAPP reports were useful and fulfilled their purpose, but that a time had been reached where new energy needed to be invested in utilising the documents. The Council found the risk assessment report good, but had to work extensively both internally and with the consultancy to bring the adaptation plan up to a standard where it could be adopted by Council. For the City of Onkaparinga the LAPP project was part of a suite of initiatives that were being undertaken through the *Onkaparinga Climate Change Strategy 2008 – 2013.* This suite of projects has enabled more informed decision-making at the Council. The areas in which the City of Onkaparinga found the LAPP reports most useful were in addressing the compounding impacts of climate change on built infrastructure and assets and recreation facilities and services. The City of Onkaparinga found both the process and the outputs of the LAPP project to be equally important. The process engaged staff in **two types of learning**: climate change and risk management. Of particular note, the process encouraged staff to **think about climate change as a compounding impact on existing issues**.

The project management staff had little difficulty in engaging relevant staff in the process **but found significant variance in the level of knowledge and skill across the organisation** with regards to climate change and risk management. The LAPP process therefore led to increased learning about climate change and risk management and assessment. On reflection, The City of Onkaparinga staff consider themselves fortunate that they have a large Council with significant capacity and a supportive Elected Members.

Ways to improve the LAPP tool and process in future applications:
Both the Cities of Marion and Burnside stated that the LAPP documents were finalised at that point in time and although they would be used as a reference they would not be revised or updated. The elements incorporated into other documents would be revised as part of the standard review process. In contrast, The City of Onkaparinga stated that at some point the documents would be revised to incorporate updated information. It was noted that the time required for this revision could have been significantly reduced if summary information had been provided in a spreadsheet format.

In comparison, the Local Government Association Mutual Liability Scheme [LGA MLS] undertook similar risk assessments based on the same tool, with South Australian Councils through the Climate Adaptation Plan [CAP] program. The information outputs from this program were provided both in a report and through a risk management program (Riskemap, Interplan or Excel based). The **advantage of these risk information systems is that updating information is a relatively simple process**. However, none of these three LAPP funded Councils have undertaken the LGA MLS CAP program. Staff from Onkaparinga and Burnside also participated in these meetings with LGA MLS staff to discuss undertaking the program but concluded that it

would be a duplication of the effort undertaken for the LAPP project. There was also concern that the duplication could potentially have led to confusion within the Councils.

All three Councils also agreed that there were **no land-use planning outcomes** from the LAPP reports. The City of Burnside stated that although the policy planners are aware of the findings of the report, the Council like Marion and Onkaparinga uses the Better Development Plan modules for consistency but will consider integrating additional information into these module templates. All three Councils also agreed that whilst the LAPP process was great for systems/cross structural thinking, **it did not encourage innovation or guarantee immediate adoption**.

It was felt that the risks that AECOM contributed were somewhat generic to the region and not specific to the individual Council's context. However it was also acknowledged that this is due to the regional nature of changes to climatic variables and the limited information available at a finer scale. There was also an issue with risks and actions being too high level, theoretical or abstruse. For this reason many suggested actions are not able to be easily implemented.

Critical success factors:

The three SA Councils observed the following critical success factors:

- ✓ Community involvement (Burnside);
- ✓ A productive relationship with the consultant (Burnside, Onkaparinga, Marion);
- ✓ Use of Federally endorsed tool (Onkaparinga);
- ✓ Alignment with Council's Risk Management and Strategic Planning frameworks and processes (Marion);
- ✓ Funding requirements and key milestones ensured momentum (Marion, Onkaparinga);
- ✓ A high level of rigor displayed by the Consultancy (Burnside); and
- ✓ Staff involvement from all departments (Burnside, Onkaparinga, Marion).

The main challenge identified by the Councils was the time pressure associated with LAPP and the propensity for this to impinge on stringent internal review processes. The complexity of the issues and the degree of internal consultation required to achieve an agreed outcome was significant. An increase in time allowance may have benefited the LAPP projects, and allowed staff to develop their skill in enunciating risks. The consultant worked with some individual departments at the City of Marion, between the two workshops, to complement the internal review process. This was considered highly beneficial given the time constraints. Likewise, the pre workshop briefing session at the City of Onkaparinga was also considered highly beneficial.

The staff at the City of Onkaparinga identified that there was **no LAPP facilitated collaboration** with other Councils undertaking LAPP projects to forge a *community of practice*. Towards the end of the projects the three Councils did have a couple of group meetings with AECOM, however Onkaparinga staff feel that **shared learning during the process** could have been very beneficial to all, and advocates for a web-based collaborative exchange to be facilitated for these types of programs.

The City of Burnside encountered a very important decision in the course of the LAPP project that significantly altered the nature of their *Climate Change Adaptation Plan*. The Council used their existing Council risk matrix for the risk assessment workshops. This is consistent with the concept that, where possible, the climate change risk assessment process should be aligned with the individual Council's existing risk management and strategic plan systems and categorisations. However, Local Government operates in a risk averse environment and this is reflected in the City of Burnside's categorisation of risk. Below are the City of Burnside risk matrix and the risk matrix suggested in the "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006).

As pointed out by AECOM, in the City of Burnside risk matrix the lowest consequence score can generate a 'high' risk rating and the lowest likelihood score can generate two 'high' risk ratings. Conversely, in the AGO recommended matrix a high-risk rating cannot be generated for any risk that has the lowest likelihood or the lowest consequence.

Likelihood:	Consequence:				
	Insignificant	Minor	Moderate	Major	Catastrophic
Certain	High	High	Extreme	Extreme	Extreme
Likely	Moderate	High	High	Extreme	Extreme
Possible	Low	Moderate	High	Extreme	Extreme
Unlikely	Low	Low	Moderate	High	Extreme
Rare	Low	Low	Moderate	High	High

Likelihood	Consequences				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Low	Medium

Table 1: City of Burnside risk matrix (City of Burnside 2008b)

In the *Climate Change Risk Assessment Report* AECOM chose to also present the risks using both the City of Burnside and the AGO risk matrix classifications. The table below adapted from the report indicates that, in using the AGO risk matrix as opposed to the City of Burnside risk matrix, the number of high and extreme risks were significantly reduced.

	Council risk matrix		AGO risk matrix	
	High	Extreme	High	Extreme
2030-2050	115	72	102	13
2070-2100	95	101	134	19

Table 3: Comparison of high and extreme risks by risk matrix (adapted from City of Burnside 2009a)

The implication of this difference is that the Council's Risk Management Framework specifies that high and extreme risks are unacceptable and require action plans to address them. From the consultancy's perspective the risk matrix used by the City of Burnside, because of its highly conservative nature, impeded the effective prioritisation of risks. There was also concern from AECOM that the large number of high and extreme risks identified (187 in the 2030-2050 timeframe and 196 in 2070-2100) would be unmanageable for the Council and could cause alarm from Elected Members.

Significant discussions with the consultancy, and within the Council, eventually resolved in the decision to continue with the use of the City of Burnside's risk matrix. Although this resulted in a substantially higher number of "unacceptable" risks that required adaptation actions, the Council felt that it could not operate in a manner contrary to its existing Risk Management Framework. AECOM strongly advises against the use of a highly cautious risk matrix for climate change risk identification.

There have been some criticisms of the reports generated in the LAPP projects regarding unclear definitions of risks and impacts, and unclear linkages between risks, likelihoods, impacts, existing controls and adaptation strategies (DCCEE 2011). The Cities of Marion and Onkaparinga stated that the level of skill available in risk management dictates the ability to achieve clarity in the use of risk language. As the LAPP projects were multi-departmental there were different levels of skill with regards to risk management. The Cities of Onkaparinga and Marion noted that on review of the report some areas were more complicated than necessary and there was repetition in the analysis.

Key learnings from AECOM perspective:

AECOM has undertaken a total of nine LAPP projects in five states and views the projects as a good first step in climate change risk assessment and adaptation planning. Key learnings provided by the lead consultant on the SA LAPP projects include:

- Most actions were too high level to be fully understood/costed - and some were *directions* rather than actions;
- Councils may find it hard to analyse the cost effectiveness of identified adaptation actions and a decision support tool is needed;
- There is no clarity on the timing or level of funding available for implementation of actions; and
- The scope of the LAPP projects may have been too broad.

5. FUTURE DIRECTIONS

Key recommendations provided by the Councils include:

- *"Definitely involve your community as a way of getting an understanding of how they perceive the issue. This will give you information on how you can best communicate back to the various demographics. Demographic segments obtain information differently and you may have to use a variety of communication channels."*
- *"Allow plenty of time to enable good engagement across the organisation"*
- *"Be clear in your initial brief, be clear in what you expect with regards to the project outputs, and do not accept the lowest common denominator from the consultancy. You will need to work with the consultancy to achieve the desired outputs."*
- *"Start with some base level climate change and risk management education for all staff who will be involved in the project. This will enhance capacity and give you an understanding of the levels of knowledge and skill."*
- *"Keep the description of risks simple."*

Implementing actions from the LAPP projects will take a considerable amount of time and all three Councils see LAPP as one step in a continuous process.

The next step for the City of Burnside is to endeavour to continue to implement actions identified in the LAPP reports via submissions for budgetary allocations.

The City of Marion is currently working on incorporating the identified climate change risks into their corporate risk register and the work area risk profiles. The Council hopes that this will increase ownership of the risks and the adaptation strategies.

As a direct result of the LAPP project the City of Onkaparinga has committed $100,000 from its Climate Change Response Fund to the following initiatives:

1. Establishing a city wide flood watch and early warning system in partnership with BoM;
2. Updating the Council's Recreation and Sporting Facilities and Services Strategy and Action Plan to include climate change adaptation actions; and
3. Updating the Councils sustainable building guidelines.

The City of Onkaparinga is also working through priority actions identified in the study *The Impact of Climate Change on the Coastal Lands of the City of Onkaparinga* (Caton 2007). The Council has partnered with the Department of Transport Energy and Infrastructure to prepare a high resolution digital elevation model of the Onkaparinga estuary as the first stage of an impacts and vulnerability assessment of the site.

Both the City of Marion and the City of Onkaparinga will use their LAPP reports to inform a regional project with the City of Holdfast Bay. This project, *Resilient South – the Southern Adelaide Region Integrated Vulnerability Assessment and Adaptation Plan*, is funded by the State and Commonwealth Natural Disaster Resilience Grant Schemes [NDRGS], the Sustainability and Climate Division of the South Australian Department of Premier and Cabinet, and the Local Government Areas involved. The project will lead to a regional sector agreement being developed under the provisions of the SA Climate Change and Emissions Reduction Act 2007. Additionally the Councils undertaking the *Resilient South* project will work in co-operation with the Western Adelaide Councils who have also received NDRGS funding, to develop a model template for regional adaptation planning under the Climate Change Adaptation Framework for South Australia (currently in draft form). The *Resilient South* project began in March 2011 and expected to be completed in December 2012. The project has three key stages:

Stage 1: Identify risks and issues
Stage 2: Assessing vulnerability

Stage 3: Agree on action

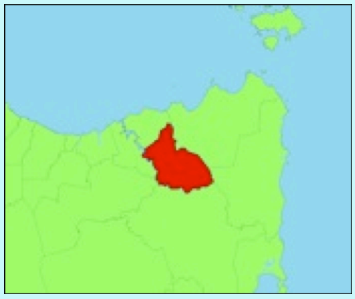
The project will take an integrated sectoral based approach and has identified the following sectors for inclusion: water resources, coastal management; biodiversity; community health and individual wellbeing, emergency management, energy and water, tourism, food and wine, infrastructure and urban areas, and manufacturing and services.

The project objectives are:

1. To improve hazard management and minimise risks associated with climate change impacts in the region;
2. To improve emergency response capabilities relevant to climate change impacts; and
3. To increase the region's understanding of climate change risks, vulnerability and adaptation responses.

Tasmania – Case Study 1

Launceston City Council: LAPP funded risk assessment



Council:	Launceston City Council
Web Address:	www.launceston.tas.gov.au/lcc/
Size:	1,405 km2
Population:	103,325
Classification:	Regional City
Program:	Local Adaptation Pathways Funding
Tools:	Climate Change Impacts and Risk Management: A Guide for Business (AGO 2006) Australian Standard AS4360 Risk Management
Function:	Risk assessment
Consultants:	GHD
Contact:	Jim Taylor Jim.Taylor@launceston.tas.gov.au (03) 6323 3006

1. OVERVIEW OF PURPOSE

The municipality of Launceston, located in the north of the Tasmania, encompasses a diverse range of land uses from urban, peri-urban, rural (agricultural and forestry) and natural areas, including the Tamar estuary and mountainous ranges. The city of Launceston itself is particularly exposed to the environmental impacts of flooding and poor air quality, due to its local topography and meteorology.

Launceston City Council's Climate Change Risk Assessment was funded under the Australian Government's Local Adaptation Pathways Program (LAPP). The project was delivered by the consultants GHD using a climate adaptation tool as per the funding requirements that it be based on *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO 2006), derived from AS Risk Management 4360:2004 (superseded by AS/NZS ISO 31000:2009).

The risk assessment project was delivered across the Council's activities and services with the exception of those associated with flood mitigation, as these have been addressed through a joint Commonwealth, State and Council funded new flood levee project.

2. ASSESSING THE TOOL

2.1 Drivers For Using The Tool

1. **Background/context:**

Located at the junction of three rivers, Launceston is vulnerable to flooding and experienced a significant flooding event in 1929 in which 4000 people were made homeless overnight.

During the cooler months Launceston experiences poor air quality due to a number of contributing factors, including the use of wood heaters. The city's steep topography, combined with cool temperatures and low wind speeds create inversions that trap air pollution within the valley and prevent dispersal.

The Council has been proactive in addressing these issues through the construction of levees to protect vulnerable areas from flooding, along with the introduction of a wood heater replacement program. Similarly the broader community has increasingly identified climate change as an issue and Council has been proactive in implementing climate mitigation and adaptation actions.

2. **Adaptation tool was taken up because?**

Council Climate Change Action:

In 2007, at a high point of climate action awareness in the broader community; a group of concerned Council employees formed an 'in-house' sustainability group. The group's aim was to

- progress issues such as climate change mitigation and adaptation across the council's activities, and
- raise staff awareness.

The group submitted a successful LAPP funding application in 2008 and the Council subsequently engaged a Sustainability Officer to coordinate, implement and deliver the resulting work, as well as addressing the identified actions that were outlined as climate/risk elements in the Council's Strategic Plan for 2008-2013. These actions required the Council to:

(i) Initiate Council and community action on climate change – principally through participation in the former Cities for Climate Protection Program; and

(ii) Facilitate enhanced flood protection for the Invermay and Inveresk Precinct**.**

Initially, the position of Sustainability Officer was a two-year contract; however it has subsequently been made permanent. A recent emphasis of the position has been to undertake mitigation works associated with 'energy retrofits' of key Council assets.

The Climate Risk Assessment Project:

Under the Local Adaptation Pathway Program the adaptation tool and the overall project were based on the prescribed requirements of the LAPP funding agreement that the methods be consistent with the *Climate Change Impacts and Risk Management: A Guide for Business (AGO 2006).*

3. **Operational level task(s): decision support, corporate planning, strategic planning, compliance and risk, stakeholder engagement, community education, other sectoral responsibilities.**

GHD were engaged as the preferred providers (identified by the Australian Government) to deliver the project across the Council. The Sustainability Officer, along with the Project Reference Group, was responsible for liaison with the consultants and coordination of the project's implementation.

The overall project was delivered in three stages: context setting; risk analysis; and adaptation. To date the first two stages have been completed, however the final stage of the Adaptation Plan has not been reported to the council and effectively remains a 'shelved' report.

Context setting:

The initial phase of the project set the overall context for the risk assessment and adaptation planning phases. It was based on a brief that was prepared by the consultant and accepted by the Adaptation Project Reference Group.

4. Which priority issues, key needs or gaps did/does the tool address?

The brief was informed by contextual information provided by the Council and sought to identify a 'preferred position' in relation to risk assessment. This work covered:

- future scenarios,
- timeframes,
- variables,
- scope and evaluation framework.

Following this a contextual adaptation workshop was conducted and attended by nominated representatives from across the council's business areas. The workshop itself covered:

- Climate future scenarios based on IPCC and CSIRO modelling;
- Contextual information requested from the council including demographics, governance and structure;
- An overview of the risk assessment methodology including time frames, stakeholders, scope and evaluation framework.

The outputs derived from the context-setting workshop formed the basis for a separate risk assessment workshop that sought to identify, analyse, evaluate and address risks related to climate change.

Risk Assessment:

The second phase of the project, the risk assessment, was based on the consequence and likelihood criteria defined in the AGO 2006 documentation. The aim of this phase was to identify the Council's activities and assets at risk of climate impacts.

5. Involvement within council

The risk assessment itself was conducted through a workshop facilitated by GHD climate and risk personnel, with nominated representatives from across the council. It was an effort to recruit staff to the workshop – nevertheless it was attended by a cross-section of the council and included the General Manager.

6. Sources of baseline information

Climate variables considered in the workshop included sea level rise, increased temperature and extreme weather events (flooding and high winds). These were derived from CSIRO and Department of Climate Change scenarios, and were typically broad regional projections. It was acknowledged by GHD that more detailed scenarios were likely to become available in the future.

During the workshop the participants elected to adopt the *AGO Consequence and Scale of Success Criteria* rating descriptors, as these were considered to provide more detail to assist in identifying appropriate consequence levels.

2.2 IMPLEMENTATION METHODOLOGY

1. Requires expertise of service provider/consultant to obtain optimum effectiveness?

Consultants were used for the project delivery and facilitation of the council workshops.

2. A stand-alone tool – or used in conjunction with other tools?

The risk assessment workshop was conducted using the prescribed methodology for LAPP funding approval as defined in the AGO Guide. The risk framework utilised was based on the consequence and likelihood criteria defined in the AGO documentation.

The climate variables considered in the workshop included sea level rise, increased temperature and extreme weather events (flooding, high winds). The level of risk for each risk scenario was analysed for 2009, 2030

(without any additional controls), 2070 (without any additional controls) and for 2030 with the implementation of potential adaptation controls, classified as "Residual".

3. **Staff resources and training required to operate successfully?**
The position of a Sustainability Officer was created within Council in order to coordinate and deliver the project. Other staff members from across council were then involved in the workshops. There was no formal training provided to workshop participants prior to them taking part, however it is worth noting that a lack of formal training in relation to the workshop topics had a potentially large influence on the outcomes of the project and its perceived usefulness

2.3 EVALUATING OUTCOMES

1. **Outcomes and results achieved**
In total 365 risks were identified, with 27 of these analysed for their **level** of risk. The four highest levels of risk identified were

- Salt water inundation and intrusion into parklands/open space;
- Increased temperature impacts on local flora and fauna;
- Impact of a price of carbon on increasing energy (electricity) costs, resulting in an increase in the use of wood heaters and reduction of local air quality;
- Extreme weather and road traffic accidents.

2. **Critical success factors?**
Whilst the use of council employees to identify climate change risks in a workshop situation provides a vital local context, this element also constitutes a potential weakness in the project approach, as it was determined that local knowledge will not always comprise the necessary expertise required to identify and assess risks.

3. **Challenges/barriers encountered in using the tool?**
The expertise and knowledge base of the workshop participants is critical to the success of outputs and identification of risks. Given the complexity and technical nature of climate change issues, sufficient technical expertise and resources don't necessarily exist within Launceston council to enable staff to effectively undertake in-house and stand-alone adaptation planning.

4. **Adaptive learnings: what key lessons have you learned?**
A critique of the project reveals that, whilst the overall methodology pertaining specifically to the AGO 2006 risk management Guide is sound, Launceston Council participants did not have the capacity nor the expertise to make technical and rigorous assessments that reflected true levels of climate vulnerability and risk. This is largely due to the 'chasm' that exists in terms of the scientific understanding of climate change and the necessary technical knowledge to interpret the risk to Council's activities and assets.

5. **Can you suggest one or more key improvement(s) to the tool's design or application, to pass on to the designers or other users?**
Ultimately, it is considered that the outputs of this workshop were based on the knowledge of participants. As a group they decided which areas were sensitive to climate change impacts and then used their own judgement in deciding whether those impacts presented a significant source of risk to specific Council activities and assets. As a consequence, it is considered that the workshop outcomes reflect the actual group of participants' perspectives, rather than 'realistically' determined climate risks. In all likelihood, a different group of participants would generate a different set of risks.

3. FUTURE DIRECTIONS

1. **Recommendations**: **What would you say about the tool to peers, neighbouring councils, professional associations, workshops and conferences etc?**
Overall it is considered that the risk assessment and associated Adaptation Plan are of a high level based on broad regional data and represent a 'first pass' at risk assessment. The Adaptation Plan has not been presented to the Council, as the project officers did not have confidence that it properly reflected the 'true' climate vulnerabilities and sensitivities. In effect it has not been implemented at all across the Council.

2. **Next steps?**

Currently there are no formal plans to review or implement the Adaptation Plan at this point in time due to a lack of confidence in the robustness of the risks identified. However, a new approach being considered is to engage suitably qualified expertise to undertake detailed and rigorous assessments of the top 5 identified risks across the council and develop adaptation plans for those.

In terms of the 'AGO tool' there is not confidence within the Council that it would be able to effectively implement it, due to the lack of understanding of weightings used by the consultant.

Local Government Association Tasmania

NCCARF
National Climate Change Adaptation Research Facility
Adaptation Research Network
SETTLEMENTS AND INFRASTRUCTURE

Tasmania – Case Study 2

Devonport City Council and Cradle Coast Authority: coastal and regional risk assessments and adaptation action plans

Council:	Devonport City Council as part of the Cradle Coast Authority
Web Address:	www.dcc.tas.gov.au/
Size & Pop:	Cradle Coast region: 22 492 km2, 112,000 residents Devonport municipality: 116 km 2, approx 26,000 residents
Classification:	Coastal/Regional
Program:	Cradle Coast Authority: Regional Risk Assessment and Adaptation Actions Plans Impacts of climate change on the Regions Councils
Tools:	Climate Change Impacts and Risk Management: A Guide for Business (AGO 2006) Australian Standard AS4360 Risk Management
Function:	Regional and Council Climate Risk Assessment
Consultants:	Climate Risk Pty Ltd
Contact:	Carol Bryant CBryant@devonport.tas.gov.au (03) 6424 0544
Rating:	2 out of 5 stars

1. OVERVIEW OF PURPOSE

In 2008 the Cradle Coast Authority (CCA), representing its nine member councils[1], received Australian Government 'Local Adaptation Pathways Program' (LAPP) funding to develop a regional (risk assessment) overview, along with individual council adaptation plans.

The LAPP Funding requirements prescribed that the climate change adaptation tool be based on the "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006), thus complying with Australian Standard AS4360 for Risk Management (now AS/NZ ISA 31000:2009).

[1] The Cradle Coast region is situated on the North West and West Coast of Tasmania and comprises the nine local Government areas of Latrobe, Devonport City, Kentish, Central Coast, Burnie City, Waratah-Wynyard, West Coast, Circular Head and King Island Councils. The region covers an area of 22 492 km2, which is approximately one third of the total area of Tasmania.

To deliver the initiative, the CCA engaged a Climate Change Project Officer. A high level steering committee was established, with representation provided from each of the nine councils, to oversee and ensure broad involvement and overall implementation of the project. Climate Risk Pty Ltd was engaged by the project to facilitate the Council Adaptation Workshops and provide technical expertise and advice regarding the initiative.

This report has been prepared, based upon Devonport City Council's experience with the project. It is anticipated that Devonport's experience was similar to that of the other councils in the CCA.

2. ASSESSING THE TOOL

1. Background/context: drivers for council taking action; project aims and scope, time frame for applying the tool, etc.

The CCA develops and coordinates regional projects through grants and the like to benefit and further the interests of the region and the individual councils. It prepared and submitted the successful LAPP Funding application to assist councils in the integration of climate risk considerations into their broader decision making processes.

Prior to this work, there was no regional driver and only a limited capacity within the CCA and its nine member Councils to undertake climate mitigation and/or adaptation action, as typically the Councils in this region are comprised of small populations across large geographical areas.

Independently, the Devonport City Council had identified the need for climate action and had focussed its efforts on participating in the Cities for Climate Protection Program. Unfortunately, the cessation of this program prior to their commencement in it saw the Council lose momentum on the issue. The Climate Adaptation Project provided Councils with a good new opportunity to 'reboot' and progress climate change adaption actions within the region.

2. Adaptation tool was taken up because?

The CCA drove the adoption and delivery (in conjunction with Climate Risk) of the adaptation tool and risk assessment process. As a LAPP project, the tool was required to be consistent with the Climate Change Impacts and Risk Management: A Guide for Business (AGO 2006), derived from the Australian Risk Management Standard AS4360:2004 (superseded by AS/NZ ISA 31000:2009).

Devonport's participation was based principally on its membership of the CCA. The Council indicated that there was an overall impression that there was little opportunity for the councils to have input into the tool selection, at the operational level.

3. Operational level task(s): decision support, corporate planning, strategic planning, compliance and risk, stakeholder engagement, community education, other sectoral responsibilities.

The purpose of the Risk Assessment and Adaptation Action Plan was to identify what risks are of concern to the Cradle Coast region and its councils and then to provide solutions for each identified risk.

Individual Risk Assessment and Evaluation workshops were held with each of the nine councils. Background materials were distributed prior to the workshops and General Managers were asked to identify primary contacts and nominated representatives were sought from at least each Division. Elected representatives were also invited to attend the workshops. Through the Adaptation Workshops an overview of the current science, regional scenarios, political and liability landscapes were presented. The workshops emphasised the need for action and set out a time frame encompassing the period up to 2030.

Devonport's climate adaptation workshop was attended by eleven council officers, of varying roles and levels of responsibility, representing the Council's corporate divisions. The overall framework set up to facilitate participation in the project, comprising the project officer and the representative steering committee, was sound. However the capacity of participating councils was limited due to human resource issues. This resulted in attendance being determined either on the basis of an interest or availability on the day, rather than a tactical process aimed at yielding the most robust outcomes for the project.

4. Which priority issues, key needs or gaps did/does the tool address?

Typically the impression of the council officers who are to implement the adaptation plans was that the priority issues, key needs and identified gaps were largely based on the experiences and perspectives of those individuals who were able to be present on the day of the workshop. A different group of participants could have produced a different suite of risks and actions, based on their limited expertise and professional experiences. This is in large part due to the fact that there is a poor level of understanding of the data and limited abilities among the participants to interpret the technical climate information provided.

It is noted that the adaptation plan's recommendations include the need for assistance in choosing the appropriate direction, and resources for implementation of adaptive and mitigation actions.

5. User(s) within council (internal) and stakeholders/community (external)

Following Devonport's participation in the Regional Adaptation Project, it underwent a restructure and the positions responsible for climate change action were made redundant. This, compounded with the cessation of the Cities for Climate Protection Program and a 'cooling' of community support for climate action, resulted in a 'lull' in the Council's climate actions. Only recently, responsibility for the Climate Adaptation Plan was transferred to the Council's Community Development section.

It is also noteworthy that the CCA no longer maintains a climate change officer position due to resourcing issues, however it does retain climate action in its strategic plan. The CCA had positioned the role to deliver the Home Energy Savings Scheme to households across the region through the provision of Household Sustainability Assessments via trained assessors under the Australian Government's Green Loans Program. It was structured to generate an income for the CCA, thus enabling it to maintain its climate function. However, the cancellation of that program saw the discontinuation, again, of the CCA's Climate Change role.

6. Partners/stakeholders e.g. neighbouring councils, ROC, CSIRO, ICLEI, university, govt agency

Partners in the tool where the nine member councils of the CCA: Latrobe, Devonport City, Kentish, Central Coast, Burnie City, Waratah-Wynyard, West Coast, Circular Head and King Island Councils. These councils are geographically situated in the North Western area of Tasmania.

7. Sources of baseline information e.g. CSIRO/BoM State of Climate 2010 projections or snapshots, Geoscience Australia

Whilst a variety of sources of information/data were used within the project to develop scenarios, principally it was based on the CSIRO climate models.

2.2 IMPLEMENTATION METHODOLOGY

Challenges and barriers:

To date the Adaptation Action Plan has been presented to Devonport Council but has not been implemented across the Council. This is due in part to:

(i) structural change within the Council that resulted in the unit responsible for its implementation being made redundant (as described above); and

(ii) a lack of certainty and overall confidence by Council officers responsible for implementation that the risks and vulnerabilities identified by the workshops were sufficiently robust and credible. Overall, the workshop participants had a poor understanding of the risk and adaptation data and lacked the technical expertise to undertake the detailed assessments required. As a result of these findings, it is thought that many actual and potential risks were missed.

There is overall consideration that the actual risk management tool, based on the Australian Standard, is a sound and useful tool; however there is an information chasm and Council officers do not have the necessary technical expertise to interpret the data in terms of the proposed risk.

It is also noted that the CCA no longer has the resources (i.e. a Project Officer) to drive and support councils to implement their Climate Adaptation Action Plans.

3. FUTURE DIRECTIONS

1. **Recommendations**: **What would you say about the tool to peers, neighbouring councils, professional associations, workshops and conferences etc?**

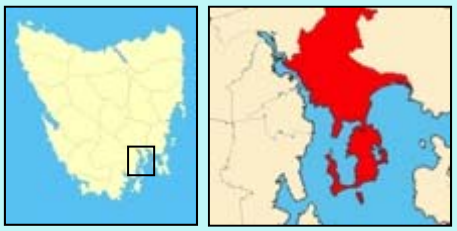
Devonport is considering reviewing its Climate Adaptation Action Plan. The review will include the establishment of a working group that includes both the Council and relevant stakeholders, along with the necessary technical expertise.

Local Government Association of South Australia

NCCARF National Climate Change Adaptation Research Facility
Adaptation Research Network
SETTLEMENTS AND INFRASTRUCTURE

Tasmania – Case Study 3

City of Clarence: comprehensive coastal vulnerability study of climate change impacts & adaptive responses - integrated spatial mapping, assessments of social & economic impacts, cost-benefit analyses and risk communication strategies



Council:	Clarence City Council
Web Address:	www.ccc.tas.gov.au
Size:	386 km²
Population:	52,140
Category:	Peri Urban/Coastal
Project:	Integrated Assessment of Climate Change Impacts & Adaptive Responses on Clarence Coasts
Tool:	Tailored integrated assessment utilising spatial mapping, damage and adaptation costing estimates, community survey, stakeholder interviews, and a communication strategy.
Consultants:	SGS Economics and Planning, Water Research Laboratory [WRL] UNSW, and Myriad Research.
Function:	Coastal Vulnerability Assessment/ Risk Communication/ Adaptation Options Assessment
Contact:	Phil Watson pwatson@ccc.tas.gov.au (03) 62 45 8619

1. OVERVIEW OF THE PURPOSE

In 2007 the City of Clarence received partial funding for a comprehensive coastal vulnerability assessment from the Integrated Assessment of Human Settlements Sub-program of the Australian Greenhouse Office (now DCCEE) Climate Change Adaptation Program, and from the Tasmanian Risk Mitigation Fund through the State Emergency Service. The *Integrated Assessment of Climate Change Impacts & Adaptive Responses on Clarence Coasts* [Clarence Integrated Assessment] consisted of three phases:

1. Social and Economic Risk Assessment and Stage 1 of the Communications Strategy,
2. Scientific/Technical Risk Assessment, and
3. Integrated Assessment and Stage 2 of the Communications Strategy.

The purpose of the project was to begin the process of selecting and implementing appropriate, effective and supported adaptation strategies for priority areas of coastal vulnerability. This project is unique in its

integrated approach incorporating community preferences and risk communication, and its objective to avoid sterilising development in coastal areas.

2. DRIVERS FOR USING THE TOOL

The City of Clarence has 191km of coastline and a long history of beach erosion (as pictured below). With a large number of residents living in close proximity to the coast, beach loss and flooding events were of increasing concern to the community, both with regards to private property and recreational amenity. Since 1992, numerous investigations of coastal erosion in Clarence have been undertaken. However only the *Indicative Mapping of Tasmanian Coastal Vulnerability to Climate Change and Sea Level Rise* project (Sharples 2006) explored how climate change might impact on existing erosion issues. This report identified vulnerable areas within the City of Clarence including Roches Beach as a priority area, and concluded that further research was required.

Image 1: Wind and wave erosion, soft rock, Rokeby Beach 2010

Image 2: Erosion on the end of a rock wall, Roches Beach 2010

The Clarence Integrated Assessment began in mid 2007 as one of five climate change impact assessments funded through the (then) AGO Climate Change Adaptation Program: Integrated Assessment of Human Settlements Sub-program.

Approximately $130,000 was awarded in grants from the AGO and the Tasmanian Risk Mitigation Fund for the Clarence Integrated Assessment, and Council contributed approximately $300,000 (Communication Strategy implementation, LIDAR etc) and a further $200,000 in-kind (mainly staff time). It is likely that a similar integrated assessment if undertaken nowadays would cost less than this because established frameworks can now be utilised and LIDAR data is more freely available.

Given the complexity of the study, project briefs developed by specialists were required. The Water Research Laboratory [WRL] from the University of New South Wales [UNSW] was awarded the tender to develop the scientific/technical component project brief, whilst Dr. Melissa Nursey-Bray was contracted to produce the project brief for the social and economic component. Following a tender process for both projects, SGS Economics and Planning was selected to undertake the Social and Economic Risk Assessment, the Communications Strategy and the Integrated Assessment Report; and WRL was selected for the scientific/technical component.

Both a Steering Committee and a Technical Reference Group oversaw the project. The Steering Committee included Council representatives, SGS Economics and Planning, WRL, AGO, the Local Government Association of Tasmania [LGAT] and the Tasmanian Government (Department of Environment, Department of Primary Industry and Water, and State Emergency Service). The Technical Reference Panel consisted of Dr. Mark Hemer, Centre for Australian Weather and Climate Research (CSIRO and BoM Initiative); John Hunter,

Antarctic Climate and Ecosystems Cooperative Research Centre; Chris Sharples, the principle investigator on the Australian Coastal Geomorphic and Stability Mapping Project (SMARTLINE); and Alasdair Wells, Tasmanian Government Department of Primary Industry and Water. In addition to the panel, Dr. John Church (IPCC member) and Prof. Ron Cox (UNSW) peer reviewed key aspects of the project methodology and outputs. The purpose of incorporating a technical reference panel was to ensure the integrity and robustness of the research and to build community confidence in the project.

2.1 Phase 1: Social and Economic Risk Assessment and Communication Strategy Stage 1

Consultant Report: *Socioeconomic Assessment and Response for Climate Change Impacts on Clarence Foreshores* **-** SGS Economics & Planning, with Myriad Research

The Social and Economic Risk Assessment investigated social, cost-benefit and institutional factors. It included an extensive literature review, stakeholder analysis and community consultation via focus groups and interviews which then informed questions for a phone survey. Stakeholders included representatives from the real estate, planning, legal and insurance sectors. The focus group and phone survey participants were segmented by the proximity of their home to the coast, distinguishing those members of the community who may be more affected from those who may be less affected. The phone survey obtained responses from 150 coastal residents and 150 non-coastal residents. Approximately 20 local business owners in Clarence coastal areas were also surveyed. Through the community consultation initiatives, the Social and Economic Risk Assessment clarified community attitudes on Clarence coastal areas, climate change, localised climate change coastal impacts, acceptable adaptation responses, the role of the Council and other stakeholders in responding, and the most effective methods for communicating information. The Social and Economic Risk Assessment was used to design the Communications Strategy. A key output of the Social and Economic Risk Assessment was the communities preferred policy options as can be seen in table 1 below.

Rank	Type	Measure	Yes %	No %
1	Mitig.	Take further action to reduce the rate of sea level rise by attempting to cut greenhouse gas emissions	94	2
2	I	Publish and promote maps etc. showing areas at risk from storm surges and flooding	91	3
3/4/5	A	Set up warning systems to alert residents about potential storm and flood events, including evacuation plans	87	5
3/4/5	P	Put shoreline protection in vulnerable areas	86	6
3/4/5	A	Introduce additional planning controls to protect property from the effects of storm surges and flooding	87	8
6	R	Limit housing development in areas at risk from sea level rise	81	8
7	A / R	Make development in risk areas at the owner's risk – with limited community liability	57	29
8	A	Compensate house owners for property damage or loss due to sea level rise	47	26
9	Anti-R	Continue to develop services, such as roads, water, sewage, in areas that are at risk	48	34
10	R	Remove existing housing in high risk areas	37	38
11	A	Compensate house owners for property depreciation due to being located in defined risk areas	35	38

I – Inform, **A** – Accommodate, **P** – Protect, **R** – Retreat (all are adaptation measures)

Table 1: Preferred Policy Options (SGS 2007).

2.2 Phase 2: Scientific/Technical Risk Assessment

Final Report: *Coastal processes, coastal hazards, climate change and adaptive responses for preparation of a coastal management strategy for Clarence City Council, Tasmania* - Water Research Laboratory [WRL], UNSW

The Scientific/Technical Risk Assessment modelled impacts using five sea level rise scenarios: mid range scenarios of 20cm by 2050 and 50cm by 2100, high range scenarios of 30cm by 2050 and 90cm by 2100, and a present day scenario. Hazards were considered using a 100 year Average Recurrence Interval [ARI]/1% Annual Exceedance Probability [AEP] events, in line with current Australian flood planning design guidelines. The report noted that these guidelines are potentially too low. In the Netherlands an ARI of 10,000 years is used for coastal protection structures and in the USA the National Flood Insurance Program found that historically approximately one third of paid insurance claims have been for flood damage occurring above the 100 year ARI flood level. Using the high scenario for 2100 the scientific/technical risk assessment indicated that a present 10,000 year ARI event will be a 1 year ARI event by the year 2100.

The assessment considered various coastal processes (astronomical tides; tidal anomalies through barometric setup, wind setup, and coastally trapped waves; ocean swell waves; local wind waves; wave setup; wave run-up and overtopping; longshore sand transport; and on-shore off-shore sand transport) and various coastal hazards (beach erosion and dune stability; shoreline recession /long-term change due to waves or sediment budget; beach rotation; unstable creek or lake entrances; wind-blown sand; coastal inundation; stormwater erosion; climate change including sea level, changes to waves, wind and rainfall; and seawater ingress into groundwater table causing displacement of fresh water).

2.2.1 Scientific/Technical Outputs

Key outputs from the Scientific/Technical Risk Assessment were an estimation of risks due to coastal erosion, recession and inundation. These risks were expressed in spatial maps, number of house/buildings at risk and the potential improved value of houses/buildings at risk. Another key output was the estimation of costs for protection strategies which informed a cost benefit analysis of protecting the houses/buildings at risk. It is noted that the risk estimates indicate the order of magnitude of the issue and should not be used for decision making at an individual house level.

The in-depth scientific analysis and modelling was first applied using existing 2m contours and the results were released in an Interim Scientific Vulnerability Assessment report. At this stage it was considered likely that higher resolution LIDAR data would become accessible in the foreseeable future. Within a nine month period 0.25m vertical and 0.4-1m horizontal LIDAR data had been acquired and the refined Final Scientific Vulnerability Assessment report - *Coastal processes, coastal hazards, climate change and adaptive responses for preparation of a coastal management strategy for Clarence City Council, Tasmania,* was released for public comment. Images 3 and 4 below are spatial maps from the *Final Scientific Vulnerability Assessment* report. These maps show respectively areas of potential risk due to coastal erosion/recession, and due to coastal inundation. An example of the number of house/buildings at risk and potential improved value of houses/buildings at risk in each location is also shown below.

	Present	2050 mid SLR	2050 high SLR	2100 mid SLR	2100 high SLR
Bellerive*	2	5	5	6	12
Howrah and Little Howrah Beach*	10	11	11	18	27
Seven Mile Beach west	1	1	2	3	11
Roches Beach, Lauderdale	19	108	108	125	195
Mays Beach	2	4	4	4	8
Cremorne (Ocean) Beach	9	36	38	44	53
Clifton (Ocean) Beach, west	3	7	7	10	12
South Arm Beach – Halfmoon Bay	9	13	18	23	43
Glenvar Beach	*0	*0	*0	*0	*0
Opossum Bay	*0	*0	*0	*0	*0
TOTAL NUMBER	55	185	193	233	361
POTENTIAL IMPROVED VALUE ($M)	28	93	97	117	181

Table 2: Indicative House/Buildings at Risk due to Coastal Erosion and Recession (WRL 2008:ES.3)

Image 3: Spatial mapping of erosion and recession hazard lines.

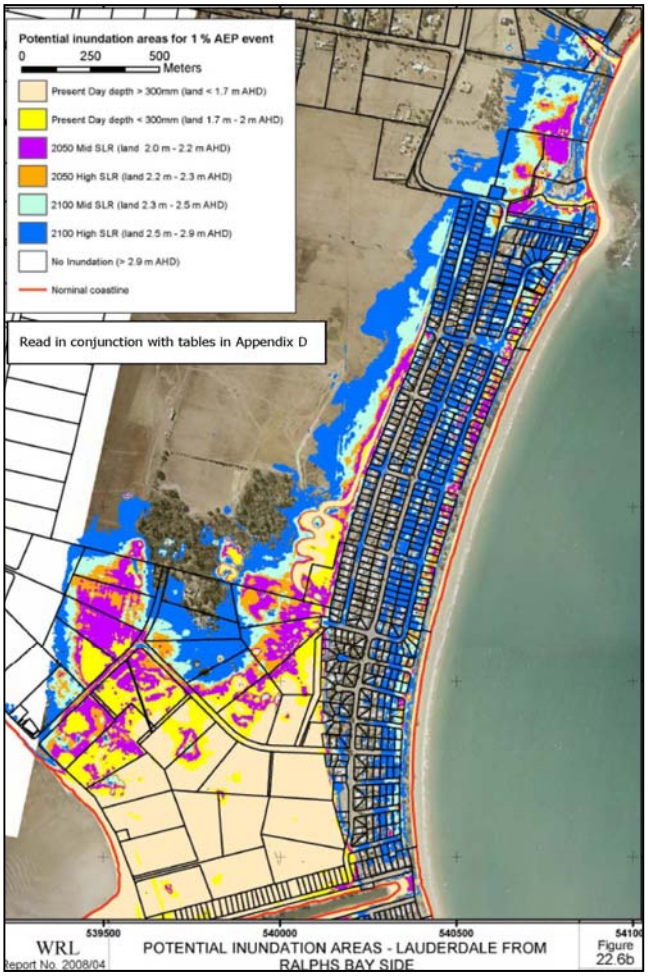


Image 4: Spatial mapping of potential inundation areas.

2.2.1 Initial Planning Scheme Response to the Scientific Report

Following the scientific/technical report, a planning scheme amendment was initiated to include a *Sea level Rise and Storm Surge* overlay to cover the mapping of the entire Clarence coast. This overlay was informed by the *Indicative Mapping of Tasmanian Coastal Vulnerability to Climate Change and Sea Level Rise* project (Sharples 2006).

2.3 Phase 3: Integrated Assessment Report and Communication Strategy Stage 2

Final Report: Integrated Assessment of Climate Change Impacts & Adaptive Responses on Clarence Coasts - SGS Economics and Planning

The Integrated Assessment Report included a synthesis of Phase 1 and 2, and proposed next steps - including further Planning Scheme amendments. In additional to *Sea Level Rise and Storm Surge* overlay the proposed Planning Scheme Amendments included:

- amendment of the "Subject to Inundation" overlay to include coastal inundation; and
- a new "Coastal Erosion" overlay.

In the hazard zones for the three overlays, any development applications will be considered as "discretionary" and will trigger the need for a performance based risk assessment at a property level by a coastal engineer at the applicant's cost. The applicant is required to demonstrate acceptable levels of risk over the life of the

project via design and certification mechanisms. The applicant is also required to demonstrate appropriate floor heights, technical feasibility, public access to the coast, and that the development will not impact on natural coastal processes or neighbouring assets.

2.3.1 Project Release

The draft Integrated Assessment Report was released at a well attended Press Conference and launched concurrently on Council's website together with a list of frequently asked questions [FAQs]. Council's Information Release Protocol was implemented to manage media and public perceptions. A special edition of the Council Newsletter focused on the project and a personal letter was sent to all residents in vulnerable areas inviting their comments and attendance at the public meetings. Approximately 300 people attended the public meetings and thanked Council for the initiative and the way in which it was presented. Questions about the draft Integrated Assessment Report predominately related to specific effects on individual properties.

The community consultation results were presented in a consultation report and incorporated into the Final Integrated Assessment report which was released as the key output of the project.

2.3.2 Key Messages communicated to stakeholders and residents

The Clarence City Council special edition newsletter *Climate Change Impacts on Clarence Coastal Areas: Sea Level Rise* (2009) communicated key issues from the Integrated Assessment Report. Council was very forthright and addressed areas of concern such as property values, Council's statutory obligations, issues for existing owners and issues regarding development applications. In this newsletter the Council stipulates that whilst a program of adaptation initiatives will be undertaken subject to funding over the next 25 years, after 2034 *coastal property owners will be expected to bear more of the cost burden*. The newsletter can be accessed via http://www.ccc.tas.gov.au/webdata/resources/files/CCC_News_Special_Edition-FINAL.pdf

3. IMPLEMENTATION METHODOLOGY

The project scientific outputs can be used by Council staff involved in the process, however those not directly involved in the project may require assistance from the consultants to understand the science. Six Council staff were primarily involved with the project and their combined time is estimated at 0.3FTE for the three year period.

3.1 Conceptual framework for an integrated risk assessment

To enable a targeted approach towards generating project outputs the concept of "licences" was coined. In this conceptualisation, Council staff saw a need for four "licences" to be obtained to achieve validity in the project:

1. Technical
2. Community/Social
3. Staff/Elected Council representatives
4. Legal

The formative diagram overleaf indicates the ways in which the Clarence Integrated Assessment project sought validity in the four areas.

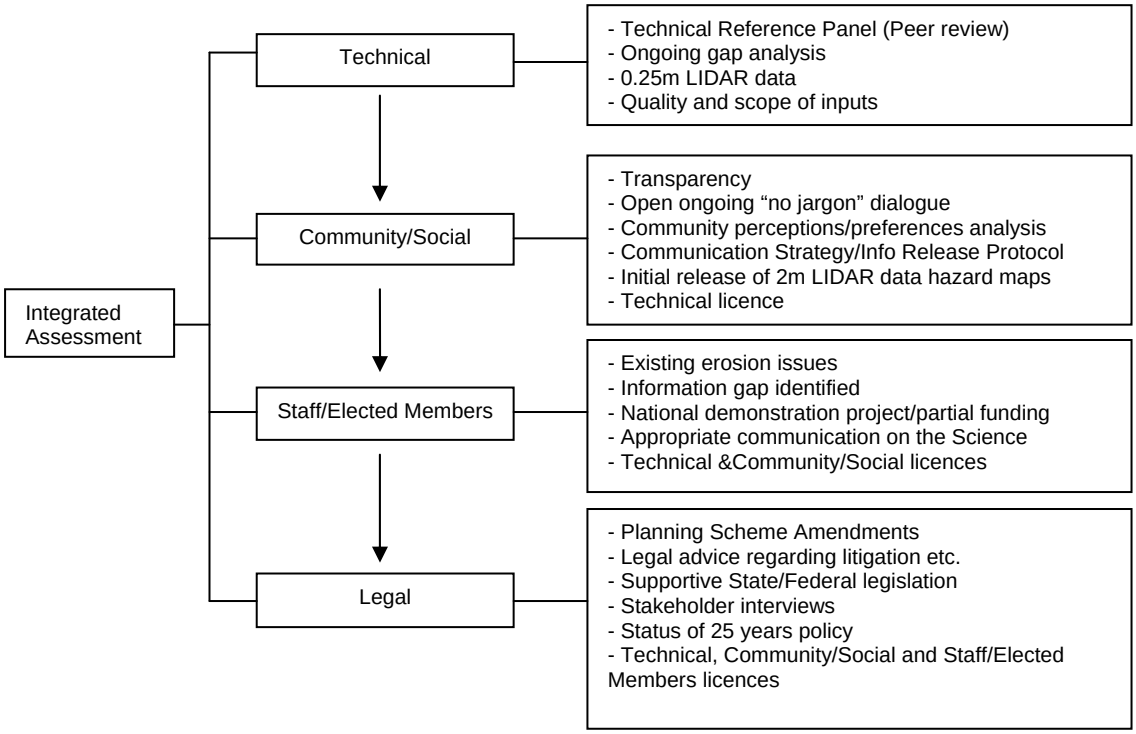


Diagram 1: Conceptual framework for achieving validity in an integrated assessment

4. EVALUATING OUTCOMES

The Clarence Integrated Assessment has resolved information gaps concerning coastal vulnerability compounded by climate change and concerning community adaptation preferences. The Assessment has enabled the Council's Coastal Adaptive Management Response Activity Plan to be further prioritised, and has identified the additional information requirements.

The spatial maps will be progressively refined for the highest priority areas using photogrammetry to establish long term trends in dune changes. It is the complex, location-specific coastal assessments and dynamic modelling that forms the largest cost in coastal vulnerability assessments. Once this information has been collected, making changes to the spatial maps and associated hazard zones to reflect updated climate change projections is not difficult. The Integrated Assessment framework used for this study could easily be applied to other localities, however significant resources would still be required to obtain the social, economic and technical inputs.

The project has enabled informed decision making, promoted systems thinking and innovation across the organisation, and has inspired staff and Elected Representatives to promote climate change adaptation. Climate change and environmental considerations are now integrated into risk assessment systems and processes when developing new projects. These outcomes have been achieved in:

- Changes to Council's Strategic Plan;
- Mainstreaming coastal management in Council's programs; and
- Employment of a Climate Change Officer (mitigation and adaptation) to support staff to develop and implement coastal adaptation responses.

The proposed Planning Scheme amendments will place additional assessment burdens on both Council and applicants for development consent, but will enable some development to still occur and not sterilise development in coastal areas.

After a protracted period of legal contestation, the Tasmanian Planning Commission (as the State Authority that assesses proposed local Planning Scheme amendments) has approved Clarence City Council's Planning Scheme amendments, subject to minor amendments.

4.1 Less tangible project outcomes

In the course of the development and implementation of the project, a few Council staff became very knowledgeable and skilled in climate change science and its application for development of policy and practice. This understanding has meant scientific projects are more highly valued and thus better placed to attract internal funding from Council's budget than in the past. For example the detailed refinement and calibration of wave climate and wind fetch modelling for Roches Beach will result in a change in policy - hazard zones for Roches Beach, and a change in practice - amended volume of sand for proposed dune building adaptation responses.

Another more covert outcome of the project has resulted in the development of a strong ownership of the Implementation Plan and the development of a change mentality within the organisation.

Additional outcomes include extensive networking and shared learning opportunities through presentations to other Local Government Organisations and an increased positive reputation of the Council and its management team.

The outcomes of the project are considered to be worth the time and money invested.

4.2 Critical success factors:

The critical success factors identified for the project include:

- ✓ Community attitudes and preferences assessed early;
- ✓ Two stage Communication Strategy focussed on community and stakeholder consultation;
- ✓ Costed and prioritised set of milestones;
- ✓ In-built flexibility in the projects to maintain an iterative approach to both administrative procedures and knowledge management;
- ✓ Transparent approach to all research and report outputs;
- ✓ Making the most of opportunities when they arise - e.g. release the interim technical report with 2m LIDAR data;
- ✓ Supportive General Manager committed to the value of adaption responses;
- ✓ Highly regarded and skilled consultants with an ability to communicate the science to non professionals;
- ✓ A strong relationship between the consultants, Project Manager, Technical Reference Panel and the Steering Committee;
- ✓ Ongoing gap analysis;
  Information Release Protocol focused on managing media and public perception; and
- ✓ Project manager within the Council to facilitate engagement and commitment of Elected Representatives and staff; interpret and promote project outputs and attract resources for implementation.

The Clarence Integrated Assessment project is recognised by Council staff as a resounding success. In the early stages of the project there was some difficulty securing commitment to the project across the organisation and some staff members within the organisation were sceptical about climate change. Yet due to existing erosion issues the importance of the project could be demonstrated. Overcoming the lack of commitment and climate change knowledge meant that the early stages of the project took longer than anticipated. However it

is believed that this extra time expended resulted in increased commitment to the project by the organisation. Other challenges included developing the brief for a pioneer project, translating and communicating the science, prioritising a very expensive and resource intensive project above competing demands, and allocating the additional resources required for implementing the communication strategy (estimated additional $200,000).

4.3 Adaptive learning – organisational and community:

A key organisational learning for the Council has been that routine ways of doing things may not be the most appropriate or effective method. Allowing the flexibility to run an iterative learning process became a positive outcome from the project. This adaptive learning has also been applied to both climate change and general considerations and has been mainstreamed throughout the organisation via the Strategic Plan. It is noted that younger staff members have flourished in this adaptive organisational environment whilst some older staff members have been less open to adapting established processes.

For the Community, a key learning has been that they can trust their Local Government to provide a high quality product - hazards maps, reports on local vulnerabilities, Response Activity Plan etc.
Council staff believe that the level of confidence and positive public perception that the Community has in the Council may have increased because of the Clarence Integrated Assessment project.

5. FUTURE DIRECTIONS

Key recommendations for other councils provided by Clarence City Council include:

- "Attract and engage highly recognised and competent consultants. Spend time locating these people and getting to know their capabilities."
- "It is critical for Local Government to capture information on long term coastal change trends, to support the calibration and refinement of coastal hazard modelling and research studies. Once you have this information any subsequent coastal hazard assessments will be more reliable and defendable, and the information will support future funding submissions."
- "Where climate change is a compounding impact on existing risks, the existing risks can be used to gain support from those who are sceptical regarding climate change."
- "The Communication Strategy has been an essential element of this project, enabling all staff and elected representatives to deliver the same key messages,"

The City of Clarence has now undertaken all actions allocated to the 1-2 year period in the Integrated Assessment Implementation Plan. Work has also begun on the 2-5 year period goals. The Council is finalising an Adaptive Management Response Plan for Roches Beach. It is intended that the process established for implementing responses at this site will then be undertaken for a number of other sites of high vulnerability.

5.1 Reprise

As per the key messages in Council's special edition newsletter (refer to 2.3.2) stipulating that after the next 25 years *coastal property owners will be expected to bear more of the cost burden*, Council will again undertake extensive community consultation after 2034, to shift the cost burden of protecting coastal development towards property owners.

The Clarence Integrated Assessment has influenced the development of a number of Regional Councils Climate Adaptation Projects [RCCAP] funded by the Australian Government's Department of Regional Australia, Regional Development and Local Government; Local Government Reform fund. The level of recognition that Clarence City Council has received from delivering a national demonstration of an integrated climate change assessment, has resulted in two partnerships with leading academic research institutions, funded by DCCEE. The two new projects are *Rising to the Challenge – Tasmanian Coastal Adaption Decision pathways,* and *CSIRO Coastal Collaboration Clusters –Science to Policy to Practice*. These two projects are in their preliminary stages and outputs are not yet available.

NCCARF
National
Climate Change Adaptation
Research Facility
Adaptation Research Network
SETTLEMENTS AND INFRASTRUCTURE

Victoria

Sector-wide review of LAPP funded risk assessment projects in Victorian councils: learning from applications

Organisation:	Municipal Association of Victoria
LGs:	19 councils
Tool:	"Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009)
Function:	Risk Assessment
Contact:	BMorris@mav.asn.au 0402570420

1. OVERVIEW OF THE PURPOSE

Since 2005, almost half of Victoria's councils have undertaken a climate change risk assessment and developed a climate change adaptation plan to:

- Understand the risks to councils' assets and services as a result of climate change impacts;
- Understand the impacts of climate change on the council's community; and
- Identify actions to adapt to climate change and/or mitigate its impacts.

Almost all of these Victorian councils have used the Australian Greenhouse Office guide, "Climate Change Impacts and Risk Management: A Guide for Business and Government", that is consistent with the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004] (Now AS/NZS ISO 31000:2009).

The prime focus of the Guide is on the initial risk assessment and prioritisation of these risks through an organisation-wide risk assessment workshop. It aims to help businesses and organisations:

- enumerate risks related to climate change impacts;
- prioritise risks that require further attention; and
- establish a process for ensuring that these higher priority risks are managed effectively.

In all cases, consultants were commissioned to apply the tool, organise and facilitate the workshops and write the resulting adaptation plan. In most cases, the risk assessments were funded externally by the Victorian Department of Sustainability and Environment (DSE) through the *Victorian Local Sustainability Accord,* or by the Federal Government through its *Local Adaptation Pathways Program (LAPP)* and *Strengthening Basin Communities* programs.

2. DRIVERS FOR USING THE TOOL

The Australian Greenhouse Office guide, "Climate Change Impacts and Risk Management: A Guide for Business and Government" was chosen for one or more of the following reasons:

- It was required as a part of the Local Adaptation Pathways Program (LAPP) funding
- It was the tool recommended by the consultants engaged to facilitate the risk assessment and adaptation planning exercise
- It was deemed the most appropriate tool to understand the risks posed by climate change
- A risk management approach was considered the most appropriate way to engage council executive.

Victorian councils involved people from across their organisations in the risk assessment workshops and subsequent planning for adaptation, with some also including CEOs, Mayors and councillors. Stakeholders such as the state government departments responsible for health, primary industries, sustainability and environment, infrastructure, and planning and community development were also involved in some cases.

The majority of risk assessments focused on **council assets, services** and areas of **responsibility**. In one case, where a second, regional assessment is being conducted, the scope includes the **impacts on the community** and the **role of regional organisations**. The focus on areas of council responsibility was driven by the need to **address key areas** where councils had the most influence and the impetus to "get [their] own house in order before approaching the community".

The scope of the climate changes assessed varied, with some councils assessing the full range of impacts and some assessing a smaller range that council staff, workshops or consultants had considered particularly relevant to each council's context.

No Victorian councils used the set of climate change scenarios outlined in the tool. Instead, most councils used the *Climate Change in Australia* data generated by CSIRO and the Bureau of Meteorology and DSE's regional climate change information for their initial risk assessments, while one regional group used CSIRO's *Sustainable Yields* project scenarios as these were deemed most relevant given the exposure of that region's community and economy to reduced water for irrigation.

Victorian councils have used a range of timeframes (including 2010, 2020, 2030, 2050 and 2070) in the initial risk assessments and only one or two climate change scenarios. Where councils used two scenarios, these were the high and low scenarios to cover the breadth of potential outcomes. Where councils used one scenario, it was either a medium scenario or a high scenario. These scenarios and timeframes were chosen as they:

- Allowed comparison with existing research in the council area
- Were appropriate for the consideration of the short-term impacts, the planning timeframe of councils and the issues being considered (i.e. peak oil)
- Ensured the analysis was kept simple (by using one scenario)
- Were considered most likely (in the case of the high emissions scenario).

3. IMPLEMENTATION METHODOLOGY

All Victorian councils engaged consultants to use the tool and facilitate the risk assessment and adaptation planning process. Apropos value for money, many council staff reported that, to apply the tool, they would have needed to expend significant time and effort to firstly understand the complexities of the tool and then, secondly, to apply it specifically to their local government context.

Nevertheless, the tool is **highly adaptable**, having been used successfully by consultants for councils ranging in size and location and for regional exercises (such as risk assessments for greenhouse alliances).

4. EVALUATING OUTCOMES

Benefits

Generally, Victorian councils found the risk assessment approach to be valuable, and also found the Australian Greenhouse Office guide, "Climate Change Impacts and Risk Management: A Guide for Business and Government" (AGO 2006) a useful tool and approach.

The main benefits of using the AGO 2006 tool and approach were:

- ✓ consistency with existing council risk management frameworks, which meant many council staff participating in the risk assessment workshops were familiar with how it worked; and
- ✓ all participating council staff improved their awareness and understanding of climate change issues and impacts, through the risk assessment process.

Whilst the awareness and understanding of climate change adaptation took time to develop, in some cases this has led to staff from across the council very quickly considering the implications of climate change impacts for their business or functional area. This broader consideration moved climate change from a narrower 'environmental issue' to a more strategic council management issue.

Critical success factors

The following actions and ownership across Victorian councils were critical to the success of the risk assessment process and the integration of climate change risks in management plans:

- ✓ *Executive support* – The councils' executive understanding of and engagement in the process influenced the attendance of officers at workshops and the responsibility officers took on.
- ✓ *Understanding of relevance for non-environment officers* – As with executive support, if council staff understood key issues and relevance for their work area, then they were more likely to engage in the process and more likely to take on responsibility for incorporating adaptation actions into their business plans.
- ✓ *The presentation of climate change information* – The use of local impact information and consideration of how they are affected by the current climate helped staff 'internalise' the issues and make climate change 'real for people'.
- ✓ *Strong evidence base for and well-known source of the impacts assessment* – Having a well-known source of the climate change projections gave the data greater gravitas in some projects and was useful in focusing people's attention on the issues and compelling action.

Challenges/barriers

Three main challenges were noted by Victorian councils:

i. Despite the familiarity of council staff with the risk assessment process, several councils reported finding the risk assessment workshops 'tedious and intense' with some involving too many people and trying to cover too many issues.
ii. Few **opportunities** were identified. Although opportunities were to be identified during the process, the focus was clearly on risk identification and treatment of harmful risks. Opportunities were therefore often missed.
iii. Despite the involvement of officers from across councils, to date very few councils have placed these risks on their risk registers or addressed the identified risks in plans across the council.

Suggested improvements

Victorian Councils identified a number of specific improvements to the risk assessment process. These included:

- Running individual workshops for each business unit
- Not considering scenarios for 2070 as it is too far in the future for meaningful and detailed planning
- Spending more time explaining the uncertainty of the projections and planning for the projected variability in climatic conditions, rather than worst case scenarios
- Presenting the extremes for example, heatwaves) in climate where these are more useful than the average projections

- Providing a **comparison** of projections with recent experience (for example, number of hot days with those experienced in 2009 and projected rainfall with that experienced in 2002 and 2010).

Additionally, the information and guidance in the AGO 2006 tool could be improved to tailor it to local government contexts and to acknowledge the time constraints and other priorities council officers face. The tool could be improved to provide guidance in clarifying:

- The likely impacts of climate change on council operations and potential adaptation measures.
- The potential purposes, likely contents and intended outcomes of adaptation planning.
- Advice and proposed methods for engaging and creating ownership amongst staff from across the council.
- Guidance for how to consider a range of local or regional scenarios, and variability within these in the risk assessment, without the process becoming unwieldy.
- Templates for use by council staff.
- Examples that demonstrate the likely impacts of climate change and the potential outcomes of adaptation planning for councils in different locations and of different sizes.

5. FUTURE DIRECTIONS

The next step for the Victorian councils that have undertaken a risk assessment and developed an adaptation plan is to **implement** those plans. In many cases, this will require integration into existing organisational processes and timelines, such as Council Plans, annual budgets, and business plans.

Implementation has been a **major hurdle for the early-mover councils** (thus a significant issue to report on) who have struggled with:

- a lack of sufficiently detailed local data;
- developing a suitable process for incorporating this data into existing plans and policies; and
- guidelines to support council decisions.

Western Australia

Overview of case studies of adaptation tools and processes

1. Statewide picture

The Western Australian Local Government Association (WALGA) is the united voice of Local Government in Western Australia. WALGA is an independent, membership-based group representing and supporting the work and interests of all 141 Local Governments in Western Australia.

WALGA provides an essential voice for almost 1,400 elected members and over 12,000 employees of the 141 Local Governments in Western Australia. WALGA also provides professional advice and offers services that provide financial benefits to the Local Governments and the communities they serve.

WALGA is a member of the Australian Local Government Association (ALGA), and actively contributes to the development of policy and advocacy at a national level.

Predominant tool
To date the climate change adaptation **tool** that has been used by most Councils in Western Australia is the "*Climate Change Impacts and Risk Management: A Guide for Business and Government*" (AGO 2006) in accordance with the Australian and New Zealand Standard for Risk Management [AS/NZS 4360:2004].

However, of the 141 Councils in WA, only 30 – 35 have undergone some kind of climate change risk assessment and/or adaptation planning process, and these have been varied and at different levels of complexity and completeness.

The majority of these Local Governments used a basic 'methodology' as outlined within the *Climate Change Risk Assessment Process* funded by the Local Adaptation Pathways Program [LAPP], either first or second round. The LAPP funding was administered by the Australian Government Department of Climate Change and Energy Efficiency, and the use of the AGO tool was a requirement of the funding.

However the degree of application of the AGO Risk Management tool has varied significantly depending on the:

- funding available to the Local Governments;
- consultant applying the methodology;
- level of internal and external engagement; and
- articulated purpose of the project i.e. first pass or comprehensive.

In many cases the Local Governments have viewed this process as a first pass assessment, designed only to ascertain risk. However, in some cases particularly those projects undertaken

by consultants very experienced in this field such as Coastal Zone Management (CZM), much broader and more strategic processes have been undertaken.

2. Case studies

Reasons for undertaking climate change risk assessment and adaptation
West Australian councils and ROCs interviewed as case studies indicated a variety of reasons for undertaking a climate change risk assessment and adaptation project. Drivers for council taking action included:

- proactive long-standing approach to sustainability (Resilient Cities) and climate change
- council was concerned about possible impacts of climate change especially in vulnerable areas, on the community and Council operations
- community demand for council to take action
- to identify and prioritise risks arising from climate change impacts
- to develop strategies for managing risks at a range of temporal and spatial scales
- to respond to climate change issues on regional and local levels
- to enhance resilience through the development and integration of adaptation strategies
- to provide leadership in climate change adaptation throughout the region
- to save money in the future and avoid liability issues
- to support development of relevant strategies and policies
- to identify future research needs and directions
- to reduce risk and litigation
- to engage, educate and prepare the community
- to build capacity
- platform for engagement with stakeholders, enabling further structured discussion of key climate change issues

Tools selected for the projects
All those surveyed used the *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO, 2006), usually in **combination with other methodologies** including *Climate change adaptation actions for local government (*Department of Climate Change, 2009) and Australian standards.

Where consultants were engaged, they tailored the approach to suit their own methodology and the objectives of the particular organisation. Coastal Zone Management Pty Ltd facilitated 4 of the 6 case studies. The AGO 2006 approach was recommended by the Commonwealth Government as part of applying for Local Adaptation Pathways Program) (LAPP) funding.

Approach
There was not just one 'off the shelf' tool and for this reason it is **difficult to define 'tool' in this review**. For the purpose of this report, the main 'tool' reviewed is the Risk Management approach based on AGO 2006 with additional input including consultants' modifications to methodology.

Tasks included risk assessment and developing adaptation recommendations. Most organisations conducted internal workshops, with internal stakeholder involvement varying from relevant council staff only, to staff, CEO and elected members. The amount of external stakeholder engagement varied from none to involving Government agencies, Catchment Councils, environment and farmer organisations.

The feedback on this approach was very good overall, with all 6 organisations considering it very good or excellent.

Specific feedback included:

- Can be used independently especially if coordinating staff have competencies in risk assessment.
- It requires the expertise of a consultant to be most effective e.g. 'It is an advantage to have an external independent consultant, partly because it generates a perception of increased importance and recognition from players.'
- Opinions on prior training varied – some said no formal training was required to initiate the process because the project itself was a learning opportunity, and the consultants were transparent about methodology and kept people informed. Some organisations provided a training session by the consultant on the principles of risk assessment and adaptation procedures.

- No additional software or other material resources are required.
- The methodology could be used in any local government situation.
- It is adaptable in LG contexts. Was applied across the board for regional issues and for individual councils including coastal zones, rivers, floodplains and other aspects of climate change
- As a 'tool' to **approach** risk management/assessment, it is one contributor to developing systems thinking and innovative approaches to urban and regional planning.
- It can contribute to developing cooperative approaches e.g. ROCs, and the Peron-Naturaliste Cooperative Group of nine LGAs from Rockingham to Busselton.
- The approach has the capacity to be adapted over time to changing needs, recognising that science and risk assessment approaches will change.
- Gives ability to put together plans with a similar structure to other councils in order that plans can be amalgamated along with Council amalgamations.

Outcomes and applications

Outcomes varied from risk assessment and a 'first pass' at developing adaptation actions to a comprehensive Climate Change Adaptation Plan to deal with strategic and site-specific risks.

The outcomes were incorporated into organisational planning in various ways, for example:

- Climate Change Adaptation Action Plans
- Formal monitoring and review of adaptation action plans every two to three years.
- Risk assessment and adaptation plan incorporated into council's structural risk register
- Adaptation strategies and measures integrated into Strategic Management Plans and annual Corporate Plans
- Policy reform and information dissemination
- Plans to be incorporated in Council Planning Schemes, Water Management Plans, Wetland Management Plans, Building and Engineering Codes, Emergency Management Plans, Approvals
- Basis for facilitating and identifying funding and revenue opportunities on a regional basis
- Basis for a more detailed review and climate change adaptation options identified be considered for inclusion in all future reviews of Council legislation, policies and procedures

One of the case studies did not produce ongoing outcomes at the regional level although a number of the member councils are actively progressing their own projects and other partnerships. (See barriers).

Usefulness of the tool

In most cases it is early days to evaluate project outcomes but the **current assessment** of the *usefulness* of the tool was generally positive, for example:

- √ Met the need for a risk assessment for coastal impacts to respond to/mitigate impacts of climate change in the coastal zone
- √ Provides a simple tool to assess potentially complicated suite of risks
- √ The approach has helped to provide a basis for LG planning
- √ Enables informed decision-making
- √ Helped to establish leadership in the region,
- √ Facilitated staff engagement across various business units, staff ownership of the adaptation process and staff acquired skills
- √ Positive outcomes were a recognition of climate change threats and collaborative work across six member councils to identify potential climate change risks and select appropriate adaptation measures
- √ Provided a shared understanding
- √ Moves people away from silo thinking and builds capacity
- √ Provides clear structure identifying responsibility for action
- √ A good start in raising awareness among councils and opening up discussion - it identified areas of risk **but did not rigorously assess the risk**
- √ Highlighted the need for Local Governments to endeavour to **forecast problems** associated with climate change before they actually arise

Barriers and challenges

1. Process

- Original grant was not sufficient for regional approach with 6 Councils over that size of project – but given the resources it was **a good start**
- Difficult to get staff across councils together for a day workshop, Difficult getting everyone in the room at the same time

- Getting appropriate staff representation for best outcomes e.g. Environmental Health officers attended because it was considered a sustainability issue, but **needed planners** to be there
- Any approach involving a variety of councils brings its own challenges
- While coastal vulnerability assessment approaches facilitate examination at a regional scale, there are **no approaches targeted at a local scale**
- The risks assessment and adaptation plan are of a high level assessment and are based on the knowledge of the participants in the workshops, which may be imperfect.
- It is an onerous task to source expert advice or conduct research
- Lack of technical knowledge about applying the tool to get risk ratings
- The AGO framework yielded results that were similar across councils around Australia – was this **because the risks are the same, or was the tool too high-level to really be useful**?

2. Ongoing application

- Use of consultants, with no training component, meant that the process didn't really develop capacity within councils.
- Varied level of support for the project across Council
- There is lack of funding to implement proposed adaptation actions to treat identified risks
- There is lack of support from Federal and State Government levels at implementation stage of the Adaptation Action Planning
- Officers need to keep up with the latest science and update risk and adaptation approaches
- Need more accurate predictions for climate change in the region, refining the current state of knowledge of the likely impact
- Staff turnover

3. Suggestions for improvement

i. While the AGO 2006 risk framework is targeted at local government level operational risk, it is a strategic assessment framework and cannot deliver site-specific outputs. As local governments continue to try to address the issue of climate change risk, there is an increasing need for a framework that moves beyond strategic assessment to site-specific assessment.
ii. The timeframe adopted (70 years) for predicting impacts was too long – incorporating a shorter timeframe would be useful.
iii. Preparatory training in risk assessment methodology and risk rating would help workshops to be more productive.
iv. Encourage more innovative thinking from the users. Although the tool was a guide, our project did not vary from the framework at all.

Recommendations from participants

- The approach (climate change risk assessment according to Australian standards) should be mandatory for Local Government.

APPENDIX

Notes from interviewer, Karen Majer

1. THE 'TOOL'

All the case studies were broadly based on the AGO 2006 risk assessment methodology. However, the application of the approach varied according to:

- individual project objectives and brief e.g. a first pass strategic risk assessment or an adaptation action plan;
- the expertise and methodology brought to bear by consultants;
- the extent of internal and external stakeholder involvement; and
- other local issues.

While this report considers the 'tool' as one approach, it is **actually a range of targeted approaches based around one or a combination of methodologies**.

2. ASSESSMENT OF THE 'TOOL'

The way in which the interviewees assessed and rated the tool is likely to depend on how well it helped them to achieve their individual short-term project objectives and especially on how well the consultant engaged delivered the process and reporting. All the Case Studies rated the approach good (one excellent). How much does this reflect the tool or the consultant?

It is also likely that these ratings reflect the current process and not longer-term success in embedding adaptation in strategic and operational planning etc. For example, the tool was rated 'good' for the SMRC project but it has not resulted in an on-going regional approach. **If a regional approach was an intended or desired outcome**, could the tool be considered good? Maybe the next round of research could tease out ratings according to some of the specific KPIs, especially as projects get further down the track.

3. TRAINING

Many projects conducted little or no staff training and relied on consultants expertise. While the project itself was an organisational learning experience (and some consultants make a specific effort in this regard), it would appear that some training (e.g. in risk assessment) in conjunction with the initial use of the tool may help to embody adaptation skills in the organisation. This will be valuable in this kind of project which will (ideally) be iterative and constantly reviewed and updated.

4. STAKEHOLDER ENGAGEMENT

The people invited to contribute to the risk assessment process varied from only internal staff at operational level through to **wide stakeholder involvement**. It may be that **this component of the process is crucial in determining eventual success in embedding the outcomes in planning and in community support**.

SUMMARY OF WA CASE STUDIES

LGA/ROC	Program	Funding	Tool	Consultant	Outcome	Rating
EMRC[1]	Future Proofing Perth's Eastern Region - Climate Change Adaptation	LAPP[2]	Standards Aust. 2004[3] AGO 2006[4]	CZM[5], Greensense Pty Ltd	RCCAAP[6] and 6 LCCAAPs[7]	5
Mandurah City Council	Mandurah Coastal Zone Climate Change Risk Assessment and Adaptatic Project	LAPP	AGO 2006 DCC 2009[8]	CZM	*Coastal Zone Climate Change Risk Assessment and Adaptation Plan*	4
City of South Perth	City of South Perth Climate Change Adaptation Project	None – pilot program	AGO 2006 DCC 2009 CSIRO 2006[9] Australian Standards[10]	Echelon Australia Pty Ltd; LGIS[11]	*Climate Change Risk Assessment Adaptation Report, City of South Perth, 2010*	4
WESROC[12]	WESROC Climate Change Risk Assessment and Adaptation Project	Self funded	AGO 2006 IPCC[13]	CZM	*WESROC Climate C Risk Assessment and Adaptation Plan Final Report* 2010	4
MWRC[14]	MWRC Climate Change Risk Assessment and Adaptation	LAPP	AGO 2006 UKCIP 2007[15]	CZM	*MWRC Climate Change Risk Assessment and Adaptation Action Plan*	4
SMRC[16]	Climate Change Risk Management and Adaptation for the southern metropolitan region	LAPP	AGO 2006 DCC, 2009	GHD	*Climate Change Risk Management and Adaptation Action Plan for Southern Metropolitan Councils* 2009	4

[1] Eastern Metropolitan Regional Council
[2] Local Adaptation Pathways Program
[3] *The Risk Assessment Framework* (Standards Australia 2004)
[4] *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO, 2006)
[5] Coastal Zone Management Pty Ltd
[6] Regional Climate Change Adaptation Action Plan
[7] Local Climate Change Adaptation Action Plans
[8] *Climate change adaptation actions for local government (*Department of Climate Change, 2009)
[9] *Climate Change Scenarios for Initial Assessment of Risk in Accordance with Risk Management Guidelines (CSIRO 2006)*
[10] AS/NZ 4360 and ISO 31000, Risk Management
[11] Local Government Insurance Services
[12] Western Suburbs Regional Organisation of Councils
[13] Intergovernmental Panel on Climate Change 'A1F1' climate change model for 2070
[14] Mid West Regional Council
[15] UK Climate Impacts Programme (UKCIP 2007)
[16] Southern Metropolitan Regional Council

Western Australia – Case Study 2

City of South Perth: 'first pass' risk assessment report - facilitated by Echelon with LAPP funding

Council:	**CITY OF SOUTH PERTH**
Web Address:	www.southperth.wa.gov.au
Size:	20 km2
Population:	43,908 as at 30 June 2010:
Classification:	Metro
Program:	**City of South Perth Climate Change Adaptation Project**
Tools:	*Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO 2006) *Climate Change Adaptation Actions for Local Government* (Dept of Climate Change 2007) *Climate Change Scenarios for Initial Assessment of Risk in Accordance with Risk Management Guidelines* (CSIRO 2006) Australian Standard AS/NZ 4360 and ISO 31000, Risk Management
Function:	Climate change risk assessment and first step to adaptation
Consultants:	Echelon Australia Pty Ltd and Local Government Insurance Services (LGIS)
Contact:	Wendy Patterson (08) 9474 0777, wendyp@southperth.wa.gov.au

1. OVERVIEW OF PURPOSE

Project aims and scope

The purpose of the Project was to enhance resilience through the development and integration of climate change adaptation strategies into the City of South Perth's **Strategic Management Plans**. This process was to undertake a 'desktop' or first pass review and assessment of the City's risks in terms of the effects of actual or potential climate change impacts.

The City of South Perth undertook a trial project in 2010 to identify and assess the risks of climate change impacts, as a '**first pass'** at understanding and recording the City's likely vulnerability to the impacts of

climate change. A *Climate Change Risk Assessment Adaptation Report*[1] was submitted to the City by the project facilitator, Echelon Australia Pty Ltd, an organisation associated with the City's insurers, Local Government Insurance Services (LGIS). The process was a pilot project for LGIS in WA. The project report contains a description of all identified climate change impacts, including the risk rating. It has resulted in the development of a spread-sheet of risks for future management.

The recommendations of the Adaptation Report have been reviewed by a staff *Climate Change Adaptation Working Group*. The risk assessment project identified a number of important impact areas that the City can incorporate into strategic management planning processes. The current priority is to undertake comprehensive technical research on the impact of sea level rise, in order to address the adaptation options identified in the Adaptation Report.

2. ASSESSING THE TOOL

2.1 DRIVERS FOR USING THE TOOL

1. *Background/context*

The City of South Perth has completed its milestone journey in the ICLEI Cities for Climate Protection campaign and developed a Sustainability Strategy. The City's efforts to date to address climate change have been based on mitigation activities. A city-wide *Climate Change Strategy 2010-2015* has been developed with three themes: Leadership, Mitigation and Adaptation. In February 2009, the City partnered with the Towns of Victoria Park and Vincent to apply for Local Adaptation Pathways Program (LAPP) funding to undertake a risk assessment for adaptation to climate change, but was unsuccessful.

Subsequently Echelon Australia Pty Ltd proposed to conduct a trial (free of charge) climate change risk assessment project for South Perth as a pilot in Western Australia. Echelon is associated with the Local Government Insurance Services (LGIS), which provides insurance services to the City.

Objectives:

- Facilitate the climate change risk assessment process for the City, based on AS/NZS 4360 and ISO 31000
- Integrate adaptation strategies and measures, specifically for *extreme* and *high* risks, into the City's Strategic Management Plans.

NB: Adaptation planning for *medium* and *low* level risks was outside of the scope for this project,

Time frame for applying the tool

Risk assessments workshops April-October 2010, report to Council March 2011

2. Adaptation tool was taken up because?

The approach was defined by the LGIS/Echelon methodology

3. Operational level tasks:

✓ risk assessment

✓adaptation recommendations

4. Which priority issues, key needs or gaps did/does the tool address?

Need for risk assessment process based on Australian Standards and 'first pass' at developing adaptation actions

5. Users within council (internal)

Staff representatives from across the organisation participated in seven workshops. A Councillor Briefing was held in July 2010. Representation came from all Council Functional Areas: Infrastructure and Property Services, Recreational Facilities, Health Services, Planning and Development, Natural Resources and Management, Water and Sewage

6. Partners/stakeholders

At this stage, no external community consultation has been conducted. (Part of next stage)

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[1] *Climate Change Risk Assessment Adaptation Report, City of South Perth, Echelon Australia Pty Ltd November 2010*

7. **Sources of baseline information**
CSIRO climate change scenarios, BoM

2.2 IMPLEMENTATION METHODOLOGY

1. **Can be used independently, without hand holding?**
Yes – but possible only if staff have the skills and competency

1b Or requires expertise of service provider/consultant to obtain optimum effectiveness?
Yes - It is an advantage to have an external independent consultant, partly because it generates a perception of increased importance and recognition from players

2. **A stand-alone tool - or used in conjunction with other tools?**
This approach was based on AGO 2006 but incorporated other methodology

3. **Staff resources required to successfully operate it**
The process was coordinated internally by the Sustainability Coordinator

- *Who needs to be involved?*

Staff from right across the organisation – all departments and functions and at all levels – Directors, Managers and Coordinators

- *Is training required before or during operation?*

No specific training was provided before this process with exception of introductory presentation (a stand out of the process) and folders provided by the facilitators. It would have been extremely useful to have had some prior training in risk assessment methodology – some struggled during the workshops

4. **Additional software or other material resources required?**
Folders provided by the facilitators

5. **Adaptability of the tool to differing local contexts?**
This approach would be adaptable to other LG contexts and areas because it is based on recognised Australian Standards.

2.3 EVALUATING OUTCOMES

1. **Did the tool lead to good outcomes/beneficial results achieved?**
It is early days to assess outcomes – no progress yet since the report was completed. Good result so far is having a risk assessment as part of the climate Change Strategy – this is a **first step** and needs to be reviewed on a regular basis.

Current evaluation:

- *Resolves a difficult problem/issue, need or gap*?
Yes - Risk assessment provided a shared understanding

- *Enables informed decision-making?*
Yes - "On the road" – is now in annual Corporate Plan with budget allocated for next stage

- *Enables improvements to strategic planning practices and/or action plans?*
Yes

- *Promotes systems thinking in climate change adaptation and sustainability?*
Not really - It is a good start in seeing interlinked issues. As the project progresses, systems thinking is essential

- *Drives innovative approaches to urban and regional planning*?
Yes – but not at that stage yet. It may do in the next stage

- *Encourages collaboration within/across councils, and/or inputs from key stakeholders?*
  Yes - Internal communication: it is rare to get everyone from across the organisation together on a task

- *Capacity for flexible applications in other contexts*?
  Yes - Moves people away from silo thinking and builds capacity

- *Capacity to be adapted or evolved over time to changing needs*?
  Yes - It is an iterative process

2. Critical success factors

- *Which feature of this tool works best for you?*
  - √ Quantifiable
  - √ Gives 'evidence' of risks even though it is incomplete data, to date

- *Particular features of the tool that suited your local context?*
  Process is generic but suited to local use

- *Is it value for money?*
  Not applicable - In this case there was no cost

3. Challenges/barriers encountered in using the tool

- Getting everyone in the room at the same time
- Preparation – raising awareness of why we are doing this
- Lack of technical knowledge about applying the tool to get risk ratings

4. Acquired skills/competencies at risk of atrophying without ongoing use?
Staff turnover is a problem

5. Adaptive learnings: what key lessons have you learned?
Learnings across council:

- √ Climate change is something we need to build into our business.
- √ Need to be prepared to adapt for the future – ongoing and critical

7. Can you suggest one or more key improvement(s) to the tool's design or application, to pass on to the designers or other users?

- Prior training in risk assessment methodology and ratings with example
- Crucial to have an experienced, reputable facilitator who is familiar with local government

3. FUTURE DIRECTIONS

1. Recommendations: **What would you say about the tool to peers, neighbouring councils, professional associations, workshops and conferences etc?**

The approach (climate change risk assessment according to Australian standards) should be **mandatory** for Local Government.

2. Next steps?

- *What implementation actions will be initiated*?

Moving into adaptation planning with wider community awareness and involvement. Key actions are:

- Raise awareness of climate change risks within the City and the community to enhance decision-making and build community resilience as part of communication and consultation.
- Address extreme risks as a priority
- Initiate a process for adaptation planning including research, gathering technical and physical data and a process for decision making. This will require an expert consultancy.
- Monitor and review risk management context with regard to changes to climate change variations, operating environment, key business drivers, strategic management, capacity, capabilities and other relevant factors to identify new climate change risks and reanalyse all existing risks.

- *Will the Strategic Plan and/or Annual Plan be revised*?

The City's Strategic Directions 2010-2015: Environment 2.5 is *Build capacity within the City and community including partnering with stakeholders, to manage climate change risk and opportunity, through leadership, adaptation and mitigation.* Adaptation strategies and adaptation options will be identified into the City's Strategic Management Planning.

The City's Corporate Plan 2010-2011 includes:
Environment 2.5.1 - Participate in the LGIS Climate Change Risk Assessment Program
Environment 2.5.2 - Consider Adaptation Plans contained in the Climate Change Risk Assessment Report
Environment 2.5.3 - Develop and implement a Climate Change Strategy
The Corporate Plan will be updated annually to prioritise adaptation planning and implement the Climate Change Strategy. Also Include climate change risk management results into the City's continuous improvement processes such as staff skill and knowledge development and into the risk management database

- *Will a regional approach be taken to adapt to major risks?*

This will include partnering with key State agencies eg Swan River Trust, Department of Environment and Conservation, Main Roads, Planning and Infrastructure and neighbouring local governments.

West Australia – Case Study 3

Eastern Metropolitan Regional Council: a 'future proofing' risk assessment for a Regional Climate Change Adaptation Action Plan

Council:	**EASTERN METROPOLITAN REGIONAL COUNCIL (EMRC)**
Web Address:	http://www.emrc.org.au/
Size:	2,100 km^2
Population:	Approx. 300,000
Classification:	Metro grouping of Local Governments
Program:	Future Proofing Perth's Eastern Region - Climate Change Adaptation
Tools:	*The Risk Assessment Framework* (Standards Australia 2004),and *Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO, 2006)
Function:	Risk assessment and adaptation
Consultants:	Coastal Zone Management Pty Ltd and Greensense Pty Ltd
Contact:	Yulia Volobueva, Environmental Projects Coordinator, EMRC (08) 8 9424 2244 Julia.Volobueva@emrc.wa.gov.au

1. OVERVIEW OF PURPOSE

The potential impacts from climate change are both varied and extensive. In order to effectively adapt to the impacts of climate change, local government authorities cannot act in isolation from the regional, state or national context. For this reason the EMRC and its six member Councils - Shires of Mundaring and Kalamunda, Cities of Swan, Belmont and Bayswater and Town of Bassendean - collaborated to undertake a comprehensive risk assessment to identify potential impacts and risks from climate change for the Perth Eastern Region. In addition, actions that could better prepare the Region to adapt to the pressures of climate change were identified. This formed the basis of a **Regional Climate Change Adaptation Action Plan** (RCCAAP) outlining what needs to be done at the regional level to adapt to climate change.

Risk assessment and adaptation methodology accredited by the Australian Government (Standards Australia, 2004 and AGO, 2006) was applied to assess regional and local climate change risks and identify adaptation measures and actions to treat the risks. To **consolidate** the work done at the Regional level, EMRC has developed **Local Climate Change Adaptation Action Plans** (LCCAAPs) in partnership with the six member Councils. While the

Regional Plan identifies actions which benefit from a regional approach, the LCCAAP focuses on actions related to individual Council's operations, and those that are local in nature and/or partner with the community. This ensures that climate change adaptation is integrated into the day-to-day planning and risk management activities of all six councils and their communities in Perth's Eastern Region. EMRC received funding from the Department of Climate Change's Local Adaptation Pathways Program (LAPP).[1]

2. ASSESSING THE TOOL

2.1 DRIVERS FOR USING THE TOOL

1. Background/context: drivers for council taking action

- to respond to climate change issues on regional and local levels
- to provide leadership in climate change adaptation throughout the region
- to save money in the future and avoid liability issues
- to support development of relevant strategies and policies and identify future research needs and directions
- to reduce risk and litigation
- to engage, educate and prepare the community

Project aims and scope

The Regional CCA Action Plan:

- identifies major climate change risks relevant to EMRC and member Councils' assets, services and operations
- is a **foundation document** that outlines what needs to be done to adapt to climate change on the regional scale over the next 4 years
- paved a way forward for EMRC and member councils to take climate change adaptation to the next step and provided a foundation for Localised Action Planning
- is utilised to advance advocacy for climate change throughout the region and leverage more funding.

Time frame for applying the tool

Funding 2008, report released October 2009

2. Adaptation tool was taken up because?

In 2008 EMRC received Federal LAPP funding to undertake a regional risk assessment and to develop a plan to treat those risks. It was also a result of **community demand**: there was a call for councillors to take action on climate change adaptation. EMRC wanted to provide leadership in the region on climate change adaptation and lead the six member Councils in the adaptation process.

3. Operational level task(s):

✓decision support
✓corporate planning
✓strategic planning
✓compliance and risk
✓stakeholder engagement
✓community education

4. Which priority issues, key needs or gaps did/does the tool address?

Risks and opportunities associated with climate change impacts on:

- Infrastructure failure
- Impacts on essential services (power loss and water availability)
- Watercourse damage and loss
- Increasing bushfires
- Water decline and reduced water quality
- Greenhouse gas emissions and related air pollution
- Loss of ecosystems and provision of Public Open Space

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[1] Regional Climate Change Adaptation Action Plan 2009-2013, EMRC, 2009 http://www.emrc.org.au/future-proofing-perth-s-eastern-region-climate-change-adaptation.html,

- Decline in population health and displaced wellbeing
- Economic challenges and opportunities
- Changing leadership and development requirements

5. **User(s) within council (internal)**
   Environmental Services, Regional Services, Risk Management, Corporate Services

6. **Partners/stakeholders**
   Shires of Mundaring and Kalamunda, Cities of Swan, Belmont and Bayswater and Town of Bassendean. WALGA, Coastal Zone Management and Greensense.

7. **Sources of baseline information**
   CSIRO
   Bureau of Meteorology
   Geoscience Australia
   Indian Ocean Climate Initiative (Partnership of the State WA, CSIRO and the Bureau of Meteorology)

2.2 IMPLEMENTATION METHODOLOGY

1. **Can be used independently, without hand holding?**
   Yes

   Requires expertise of service provider/consultant to obtain optimum effectiveness?
   Yes

2. **A stand-alone tool - or used in conjunction with other tools?**
   EMRC's climate change adaptation model could be applied in any local government

3. **Staff resources required to successfully operate it – one person, or more?**
   - *Who needs to be involved?*

   All departments within the organisation need to take part in the adaptation process to ensure successful outcomes.

   - *Is training required before or during operation?*

   Before and after. Relevant staff members across various business units were identified to take part in the risk assessment and adaptation process. For this purpose these staff members were provided a training session by the consultant on the principles of risk assessment and adaptation procedures. After risk identification and adaptation processes were completed relevant staff members were approached to take part in the adaptation action plan development to ensure establishment of the project ownership. These staff members were also provided a brief training session on the action implementation and reporting.

4. **Additional software or other material resources required?**
   No

5. **Adaptability of the tool to differing local contexts?**
   The methodology could be used in any local government

2.3 EVALUATING OUTCOMES

1. **Did the tool lead to good outcomes/beneficial results achieved?**
   Regional Climate Change Adaptation Action Plan (RCCAAP) is monitored annually to determine progress against the Plan. Annual progress report outlines achievements to date and reports any issues or changes that may have occurred that will require minor adjustment to the Plan.

   Current evaluation:
   - *Resolves a difficult problem/issue, need or gap?*
     Yes

   - *Enables informed decision-making?*
     Yes

- *Enables improvements to strategic planning practices and/or action plans?*
  Yes

- *Promotes systems thinking in climate change adaptation and sustainability?*
  Yes

- *Drives innovative approaches to urban and regional planning?*
  Yes

- *Encourages collaboration within/across councils, and/or inputs from key stakeholders?*
  Yes

- *Capacity for flexibility/adaptability in other applications or contexts?*
  Yes

- *Capacity to be adapted or evolved over time to changing needs e.g. improved standards for risk assessments, improved valuation, improved processes for monitoring, evaluation and reporting on outcomes.*
  Yes

2. Critical success factors?

- ✓ Establishment of leadership in the region;
- ✓ Addressing local community interests;
- ✓ Staff engagement across various business units;
- ✓ Staff ownership of the adaptation process.

- *Is it value for money?*
  Yes

3. Challenges/barriers encountered in using the tool?
Initially EMRC engaged a consultancy to provide expertise in the application of the risk assessment and adaptation methodology. Councillor and staff engagement in the process was a challenging process to begin with.

4. Acquired skills/competencies at risk of atrophying without ongoing use?
Through development of the Regional Climate Change Adaptation Action Plan, EMRC's relevant staff acquired skills that enabled them to develop Local Climate Change Adaptation Plans for six member Councils

5. Adaptive learning: what key lessons have you learned?
Learnings across ROC:

- lack of funding to implement proposed adaptation actions to treat identified risks;
- lack of support from Federal and State Government levels at the **implementation stage** of the Adaptation Action Planning.

Positive outcomes were:

- a recognition of climate change threats to Perth's Eastern Region;
- collaborative work across six member councils to identify potential climate change risks and to select appropriate adaptation measures to treat these risks;
- WALGAS support with adaptation process in the area of advocacy and policy development.

Learnings within the local or regional community:
It is a challenge for EMRC to get six member councils to release their Local Climate Change Adaptation Plans to the community for comment. Community members would like to know what their local government undertakes to tackle anticipated climate change impacts. However there are still members of public who could not care less about climate change issues. Therefore Councils would like to develop various community engagement programs that cater for various audiences to communicate climate change effectively.

3. FUTURE DIRECTIONS

1. Recommendations:

EMRC promotes the model it used to adapt to climate change to other local governments. In response to this, another regional local government body utilised the model in developing their regional climate change adaptation plan.

2. Next steps

- EMRC proposed a number of adaptation actions to be undertaken within a four year period to adapt the Region to anticipated climate change impact.
- The plan is monitored annually to determine progress.
- A regional approach will be taken to adapt to major risks.

West Australia – Case Study 4

Mandurah: coastal risk assessment and adaptation project

Council:	**MANDURAH CITY COUNCIL**
Web Address:	www.mandurah.wa.gov.au
Size:	173.5 km2
Population:	64,787 (June 2008)
Classification:	Regional
Program:	**Mandurah Coastal Zone Climate Change Risk Assessment and Adaptation Project**
Tools:	*Climate Change Impacts and Risk Management: A Guide for Business and Government* (AGO, 2006) *Climate change adaptation actions for local government (*Department of Climate Change, 2009) with additional methodology by consultant CZM
Function:	Risk Assessment and adaptation
Consultants:	Coastal Zone Management (CZM)
Contact:	Craig Perry, Coordinator Climate Change Services (08) 95503243 , Craig.Perry@mandurah.wa.gov.au

1. OVERVIEW OF PURPOSE

A Coastal Climate Change Risk Assessment and Adaptation Project was conducted by the City of Mandurah, supported by Federal Government (LAPP) funding, between November 2008 and July 2009. The first step in the risk assessment process was identifying the range of potential climate change impacts in the City of Mandurah coastal zone. The risks that these impacts pose to the City of Mandurah were considered at both a strategic and site-specific level.

The approach selected was based on '*Climate Change Impacts and Risk Management: a guide to business and government'* (Australian Greenhouse Office, AGO, 2006) with risks for local government categorised according to '*Climate change adaptation actions for local government' (*Department of Climate Change, 2009). The approach was adapted specifically for Mandurah by consultants Coastal Zone Management (CZM). This included a methodology for site-specific risk assessment to determine where risks were highest and how the risks varied throughout the coastal zone. Risk treatment options were based on a review of best practice with regard to coastal climate adaptation in conjunction with the guidelines and frameworks in *AGO 2006* and Department of Climate Change *2009,* which is specifically tailored for local government application.

A *Coastal Zone Climate Change Risk Assessment and Adaptation Plan* has been developed.[1] Subsequently, Mandurah Council conducted a further internal risk assessment based on a similar approach, to broaden the scope of climate change impacts beyond the coastal zone.

2. ASSESSING THE TOOL

2.1 DRIVERS FOR USING THE TOOL

1. Background/context:

Note: It is difficult to define 'tool' in this context. There was not just one "off the shelf" tool. This case study refers to the overall approach.

Project aims and scope:

The objectives of the Project were to:

- Identify and prioritise risks arising from climate change impacts for the Mandurah Coastal Zone.
- Develop strategies for managing these risks at a range of temporal and spatial scales.
- Develop a Climate Change Adaptation Plan.
- Integrate results of climate change risk assessment and adaptation responses into the proposed Climate Change Response Plan.

The key intended outcome will be an adaptation plan to deal with strategic and site-specific risks throughout the City of Mandurah Coastal Zone.

Time frame for applying the tool:

November 2008 - July 2009

2. Adaptation tool was taken up because?

Mandurah Council has a long involvement in sustainability including Local Agenda 21 (Rio Convention). Mandurah is in the coastal zone with waterways and canals so council was concerned about possible impacts of sea level rise and severe weather events, in line with Australia-wide concerns. The need to adapt to climate change was recognised some five to six years ago by council officers and a proactive Mayor. The particular approach was recommended by the Commonwealth Government as part of applying for Local Adaptation Pathways Program) (LAPP) funding.

3. Operational level tasks:

✓ risk assessment
✓adaptation recommendations
✓stakeholder engagement

4. Which priority issues, key needs or gaps did/does the tool address?

Need for a risk assessment for coastal impacts to respond to/mitigate and adapt to impacts of climate change.

5. User(s) within council (internal)

Internal workshops involved all relevant council staff.

Partners/stakeholders

Key external stakeholders comprised Government agencies and the Peel-Harvey Catchment Council.

6. Sources of baseline information

CSIRO/Bureau of Meteorology projections, Department of Transport coastal mapping (vulnerability and sensitivity assessment).

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[1] www.mandurah.wa.gov.au/ClimateChangeStrategy.htm
Coastal Zone Climate Change Risk Assessment and Adaptation Plan: Risk Assessment and Adaptation Summary Report, CZM Pty Ltd, 2009

2.2 IMPLEMENTATION METHODOLOGY[2]

1. **Can be used independently, without hand-holding?**
   Yes - Council followed a similar process to conduct climate change risk assessment internally for a subsequent project (see next question).

   Requires expertise of service provider/consultant to obtain optimum effectiveness?
   Consultants were used for the initial assessment of coastal zone impacts. Two staff then undertook a two-day training course on risk assessment. The next round of risk assessment, which broadened the scope from coastal zone to other climate change impacts, was conducted internally.

2. **A stand-alone tool - or used in conjunction with other tools?**
   It is difficult to define 'tool' in this context. There was not just one "off the shelf" tool. The approach involved a range of actions based on AGO 2006, Department of Climate Change 2009, and CZM methodology.

3. **Staff resources required to successfully operate it?**
   Coordinator Climate Change Services coordinated the project.

   Who needs to be involved?
   Other staff, Councillors and external stakeholders were involved in workshops

   Is training required before or during operation?
   No formal training was required to initiate the process. The project itself was a learning opportunity and the consultants were transparent about methodology and kept people informed.

   Additional software or other material resources required?
   Mandurah Council produced an *Adaptation Issues Paper* to assist Mandurah officers undertake climate change risk assessment.

4. **Adaptability of the tool to differing local contexts?**
   A similar approach was used in the follow-up other aspects of climate change in round of risk assessment, which broadened the scope from coastal zone to other climate change impacts

2.3 EVALUATING OUTCOMES

Note: Mandurah Council has produced:

- a *Local Adaptation Pathways Program) (LAPP) Grant Recipient Project Evaluation Report* that highlights the usefulness, benefits etc of the 'tool' Mandurah used
- a LAPP Summary report summarising key outcomes of the LAPP project. It can be found at http://www.mandurah.wa.gov.au/ClimateChangeStrategy.htm

1. **Did the tool lead to good outcomes/beneficial results achieved?**
   The process resulted in a risk assessment and adaptation plan that was incorporated into Council's structural risk register. Council is required to report on implementation of actions in the register, so success will be measured by implementation.

[2] See Elrick, C. and Travers, A. (2009) *Mandurah Coastal Zone Climate Change Risk Assessment and Adaptation Plan: Risk Assessment Methods*, Report prepared for the City of Mandurah. Coastal Zone Management Pty Ltd, Perth. www.mandurah.wa.gov.au/ClimateChangeStrategy.htm

The Project evaluation indicated that the process met all stated project objectives with the exception of *Integrate results of climate change risk assessment and adaptation responses into the proposed Climate Change Response Plan.* This is under way.

Current evaluation is as follows:

- *Resolves a difficult problem/issue, need or gap*
  Yes - *met the need for a risk assessment for coastal* impacts to respond to/mitigate impacts of climate change in the coastal zone

- *Enables informed decision-making*
  *Y*es - The project objective to identify and prioritise risks arising from climate change impacts for the Mandurah Coastal Zone has been met. Risk assessment was carried out initially at a strategic level. A number of climate change impacts were identified for consideration in the adaptation phase,

- *Enables improvements to strategic planning practices and/or action plans*
  Yes - **Currently a key risk is uncertainty in long-term land use planning and infrastructure design**. The approach has helped to provide a basis for LG planning. Implementation of the Adaptation Plan requires mainstreaming of climate change adaptation across Council and integration of climate change issues in key documentation that the Council utilises to deliver its services to the community. These documents and processes may include: Council Planning Schemes; Water Management Plans; Wetland Management Plans; Building and Engineering Codes; Emergency Management Plans; and Council Approvals.

- *Promotes systems thinking in climate change adaptation and sustainability*
  Yes - includes functional areas including NRM.

- *Drives innovative approaches to urban and regional planning*
  Yes - The approach ('tool') is one contributor to this.

- *Encourages collaboration within/across councils, and/or inputs from key stakeholders*
  Yes - Part of the City of Mandurah's approach is to contribute to the Peron-Naturaliste Cooperative Group of nine LGAs from Rockingham to Busselton

- *Capacity for flexibility/adaptability in other applications or contexts*
  Yes - Starting with coastal issues has encouraged Council to adapt the approach to examine climate change impacts across all areas

- *Capacity to be adapted or evolved over time to changing needs*
  Yes - Recognise that science and risk assessment approaches will change. The Adaptation Action Plan should be regularly reviewed and updated re the risk assessment component, and to monitor effectiveness of adaptation actions in treating identified risks.

2. Critical success factors?

- *Which feature of this tool works best for you?*

Risk assessment highlighted risks to Council from coastal climate change impacts

- *Particular features of the tool that suited your local context?*

The approach was designed for the local context based on the CZM approach.(See Q4 below).

3. Challenges/barriers encountered in using the tool?

CZM had to modify the approach because it was effective at assessing strategic risk for LG but Mandurah Council was **seeking a more specific, localised approach**.

4. Acquired skills/competencies at risk of atrophying without ongoing use?

Officers need to keep up with the latest science and update risk and adaptation approaches.

5. Adaptive learnings: what key lessons have you learned?

Council has developed an approach to assessing climate change risks and developing adaptation strategies by using this approach for the coastal zone, and is now applying it in the wider context. (For detailed learnings see Evaluation Report).

7. **Can you suggest one or more key improvement(s) to the tool's design or application, to pass on to the designers or other users?**
While coastal vulnerability assessment approaches facilitate examination at a regional scale, there are no approaches targeted at a local scale. Further, while the AGO risk framework is targeted at local government level operational risk, it is a strategic assessment framework and cannot deliver site-specific outputs.

As local governments continue to try to address the issue of climate change risk, there is an increasing need for a framework that moves beyond strategic assessment to **site-specific assessment**.

3. FUTURE DIRECTIONS

1. **Recommendations**: **What would you say about the tool to peers, neighbouring councils, professional associations, workshops and conferences etc?**

This Risk Assessment and Adaptation approach provides a consistent, transparent approach. It is recognised and meets Australian standards. It is beneficial to undertake such an assessment.

2. **Next steps?**

- Implementation involves an Action Plan based on the risk register. The Plan will be revised e.g. the original coastal zone risk assessment didn't have contour maps available. Will need to update with latest maps.

- The coordinated approach through the Peron-Naturaliste Cooperative Group will minimise duplication of effort.

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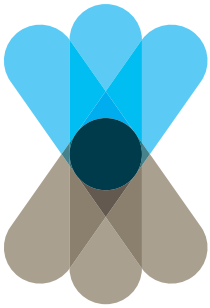

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