Understanding coastal urban and peri-urban Indigenous people’s vulnerability and adaptive capacity to climate change

Final Report

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Aboriginal reconnections:
Understanding coastal urban and peri-urban Indigenous people’s vulnerability and adaptive capacity to Climate Change

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The role of NCCARF is to lead the research community in a national interdisciplinary effort to generate the information needed by decision-makers in government, business and in vulnerable sectors and communities to manage the risk of climate change impacts.

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Cover image: Tjilbruki Monument, Kingston Park, South Australia © David Jones
ACKNOWLEDGEMENTS

We acknowledge the elders, families and forebears of the Kaurna people of the Adelaide Plains region, the Wathaurong and Boon Wurrung peoples of the Port Phillip Bay region, the Jagera people of the Ipswich and Brisbane region, and the Quandamooka people of Moreton Bay and North Stradbroke Island, who were and are the custodians of the land and water for many centuries.

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Boon Wurrung Story of the Creation of Port Philip Bay

This story was told by Ms Carolyn Briggs, a Boon Wurrung Elder, at a special Reconciliation Assembly of the Parliament of Victoria, 31 May 2000, during National Reconciliation Week

Many years ago this land that we now call Melbourne extended right out to the ocean. Port Phillip Bay was then a large flat plain where Boon Wurrung hunted kangaroos and cultivated their yam daisy.

But one day there came a time of chaos and crises. The Boon Wurrung and the other Kulin nations were in conflict. They argued and fought. They neglected their children. They neglected their land. The native yam was neglected. The animals were killed but not always eaten. The fish were caught during their spawning season. As this chaos grew the sea became angry and began to rise until it covered their plain and threatened to flood the whole of their country.

The people went to Bunjil, their creator and spiritual leader. They asked Bunjil to stop the sea from rising. Bunjil told his people that they would have to change their ways if they wanted to save their land. The people thought about what they had been doing and made a promise to follow Bunjil. Bunjil walked out to the sea, raised his spear and directed the sea to stop rising. Bunjil then made the Boon Wurrung promise that they would respect the laws.

The place the Kulin then chose to meet as a means of resolving these differences is where this Parliament [of Victoria] is now located. The Kulin nations met here regularly for many thousands of years. They debated issues of great importance to the nation; they celebrated, they danced.

For my great grandmother it was the strength of these beliefs and the belief that people could work together that helped her survive the crises our people faced when Europeans invaded her country over 160 years ago. My great grandmother was known by her European name, Louisa Briggs. When Louisa was a young girl she went on a journey with her mother, aunt and grandmother to what is now called Point Nepean. This is a special place with a special significance for the Boon Wurrung women. While they were there they were kidnapped by sealers and taken to an isolated island in Bass Strait. There they were put to work for the sealers. But at the age of 18 she took a husband and returned to her country in a small open boat.

When she returned to her country she searched for her people, but they were no longer there. Louisa eventually found some of her people at the Coranderrk reserve and she settled down to live there. She worked at the reserve as a matron. She became a strong political activist and her family were again forced to move because of their strong stand on land rights. They were banned from the reserve. She died in the 1920s at a very old age, but in bridging the time between the invasion of her country and the dispossession of her people she provided the cultural link, ensuring that her heritage continued to live. She continued to dream and talk about her country.

Louisa fought oppression, racism and political inequality. Today, as we consider the act of Reconciliation, I hope that her story will inspire not only her descendants but that in the spirit of Reconciliation it will provide a model of strength that can inspire all Australians.

Today Melbourne is the great multicultural city of the world and this special place continues to carry forward the spirit of our tradition. This land will always be protected by the creator, Bunjil, who travels as an eagle, and by Waarn, who protects the waterways and travels as a crow. Bunjil taught the Boon Wurrung to always welcome guests, but he always required the Boon Wurrung to ask all visitors to make two promises: to obey the laws of Bunjil and not to harm the children or the land of Bunjil.

As the spirit of my ancestors lives, let the wisdom and the spirit of generosity which Bunjil taught us influence the decisions made in this meeting place.


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ACRONYMS AND ABBREVIATIONS

AAV  Aboriginal Affairs Victoria
ABS  Australian Bureau of Statistics
AIATSIS  Australian Institute of Aboriginal and Torres Strait Islander Studies
BOM  Australian Bureau of Meteorology
BW  Boon Wurrung, occasionally written as Boonwurrung and Bunerong
BWF  Boon Wurrung Foundation Ltd
CBC  City of Brisbane Council
CC  Climate change
CCA  climate change adaptation
CCAC  Corporation of the City of Adelaide Council
CGGC  City of Greater Geelong Council
CHMPs  Cultural Heritage Management Plans
DCCEE  Department of Climate Change and Energy Efficiency
DPCD  [Victorian] Department of Planning & Community Development
GMATOC  Gunditj Mirring Aboriginal Traditional Owners Corporation
ICCA  Indigenous climate change adaptation ICCA
ILUA  Indigenous Land Use Agreement
IPCC  Intergovernmental Panel on Climate Change
JGMAC  Jagara Ganay-Magil Aboriginal Corporation Ltd
KNCHA  Kaurna Nation Cultural Heritage Association Inc
LKC  Living Kaurna Centre
MPC  Mornington Peninsula Council
NARP  National Adaptation Research Plan
NCCARF  National climate change adaptation Research Facility
PBC  Prescribed Body Corporate (prescribed under Queensland Native Title Act 1993)
PRG  Project Reference Group
PV  Parks Victoria
QCCCE  Queensland Climate Change Centre of Excellence
QLCAC  Quandamooka Lands Council Aboriginal Corporation Ltd
RAP  Registered Aboriginal Party (prescribed under Victorian Aboriginal Heritage Act 2006)
SEQ  South East Queensland
TOs  Traditional Owners
WAC  Wathaurung Aboriginal Corporation Ltd
WACO  Wathaurong Aboriginal Co-Operative Ltd
WTLCHC  Wurundjeri Tribe Land Cultural Heritage Council Inc

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GLOSSARY OF TERMS

Community Facilitator means an individual recognised by their respective Indigenous community who can serve as a conduit to enabling consent, participation, venue, engagement, clarifying network threads, whom has been nominated by their respective community to speak with and engage with the Project Team, and does not necessarily represent an Elder in their respective community.

Country means the tract of landscape for which an Indigenous community is historically custodian and occupier of including both land and water. The tract is often distinguished by one language, one set of community values and moiety systems, and one contemporary management entity.

Elder means a senior member of an Indigenous community – male or female – whom has a hierarchical leadership role in their respective community and whom often formally carries the ‘Uncle’ or ‘Aunty’ title. Note, not all Elders use this title in the public domain notwithstanding their clear governance position in their community.

Ethics comprises ethics consent and approval process under the National Statement on Ethical Conduct in Human Research (NHMRC 2007a) prepared jointly by the National Health and Medical Research Council (NHMRC), the Australian Research Council (ARC) and the Australian Vice-Chancellors’ Committee (AVCC), to which all Australian universities and academics must adhere to when undertaking research activities.

Governance is the management entity that has formal and or informal management and referral responsibilities as recognised by the respective state government. Most of these governance entities have formal corporate incorporation and legal structures and reporting mechanisms, and delineation of their geographical responsibilities.

Indigenous cultural systems comprises the Australian Aboriginal & Torres Strait Island peoples’ interpretations of their ‘country’ in terms of language, kin/blood, boundaries, familial hierarchy and internal management and custodianship systems and structures, including contemporary structures and entities.

Indigenous knowledge comprises the Australian Aboriginal & Torres Strait Island peoples’ interpretations of their environment including plants, seasons, animals, birds, astronomy, ‘country’, moral codes and oral narratives, familial and moiety systems, trade and journey routes including resource harvesting activities, etc.

Indigenous people in the context of this report refer to Australian Aboriginal or Torres Strait Islander persons. The research has used the Commonwealth Governments three part definition of an Indigenous person. In this definition an Indigenous person must be of Aboriginal or Torres Strait Islander descent, they must self-identify as Indigenous and also be accepted as part of the Indigenous community.

Reconciliation means ‘coming together’. In Australia it is the term used to refer to the bringing together of Aboriginal and Torres Strait Islander, or Indigenous, and non-Indigenous Australians.

Senior Custodian refers to people who have formal rights and responsibilities over Indigenous cultural matters.
**Traditional Owner** (TO) means the Indigenous community and its members who possess primary historical cultural associations with the country upon which they continue to occupy. It is often a term linked to governance of the country and used when speaking of native title.
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EXECUTIVE SUMMARY

Climate change is expected to have social, economic and environmental impacts on urban and peri-urban Indigenous communities inhabiting coastal areas throughout south-eastern Australia. These impacts include a loss of community and environmental assets, including cultural heritage sites, with significant impact on the quality of life of populations inhabiting these areas, and the establishment of potential favourable conditions for the spread of plant diseases, weeds and pests. Over most of south-eastern Australia, including southern Victoria and the Adelaide region, climate change is expected to lead to increased risk of heatwaves, longer drought periods, increased bushfire risk, increased risks of flood events and more frequent coastal inundation and associated impacts such as coastal erosion.

A review of the literature examining the impacts climate change on peri-urban and urban Indigenous people found that there is limited research on the topic in Australia and globally. The review did show that lower socio-economic members of this group are more vulnerable to climate change compared to the general Australian population. Their adaptive capacity is low as a result of the same systemic issues confronting Indigenous people that have led to disadvantage. As such, research on climate change adaptation positions climate change as one of the many issues facing Indigenous people and needs to be addressed collaboratively and not in isolation. Research from other more remote regions in Australia and abroad indicate collaborative community-based approaches are needed for effective climate change vulnerability assessments and the building of individual and collective adaptive capacity.

Several aspects collectively emerged from the literature research and the project workshops, namely:

- Specific Indigenous climate change adaptation (CCA) policy is absent in government policies and strategies and Indigenous representation in government climate change adaptation policy forums is poor - there is a need for a specific Indigenous voice in climate change adaptation discussions at the state and national levels;
- Adaptive capacity could be improved if Indigenous groups had enhanced access to their country;
- Due to ongoing historical disadvantage, socio-economic issues tend to override climate change adaptation considerations;
- Whilst important economically, wild plants and animals have cultural importance in contemporary identity building and exploitation of the wild food network presents important opportunities for urban and peri-urban Aboriginal people;
- Aboriginal language and words hold certain commonalities that have within them appraisals of longitudinally environmental patterns and changes, but opportunity to study urban and peri-urban Indigenous peoples understanding of climate change through these mediums will be seriously constrained through the decline in Indigenous language speakers amongst urban and peri-urban Aboriginal communities;
- There is concern about changes occurring within a background of peri-urban and urban expansion which have the potential to further disconnect Aboriginal communities from their country and seriously limit their stewardship opportunity;
- Peri-urban expansion is having a major deterioration upon the physical environment (land and water), which threatens cultural assets such as Aboriginal sites and is exacerbated by climate change;
Many of the climate change adaptation challenges can be overcome through collaborative approaches especially those that build in traditional knowledge so that it does not undermine cultural identity; and

There is an urgent need to ensure that the next generation of Aboriginal communities is across climate change adaptation and other environmental management issues related to country whilst addressing issues of succession planning.

The evidence emerging from this research clearly demonstrates that Aboriginal people’s consideration of the future, even with the overlay of climate change and the requirements for serious considerations of adaptation, are significantly influenced and dominated by economic aspirations which are seen as fundamental survival strategies for their communities.

Opportunities do not readily exist for a higher level of engagement with climate change adaptation policy and initiatives and this is further exacerbated by existing acute shortage of qualified / experiences members in urban and peri-urban Indigenous communities. Any opportunity to engage in climate change debate and policy formulation should not be missed for urban and peri-urban Indigenous communities. This is largely because many other initiatives can be linked and / or run in parallel with climate change adaptation initiatives which can start to address some long standing issues of a socio-economic and human capacity nature.

The recommended collaborative and comprehensive approach involves a high degree of inclusive participation and youth engagement leading to greater Indigenous connection to country, thus improving the chances of enhancing the adaptive capacity of individual and collective Indigenous people. This should lead to more meaningful engagement that maximises the gains from existing and emergent Indigenous Land Use Agreement (ILUA) process through the embedment of climate change adaptation intentions and support commitments along with serious employment of protocols in the ILUA process. All of these initiatives should lead to meaningful and higher order engagement by urban and peri-urban Indigenous communities in formal climate change adaptation policy agendas.

Much can be driven through the implementation of the proposed Research Plan which is a cornerstone of this research project.
1. INTRODUCTION

1.1 General

This research project, a partnership between Griffith University and Deakin University, links established Indigenous ‘country’ research and academic inquiries to strengthen the ‘community of knowledge’ about adaptation to climate change having regard to Indigenous longevity of perspective and Indigenous science.

This research has been funded from a grant from National climate change adaptation Research Facility (NCCARF) and undertaken under the auspices of their National climate change adaptation Research Plan for Indigenous Communities (2012) [NARP-I, 2012]. That NARP identified five broad categories of information necessary to enhance decision-making about climate change adaptation for Indigenous Australians, namely:

1. The sensitivity and exposure of Indigenous individuals, households, communities, businesses and institutions to climate risks;
2. The vulnerability and adaptive capacity of Indigenous individuals, households, communities, businesses and institutions to climate change;
3. Extreme weather events and emergency management planning for Indigenous communities;
4. Indigenous population movement, displacement, community relocation, and severe climate variation; and
5. Climate change adaptation and Indigenous biodiversity management.

This specific project addressed the NARPs Priority Research Topic 5: Understanding the capacity of Indigenous individuals, households, businesses, and institutions to adapt to climate change, and the identification of strategies to enhance this capacity.

1.2 Aims and Objectives

The overall aim of this study was to provide an initial examination of coastal urban and peri-urban Indigenous peoples’ vulnerability to, and capacity for climate change adaptation (CCA). Working collaboratively with five case study Aboriginal organisations, the study has explored a number of relevant climate change futures with the intent of examining an initial set of strategies to enhance their capacity to adapt to climate change. This was undertaken within the establishment of an ongoing framework for research and partnership in climate change adaptation. Set within the limited available time and resources, it has been designed to establish a framework, processes and procedures that can lead directly to a longer and more comprehensive research agenda over a number of years that will be capable of sourcing funds from conventional research and specific Indigenous sources.

The project’s specific objectives were:

1. to understand the vulnerability and adaptive capacity of coastal urban and peri-urban Indigenous people;
2. to collaboratively explore a range of strategies to enhance Indigenous adaptive capacity in selected case studies within a community of knowledge framework;
3. to establish the foundations of a community of Indigenous knowledge (network) for ongoing research into Indigenous climate change adaptation;
4. to consolidate the public domain knowledge and research in Indigenous climate change adaptation;
5. to scope the opportunities, challenges and processes for adding to the public domain knowledge;
6. to develop in partnership a set of protocols for ongoing Indigenous climate change adaptation research; and
7. to provide opportunities for the up-skilling of Indigenous researchers in the field of climate change adaptation.

1.3 Defining the Spatial and Focal Context

The spatial context in which this research has been focussed, includes the “urban” and “peri-urban” environments.

**Urban** areas may be cities, metropolitan areas, towns or conurbations. An urban location (sometimes referred to as the ‘built up area’) relates to or is concerned with a city or densely populated area. It is a place dominated by human activities and is characterised by higher population densities than its surrounding areas.

**Peri-urban** in the Australian context, refers to the fringing landscapes adjacent to the edge of an urban area into which it expands or influences (‘peri’: around, about or beyond) (Buxton et al, 2006). These areas have experienced unprecedented rapid growth and have been defined as “the urbanized edges of cities plus the spaces into which they expand, both physically and functionally” (Burnley & Murphy, 1995: 245).

Whilst comprising only approximately 1.2 % of the total population of major cities in 2006, most Indigenous Australians live in urban or regional parts of the country. In 2006, 74.5% of the Australian Indigenous population lived in a major city or regional centre (Biddle 2012: 14). In fact, 43% of Australia’s Indigenous population reside in an urban centre (Australian Government 2010: 106). Increasingly, the Indigenous population is becoming more urban and this pattern is likely to continue over the next few decades (Biddle 2012: 18). Taken together, projections in Biddle and Taylor (2009) suggest that the Indigenous population in major cities will increase by 34.0% between 2006 and 2016 compared to 8.8% for the Indigenous population in very remote areas.

A critical difference between the coastal urban and peri-urban Indigenous people who were the focus of this study and traditional Aboriginal communities of remote and central and northern Australia is that the former do not live in discrete Indigenous communities and tend to be generally integrated into the wider urban and peri-urban community. In essence, the majority of urban and peri-urban Aboriginal people live off-country. This fact had important methodological implications for the research engagement with the case study organisations (see Section 2).

Coupled with this increasing urbanisation of the Indigenous population is a decline in the percentage of the Indigenous population who spoke an Indigenous language at home. Biddle (2012: 21) estimates that it has declined from 12.1% in 2006 to 11.6% in 2011.

To understand the relationship of the Indigenous population to the peri-urban context, Dugdale (2008) has reported that in the 2006 Queensland situation, 24% of the state’s Indigenous population lived in Brisbane City and 32.4% lived in the essentially peri-urban South East Queensland (SEQ) region centred on Brisbane City.
In all five case studies, the percentage of the population in each respective region who were estimated to be Indigenous was less than the national average (3.0%). The focal context is set by the project’s aims and objectives (see Section 1.2). In this sense it is clearly focussed on climate change adaptation.

**Adaptation** is understood as “actual adjustments, or changes in decision environments, which might ultimately enhance resilience or reduce vulnerability to observed or expected changes in climate” (Adger et al., 2007: 720).

The matter of a community’s vulnerability, adaptive capacity and resilience to climate change, especially in regard to selected urban and peri-urban Indigenous coastal communities, provides a finer focus on this project’s directions. This study adopts the definition of vulnerability and its components – exposure, sensitivity and adaptive capacity – proposed by the Intergovernmental Panel on Climate Change’s Fourth Assessment Report (Adger et al., 2007).

**Vulnerability** is understood here as: “the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.” (Adger et al., 2007: 883).

**Exposure** refers to the expected changes to climatic stimuli in a given location. For example, coastal regions are more exposed to sea-level rise than inland communities; and inland regions are more exposed to temperature increases than coastal communities.

**Sensitivity** is the degree to which a system may directly or indirectly be affected by climate variability or change. For example, the sensitivity of a large city to the impacts of a cyclone crossing over is greater than for an unpopulated region; and the sensitivity to higher temperatures of crops that require regular winter frosts is greater than tropical crops.

Together, exposure and sensitivity produce the potential impacts of climate change, which can be attenuated by the individual or system’s adaptive capacity.

**Adaptive capacity** refers to the ability or potential to respond successfully to climate variability and change, including adjustments in behaviour, resources and technologies. It is comprised of a society’s or system’s financial, human, technological, infrastructural, institutional and natural capital.
2. METHODOLOGY

2.1 Approach

This project adopted a case study approach and engaged with key representatives from Indigenous organisations in five case study locations in three states of Australia (discussed in following Chapter). Over the 12 months available for the research, a series of case study specific workshops, were undertaken to engage with the nominated key individuals to introduce, discuss and understand their capacity as individuals, households, businesses, and institutions to adapt to climate change. A limited number of selected interviews were also undertaken to follow up a number of themes that emerged from the workshops. The workshops also provided opportunities to identify and to commence to scope out strategies to enhance their capacity to adapt to future climate change.

A key overarching issue for this project has been the twelve months available for the research and the short time frames that were available to negotiate and establish the collaborative agreements with the various Indigenous groups. This was overcome through the existing contacts and established ongoing working relationships that the principle investigators had with a number of Indigenous community groups throughout urban and peri-urban Australia. Using their existing contacts, the researchers were able to rapidly gain agreement for the participation of selected Indigenous organisations as representatives of the dispersed urban and peri-urban Aboriginal communities in three states. However it should also be noted that this process was not helped by a number of unexpected changes at the CEO level of two of the original case study organisations that delayed the project.

Whilst it was originally hoped that a series of community workshops could be conducted in each of the five case study areas, it became obvious from initial discussions at the commencement of the study that this approach was highly problematic because many of the case study communities were heavily distracted with native title and related issues and others were overcommitted on a range of essential Aboriginal services delivery. The fact that Aboriginal urban and peri-urban community members were not co-located and were living and working in dispersed modes throughout the wider general community made it difficult to place extra calls on them to assemble for research workshops at convenient times and locations.

At the commencement of the project, the principle investigators worked with their respective contacts in the five Aboriginal organisations to gain agreement on the scope and the level and methods of engagement. These contacts acted as ‘community facilitators’ and were crucial in ensuring the success of the engagement process. They were respected and influential members in each community that the principal investigators had long and established links with. In all cases they included Elders and chief office bearers of the case of Aboriginal organisations.

It was agreed to persist with the original two series of workshops for the twelve-month project time frame but to reorganise them into a meeting format with facilitated discussions with stakeholders engaged through this process being Elders, chief office bearers of organisations and knowledgeable people who could present the position of their dispersed communities – e.g. people in executive and / or responsible positions in Aboriginal organisations. All of the Elders engaged in this manner were in most cases the most senior members of their community and were also members (Directors) of governing boards overseeing the affairs of their communities.
The participants engaged through this process and thus the number of attendees and their cultural ability to discuss and consider the information and offer thoughts and recommendation were beyond the control of the research team. The research team had to respect these arrangements, as they are part of the respective cultural protocol of the Indigenous communities participating. Thus, the merit of the results are not embedded in conventional humanities and applied science numerical statistics but in cultural statistics in terms of cultural standing, cultural engagement and cultural empowerment and these qualitative variables cannot be explicitly explained in the body of the report because of NEAF ethical protocols, and because of cultural protocols expected of the research team by the participants and their communities. The number of Elders, senior office bearers and key knowledge members that attended each meeting is shown in Table 1.

Table 1: Attendance of Elders, senior office bearers and key knowledge members at Workshop Meetings

<table>
<thead>
<tr>
<th></th>
<th>Quandamooka</th>
<th>Kaurna</th>
<th>Wathaurong</th>
<th>Boon Wurrung</th>
<th>Jagera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workshop Meeting #1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Workshop Meeting #2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

The workshops acted as a principal data collection process of what is considered a pilot study which was set up to explore options that could lead to possible extension studies which could be completed beyond the scope of this study. The first series of one day workshops was focused on providing participants with a background explanation of the project and to introduce them to climate change material for their respective regions aimed at leading to an understanding of potential climate change impacts and associated landscape changes. The climate change material was arranged and presented in the form of “Climate Storylines” and a series of impact and landscape change maps (see Appendix B).

The remainder of the workshop sought to explore participants’ and their organisations’ vulnerabilities and adaptive capacity (including their concerns, viewpoints, aspirations, and issues about climate change adaptation). Particular attention was focused on attempting to identify participant’s vulnerabilities and existing known adaptive capacities to climate change. Clarification was also sought on what information and content was culturally acceptable to be included in the public domain reports. These undertakings were set within a broader context with participants completing a visioning exercise in relation to their aspirations for a future:

1. Australian Aboriginal society in 20+ years; and
2. their community by 2030.

Both series of workshops were conducted approximately three months apart with timing determined solely by participant’s availability. The second series of one day workshops commenced with bridging material comprising the outputs of workshop 1 and a reiteration of the climate change material from the previous workshop. The workshop explored a range of potential strategies for enhancing adaptive capacity within the case study organisations including discussions about climate change adaptation interpretations and responses.
An extensive literature search was completed on the topic of Indigenous climate change vulnerability and adaptation pertaining to urban, peri-urban and coastal communities. University library databases and Google scholar were used to search for peer reviewed literature including combinations of the following words: indigenous; climate change adaptation; vulnerability; peri-urban; urban; traditional knowledge; aboriginal. This led to the compilation of an annotated bibliography on the subject of: “Understanding Coastal Urban and Peri-urban Indigenous People’s vulnerability and adaptive capacity to Climate Change”. A document review was also conducted of key State and Local Government’s policy documents on the topic of climate change adaptation and direct and indirect links to the Indigenous communities in the jurisdiction of those policy documents.

As the study progressed through its various stages, the research team sought constant feedback and confirmation of reported findings and minutes of meetings from the participating Aboriginal organisations and their representatives. The final recommendations and the research plan are the outcomes from a special workshop of the Project Reference Group (see Section 2.3) conducted at the conclusion of the research phase to confirm the second series workshop findings.

2.2 Research Protocols & Ethics

The overarching protocols used in this project include:

- National Health and Medical Research Council (NHMRC 2007a), Australian Research Council (ARC) & Australian Vice-Chancellors’ Committee (AVCC) 2007, National Statement on Ethical Conduct in Human Research. Canberra, ACT: Australian Government.

The project was subject to successful ethics approvals applications via Griffith University and Deakin University. The project was granted ethical approval by:

- The Griffith University’s Expedited Ethical Review Panel (GU Ref No: ENV/04/12/HREC); and
- Deakin University’s Human Research Ethics Committee (DU Ref No: 2011-250).

From the outset, a core agenda of the research team has been to ensure ‘fair, prior and informed consent’ of all Indigenous partners that commenced prior to the call for the project tenders phase that enabled the sourcing of ‘letters of commitment’ by the Indigenous organisations, and thereupon progressive individual participant consent during the research process.

During the study, all participants engaged in the workshops and interviews were supplied with an Information Sheet setting out the ethical conditions under which the research was being conducted. Each participant was then requested to signify their
voluntary participation by signing a Plain Language Consent Form as required under the Ethics procedures. A copy of the Information Sheet and the Consent Form is included as Appendix A.

2.3 Project Reference Group

The project and the case study research was guided by an expert reference group – a Project Reference Group (PRG), drawn from key stakeholders in each case study jurisdiction and all project partners. The PRG was established with representatives from all five Indigenous organisations. Each Indigenous partner organisation was invited to nominate their representative in accordance with established protocols.

Role of the PRG

The PRG guided the overall study, directed the researchers to specific matters relevant to Indigenous society and its Indigenous members acted as the ‘community facilitators’ to their respective communities.

The specific roles of the PRG and its members were to:

- participate in Reference Group meetings;
- provide a forum for the researchers to discuss ideas, progress and seek stakeholder opinion, advice and support;
- provide reviews of project outputs and comments on draft reports;
- guide the project team to relevant data sources and information;
- identify key contacts and information for the project, suggest target audiences for project outputs and, where appropriate, promote the project and its findings in appropriate forums;
- provide input regarding communication guidelines and strategies;
- assist the project team to disseminate the project outputs through their respective networks; and,
- provide advice on linkages to other relevant programs and projects in the project study areas.

Membership

The PRG comprised a representative from:

- Kaurna National Cultural Heritage Association (Adelaide Plains region) (KNCHA) in South Australia
- Wathaurong Aboriginal Co-Operative Limited (Greater Geelong region) (WACO) in Victoria
- Boon Wurrung Foundation Limited (Melbourne City to Wilsons Promontory region) (BWF) in Victoria
- Quandamooka Lands Council Aboriginal Corporation (Stradbroke Island/Moreton Bay region) (QLCAC) in Queensland

1 The former Queensland Department of Local Government & Planning (Q.DLGP) was an original member prior to the 2012 change in government.
- Jagera Ganay-Magil Aboriginal Corporation (Brisbane-Ipswich region) (JGMAC) in Queensland
- Griffith University research team
- Deakin University research team

The PRG secretariat was provided by the Griffith University research team.

The Project Reference Group was instrumental in providing guidance and cultural protocol oversight for the research project. The cross-community membership of the Group collectively considered and approved the methodological approach employed by the research team, variations in community case study arrangements, and the validity of the community engagement workshops in terms of attendance and cultural standing.
3. CASE STUDY AREAS

3.1 Indigenous Case Study Areas

Five coastal peri-urban/urban case study areas across south-eastern Australia were identified through agreements with five autonomous Indigenous community organisations that were engaged from the outset of the project proposal (see Figure 1). Participating Indigenous organisations include:

- Kaurna Nation Cultural Heritage Association Inc (KNCHA) Adelaide Plains - an urban Indigenous group within the Adelaide metropolitan region that has been involved in recent strategic planning place-making expression activities and workshops.
- Wathaurong Aboriginal Co-Operative Limited (WACO) at North Geelong – a community-based organisation providing Indigenous people within the Greater Geelong and surrounding areas with access to health, housing, education, employment and heritage services.
- Boon Wurrung Foundation Limited (BWF) in conjunction with the Mornington Peninsula Shire (MPS), Victoria (Melbourne City to Wilsons Promontory) - an urban/peri-urban Indigenous group on the south-east fringe of Melbourne that has extensive coastal urban sprawl and is witnessing attempts by the Victorian state government to enable increased sprawl into previously designated green belt areas within their ‘country’ that directly impact upon their cultural and natural environmental responsibilities.
- Quandamooka Lands Council Aboriginal Corporation (QLC) Stradbroke Island / Moreton Bay South East Qld - a peri-urban Indigenous community that experiences major seasonal visitation impacts associated with their proximity to the Brisbane metropolitan region. The State government is currently undertaking a major land use planning study for North Stradbroke Island which involves the Quandamooka community and their recently awarded native title lands. Many members of this community reside and work off country in the Brisbane metropolitan area.
- Jagera Ganay-Magil Aboriginal Corporation in the Brisbane-Ipswich region - comprises and represents several urban Indigenous groups within the Brisbane-Ipswich metropolitan region.

2 Whilst the study team has chosen to work with the five case study organisations for reasons outlined in Section 2.1, it is recognized and acknowledged that there are other traditional owner groups who may also have interests in the case study areas but are not involved in this project (e.g. the Turrbal in relation to Brisbane and Wurundjeri in relation to Melbourne).
3.1.1 South East Queensland Landscape

As with other urban/peri-urban regions in south-eastern Australia, South East Queensland (SEQ) contains a large heterogeneous Indigenous population that is comprised of individuals and families drawn from communities based across Australia. With the increasing urbanisation of Indigenous peoples, it is a region with a steadily growing Aboriginal population (Biddle 2012; Biddle & Yap 2010). The recognised Traditional Owners (TOs) of the region are extended families who identify with the former hunter-gatherer language groups, such as the Jagera (Yagara, Yuggera or Jagara) and Quandamooka peoples, who lived in the region when European settlement commenced in the early 19th century (see Figure 2).
The Jagera Ganay-Magil Aboriginal Corporation is an Indigenous community organisation based in the Brisbane-Ipswich region of SEQ. It services the contemporary Jagera community that numbers a hundred or more individuals, many of whom are members of the extended Bonner family. While membership of the Corporation is based upon local residency, individuals within the Jagera community are widely dispersed. The Jagera people have formed a native title party and after an earlier claim was withdrawn, have now lodged the Jagera People #2 native title claim (Native Title Determination Application QUD6014/03) over their country. The area claimed includes parts of Queensland’s most heavily populated region: the Brisbane CBD, much of Brisbane’s southern and eastern suburbs, and Ipswich. This claim is yet to be determined by the Federal Court, although the City of Ipswich has an ILUA (City of Ipswich 2008) with the Jagera, Yuggera and Ugarapul People, which recognises the rights of TOs and assists them to continue caring for country.

The Quandamooka Lands Council Aboriginal Corporation represents an Aboriginal community that has continuously occupied their traditional lands on North Stradbroke Island (Minjebra) since European settlement. Numbering between four and five hundred people, the Quandamooka people on the island are comprised of families based in the small settlements of Dunwich, Amity Point and Point Lookout, and others living on bush allotments. There are also Quandamooka families living nearby in the Brisbane metropolitan area. The Quandamooka traditional estate includes the central and southern seas of Moreton Bay, the islands of Moreton, North and South Stradbroke, across to the mainland coast and coastal streams between the Brisbane and Logan Rivers (roughly coinciding with Redland Shire), and the numerous smaller islands in the central and southern Bay. The Quandamooka community was granted
native title of North Stradbroke Island in late 2011 (Federal Court no. QUD6010/1998). As a consequence, a Prescribed Body Corporate (PBC), the Quandamooka Yooloooburrabee Aboriginal Corporation (QYAC), has been established under the Native Title Act 1993 to hold in trust and manage the determined native title on behalf of the native titleholders of North Stradbroke Island (Minjebrah)3.

The Quandamooka people living on North Stradbroke Island are largely engaged in service industries (such as health and housing), tourism, sand mining and commercial fishing (Quandamooka Aboriginal Community 2007). At peak holiday times, the island population sometimes swells to more than 30,000, leading to a range of significant social and environmental impacts. The local Aboriginal community deals with a diverse range of management issues that appear to be unique in south-eastern Australia, due to the impacts of close proximity to a metropolitan area coupled with limited access to services often more akin to a remote location. Organisations comprised of resident groups have possessed the majority of the management and governance responsibilities for the Island, although since the granting of native title they have been subject to further challenges with maintaining corporate decision making processes and economic viability.

3.1.2 Southern Victorian Landscape

The Port Phillip Bay region includes Geelong, Melbourne and the Mornington Peninsula urban and peri-urban regions. The Boon Wurrung Foundation Limited represents the interest of TOs living in the region from the City of Melbourne to Wilsons Promontory, including the Mornington Peninsula. While it is not a Registered Aboriginal Party (RAP) at present, it has recently made a formal application to be considered for this standing under the Victorian legislation. The Boon Wurrung community is a small group of less than a hundred individuals, with membership chiefly defined by their relations to key Elders, in particular Aunty Carolyn Briggs. While building the broader recognition of their identity as TOs, the Boon Wurrung community has become involved in Aboriginal heritage assessment clearances and land care projects. The community is now profiled in museum displays and the state education Indigenous curriculum, with Aunty Carolyn Briggs promoting the Dreaming connections to country and studying their Indigenous language (Briggs 2008, 2010). To help achieve their goals in having an expanded role in managing country, the Foundation has formed a close partnership with the Port Philip EcoCentre at St Kilda.

The Wathaurong Aboriginal Co-Operative Limited (WACO) is a community-based organisation with the primary goal of providing Indigenous people within the Greater Geelong and bordering areas access to a range of culturally appropriate holistic services, particularly in health, housing, education, employment and heritage (Wathaurong Aboriginal Co-Operative 2012). Formally, under Victorian state legislation, it is not a RAP. RAP responsibilities have been vested in the Wathaurung Aboriginal Corporation (WAC), which is based in nearby Ballarat. More generally the Co-Operative contributes to the improvement of cultural well-being and the capacity building for Indigenous people, as the community strives to control its own affairs and achieve self-determination. It services an Indigenous community numbering between 3,000 to 5,000 people, which includes a large proportion of transient Aboriginal and Torres Strait Islander people who travel to Wathaurung country from all over Australia.

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3 The Quandamooka Lands Council Aboriginal Corporation (QLC) study participants were associated with the executive of the QYAC.
for education, employment, housing and health reasons. The people who are more permanently based in the area and identify themselves as having direct family links to the Wathaurong number about 2,500. In some contexts the Co-Operative takes on the role of speaking for the Custodians of Wathaurong (Wathaurung, Wada Wurrung) country, although the Victorian Government does not recognise it as a RAP to represent TOs. Near the You Yangs, to the north of Geelong on the Werribee Plains, the Co-Operative is currently managing the 800ha Wurdi Youang volcanic plains grassland property.

Figure 3: Native Title claims & Interest Areas in the Southern Victoria Region

3.1.3 Adelaide Plains Landscape
In the urban and peri-urban areas centred around Adelaide City live Indigenous families with strong connections to former Aboriginal missions, such as Point McLeay (Raukkan) in the Lower Murray and Point Pearce on Yorke Peninsula (Clarke 1996; Hall 2004; Hemming & Clarke 1989). Apart from their links to the surrounding rural regions, some of these families also trace descent from the Kaurna people, who are the TOs of the Adelaide Plains region. Broader community recognition of the Kaurna community as Indigenous TOs of the Adelaide Plains and surrounding areas emerged
in the 1970s when key individuals, Respondent K2 and Respondent K1⁴, began exploring their cultural relationship to the region through their own genealogical and Dreaming links. The number of Indigenous people identifying as Kaurna today numbers several hundred. The remit of Kaurna identity-building activities has included the increasing focus on sites associated with the Tjilbruke (Glossy Ibis (Plegadis falcinellus)) Ancestor and the study of the dictionary produced by Lutheran missionaries (Teichelmann 1857; Teichelmann & Schürmann 1840) living in Adelaide during the 1830s. The Kaurna Nation Cultural Heritage Association (KNCHA) is a group that is primarily concerned with the management of Aboriginal sites on Kaurna country. The Association works alongside two other Kaurna organisations: Kaurna Yerta Co-Operative, which is the native title group, and Kaurna Warra Pintyandi, which looks after custodianship of the Kaurna language.

While the profile of the Kaurna people is high within South Australia, as a community they do not have access to sufficient land for the development of cultural businesses. There has not yet been a determination of their native title claim, which they lodged back in 2000 (Federal Court no. SAD6001/2000). The Warriparinga Living Kaurna Centre, operated by the City of Marion Council, is a focus of future plans for increasing the profile of the Kaurna community as TOs of the greater Adelaide region. Kaurna country includes the coast line and adjacent plains of Gulf St Vincent and Fleurieu Peninsula, from Cape Jervis to Crystal Brook, along the western side of the Mount Lofty Ranges.

⁴ In accordance with the protocols for this project, the anonymity of study participants (e.g. workshops and interviews) has been ensured through the utilization of these codes
Figure 4: Kaurna Peoples Native Title Area in the Adelaide Region
A summary of the generic characteristics of each of the five case studies and their respective organisation is provided in Table 2.

**Table 2: Summary of Generic Characteristics of the case Studies**

<table>
<thead>
<tr>
<th>Case Study</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational Name</td>
<td>Kaurna National Cultural Heritage Association Inc (KNCHA)</td>
<td>Wathaurong Aboriginal Co-Operative Ltd (WACO)</td>
<td>Boon Wurrung Foundation Ltd (BWF)</td>
<td>Quandamooka Lands Council Aboriginal Corporation Inc (QLCAC)</td>
<td>Jagera Ganay-Magil Aboriginal Corporation Inc (JGMAC)</td>
</tr>
<tr>
<td>Country: Geographical Location &amp; Scope</td>
<td>Adelaide Plains</td>
<td>Geelong and Barwon Region, south-west of Melbourne</td>
<td>Lands stretching from southern Melbourne to Wilsons Promontory including the Mornington Peninsula</td>
<td>Moreton Bay and North Stradbroke Island region east of Brisbane</td>
<td>Brisbane – Ipswich metropolitan areas</td>
</tr>
<tr>
<td>Corporate Status</td>
<td>Incorporated with an aim of cultural heritage custodianship and referral</td>
<td>Co-operative with an aim of employment, social and health provision for Indigenous residents</td>
<td>Limited company serving as a spokesperson for the Boon Wurrung</td>
<td>Incorporated with an aim of cultural heritage custodianship and referral</td>
<td>Incorporated with an aim of cultural heritage custodianship and referral</td>
</tr>
<tr>
<td>Legal Status</td>
<td>Advisory referral service</td>
<td>Advisory referral service; not a Registered Aboriginal Party (RAP) which is fulfilled by the Wathaurung Aboriginal Corporation</td>
<td>Advisory referral service; not a Registered Aboriginal Party (RAP) but has made application for status in conjunction with the Bunerong community</td>
<td>Quasi-local government entity arising from a successful Native Title claim</td>
<td>Advisory referral service</td>
</tr>
<tr>
<td>Urban Characteristics</td>
<td>Urban and peri-urban Adelaide Plains metropolitan context</td>
<td>Urban and peri-urban Geelong metropolitan context</td>
<td>Urban and peri-urban southern Melbourne metropolitan context</td>
<td>Peri-urban Moreton Bay regional context</td>
<td>Urban and peri-urban Brisbane - Ipswich metropolitan context</td>
</tr>
<tr>
<td>Geographical Characteristics</td>
<td>Plains landscape adjunct to the Gulf St Vincent</td>
<td>Rolling plains landscape adjunct to Port Philip Bay and the Bellarine Peninsula</td>
<td>Mixed environment from coastal to swamps to farmlands to national parks</td>
<td>Coastal and riverine landscapes including major islands</td>
<td>Mixed environment from coastal to swamps to farmlands to riverine plains</td>
</tr>
</tbody>
</table>
4. CLIMATE CHANGE ADAPTATION

Based on the current concentration of greenhouse gases already accumulated in the Earth's atmosphere, it is increasingly recognised that we will need to adapt to climate change regardless of efforts focused on curbing future carbon emissions (Parry et al., 2007; Monasterik, 2009).

Expected climate change impacts to affect Australia include change in rainfall patterns, increase in average temperatures, sea level rise, drought, and increase in the frequency and intensity of extreme weather events such as heatwaves, coastal hazards and storms (CSIRO, 2007; Hennessy et al., 2007).

Climate change impacts are expected to affect cities and regions differently (Füssel, 2007). Additionally, there is no uniformity across individuals, groups within society, organisations and governments in terms of their adaptive capacity and how they can respond to current and future climate change impacts (Vincent, 2007). Consequently, adaptation will need to occur at, and be specific to, various scales from local through to regional and national (Adger, 2005). This section focuses on the current status of climate science knowledge for the three regions containing the five case studies and identifies key implications that climate change is likely to have for its Indigenous communities.

4.1 Climate Science

Climate science comprises an evolving field of knowledge and is marked by uncertainties (Reilly and Schimmelpfennig, 2000; Patt et al., 2005). This is particularly the case of future climate change projections specific to smaller scale areas such as defined native title areas. Drawing on the latest available information, an overview of how climate change is likely to impact the three regions containing the five case study areas: South East Queensland, Southern Victoria and the Adelaide region is presented in Table 3. Detailed projections and information for each region and case study area are contained in specific climate storylines and impact maps that were employed in workshops during the course of the research with the case study communities (see Appendix B). A comparative summary of the climate change variables for each case study community is tabulated below.
## Table 3: Comparative Summary of Climate Change Variables for Case Study regions

<table>
<thead>
<tr>
<th>Climate Change Variables</th>
<th>Case Study Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Kaurna National Cultural Heritage Association Inc (KNCHA)</td>
</tr>
<tr>
<td>Vulnerability Rating (CSIRO, 2007; Suppiah et al., 2007; Suppiah et al., 2006)</td>
<td>Medium</td>
</tr>
<tr>
<td>Temperature Changes</td>
<td>Average temperatures have already increased by 1.2°C since the 1950's (Suppiah et al., 2006), increase in the future reaching 0.8°C by 2030 and 2.3°C by 2070 (Department of Environment and Natural Resources, 2010).</td>
</tr>
<tr>
<td>Rainfall Changes</td>
<td>Decline in annual averages of 4.5% by 2030 and 15% by 2070, with greatest decline to occur in winter and spring (8%) (Department of Environment and Natural Resources, 2010).</td>
</tr>
<tr>
<td>Rainfall Events</td>
<td>More extreme rainfall events are also expected (Suppiah et al., 2006; Murphy and Timbal, 2008).</td>
</tr>
<tr>
<td>Flooding &amp; Wind Events</td>
<td>Not available.</td>
</tr>
<tr>
<td>Coastal</td>
<td>More intense storm events as greater exposure to storm surge</td>
</tr>
</tbody>
</table>

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20 Aboriginal reconnections
<table>
<thead>
<tr>
<th>Climate Change Variables</th>
<th>Case Study Regions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Risks (Storm surges and erosion)</strong></td>
<td></td>
</tr>
<tr>
<td>well as higher coastal storm surges (Suppiah et al., 2006)</td>
<td></td>
</tr>
<tr>
<td>inundation with expected change to be from the current 1 in 100 year to become a 1 in 1 to 1 in 4 year event by 2070 (Kinrade and Preston, 2008).</td>
<td></td>
</tr>
<tr>
<td>indicate a rise of approximately 80 cm by 2100 (Parry et al., 2007).</td>
<td></td>
</tr>
<tr>
<td><strong>Evaporation (CSIRO, 2007)</strong></td>
<td></td>
</tr>
<tr>
<td>Increased potential evaporation and reduction in relative humidity leading to drier conditions</td>
<td></td>
</tr>
<tr>
<td>Increased potential evaporation and reduction in relative humidity leading to drier conditions</td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Increased potential evaporation and reduction in relative humidity leading to drier conditions</td>
<td></td>
</tr>
<tr>
<td><strong>Bushfire Events</strong></td>
<td></td>
</tr>
<tr>
<td>Increase the frequency and intensity of extreme fire weather days as well as create conditions towards longer fire seasons and reduced number of days suitable for controlled burning due to accumulated fire risk (Lucas et al., 2007).</td>
<td></td>
</tr>
<tr>
<td>Worsening fire weather conditions are also expected to occur with an increase in the number of days of ‘very high’ or ‘extreme’ forest fire fire risk by 1 to 2 days by 2030 (Lucas et al., 2007).</td>
<td></td>
</tr>
<tr>
<td>Worsening fire weather conditions are also expected to occur with an increase in the number of days of ‘very high’ or ‘extreme’ forest fire risk by 1 to 2 days by 2030 (Lucas et al., 2007).</td>
<td></td>
</tr>
<tr>
<td>Increase in average mean annual temperature and severe weather events, such as extended periods of drought, due to climate change could also lead to more favourable conditions for the occurrence of bushfires (Hennessy, 2004).</td>
<td></td>
</tr>
<tr>
<td><strong>Hot Days and Frost days</strong></td>
<td></td>
</tr>
<tr>
<td>Increase in the frequency of extremely warm days (above both 35°C and 40°C) and nights along with a decrease in the frequency of extremely cool days and nights (McInnes et al., 2003).</td>
<td></td>
</tr>
<tr>
<td>Increase in the number of extreme hot days with temperatures above 35°C and 40°C and a decrease in the number of frost days (City of Greater Geelong, 2011; Department of Sustainability and Environment, 2008).</td>
<td></td>
</tr>
<tr>
<td>Increase in the number of extreme hot days with temperatures above 35°C and 40°C and a decrease in the number of frost days (City of Greater Geelong, 2011; Department of Sustainability and Environment, 2008).</td>
<td></td>
</tr>
<tr>
<td>Increase in mean temperatures will also increase the number of days over 35°C in the region (Suppiah et al., 2007; Department of Environment and Resource Management, 2009).</td>
<td></td>
</tr>
</tbody>
</table>

Aboriginal reconnections
4.1.1 South East Queensland

The SEQ region has been identified as a vulnerability ‘hot spot’ to be affected by climate change in Australia due to on-going population growth and the location of urban development along its low-lying coastline and floodplains (Hennessy et al., 2007). While there is much uncertainty surrounding current climate science, models have shown that SEQ will be affected by changes in climatic averages, including rainfall and temperature, sea-level rise and an increase in extreme weather events.

Over the last decade, SEQ has had an increase of 0.4°C in the average annual temperature and an increase between 0.5 and 1.5°C is projected to occur by 2030 (Suppiah et al., 2007; Department of Environment and Resource Management, 2009). The increase in mean temperatures will also increase the number of days over 35°C in the region (Suppiah et al., 2007; Department of Environment and Resource Management, 2009). The region’s average rainfall has been changing, particularly in the eastern coastal region where a decline by almost 55mm per decade has been observed since 1950 (Gallant et al., 2007). Although rainfall projections carry significant uncertainties it is expected that there will be changes in average rainfall, with an increase in the frequency of dry days and decrease in the frequency of wet days (CSIRO, 2007).

On the other hand, by 2070, extreme rainfall events are likely to increase across most of the region, particularly along the stretch from the New South Wales border to the north of Brisbane (Abbs et al., 2007). The region could face an increase of up to 25% in the intensity of 1-in-20 year daily-rainfall event (Hennessy, 2004). As SEQ is one of the most flood-prone regions in Australia, an increase in extreme rainfall events could inundate the floodplains of several catchments (Abbs et al., 2007).

Extreme rainfall events affecting SEQ are a consequence of severe storms, particularly of tropical and sub-tropical origin. While tropical cyclones can affect SEQ on a small scale (Harper et al., 2001), east coast lows affect the region more frequently with severe consequences, such as flooding and wind damage, particularly along the coast (Harper and Granger, 2001; Abbs et al., 2007). In addition, SEQ has moderate thunderstorm activity averaging between 20 to 40 days per year (Hennessy, 2004).

A number of characteristics presented by human settlements in SEQ can potentially increase the risk and related consequences of bushfires in the region. These include the increasing population inhabiting outer suburban and peri-urban areas which are located in close proximity to bushlands (Granger et al., 2001; Low Choy et al., 2007). The increase in average mean annual temperature and severe weather events, such as extended periods of drought, due to climate change could also lead to more favourable conditions for the occurrence of bushfires in the region (Hennessy, 2004).

In terms of coastal hazards posing threats to SEQ, these include storm surges and coastal erosion. While these hazards already impact the region due to weather patterns in the Pacific Ocean, the Coral Sea and the Tasman Sea (Low Choy et al., 2010), current projections indicate that tropical cyclones are likely to be less frequent but more intense as well as move further south in their current tracks (Department of Climate Change, 2009). In terms of sea-level rise, projections indicate a rise of approximately 80cm by 2100 (Parry et al., 2007). However, sea-level rise could be more intense when added the impact of melting ice sheets. The combination of intensified coastal hazards and sea-level rise could result in extreme erosion events and the inundation of further
inland areas, intensifying damages to both built and natural environments (CSIRO, 2007).

In summary, key climate change related impacts to affect SEQ include greater evaporation and decreased rainfall causing increased pressure on water supplies; potential favourable conditions for the spread of plant diseases, weeds and pests; increased coastal flooding and erosion due to sea-level rise and storm surges with subsequent damage to infrastructure and building structures; increase in heat related illness; and increased risk of tropical cyclones reaching the region (Queensland Climate Change Centre of Excellence and Department of Environment and Resource Management, 2010).

4.1.2 Southern Victoria

Since 1950, southern Victoria has seen an increase in annual average temperatures along with a rise in sea levels and decline in precipitation (City of Greater Geelong, 2011; Department of Sustainability and Environment, 2008). Climate change is likely to exacerbate some of these trends as annual average temperatures are likely to increase by 0.5 to 1.1°C by 2030 and 0.9 to 3.5°C by 2070 (Kinrade and Preston, 2008). An increase in the number of extreme hot days with temperatures above 35°C and 40°C and a decrease in the number of frost days are also expected (City of Greater Geelong, 2011; Department of Sustainability and Environment, 2008).

Worsening fire weather conditions are also expected to occur with an increase in the number of days of ‘very high’ or ‘extreme’ forest fire risk by 1 to 2 days by 2030 and by 2 to 7 days by 2050. In particular, climate change could increase the frequency and intensity of extreme fire weather days as well as create conditions towards longer fire seasons and reduced number of days suitable to controlled burning due to accumulated fire risk (Lucas et al., 2007). While changes in fire weather patterns are likely to be smaller in coastal areas, projections based on low to high emissions scenarios indicate an increase in very high fire danger days between 2-13% and 10-30% by 2020 and between 5-23% and 20-100% by 2050; as well as an increase in extreme fire danger days between 5-25% and 15-65% by 202 and between 10-50% and 100-300% by 2050 (Lucas et al., 2007).

Rainfall patterns are likely to change in the region with a decrease in average annual rainfall by up to 8% by 2030 and 23% by 2070, higher reductions are expected in winter and spring. While annual average rainfall is forecasted to decrease, there could be an increase of up to 25% in extreme rainfall events of 1 to 24 hours in duration in at-risk areas by 2030 and up to 70% by 2070. This will lead to a potential increase in the frequency or magnitude of flood events or flood heights. Additionally, changes in rainfall patterns are likely to increase in drought frequency and intensity (Kinrade and Preston, 2008).

Coastal areas could be under greater exposure to storm surge inundation with expected change to be from the current 1 in 100 year to become a 1 in 1 to 1 in 4 year event by 2070. Sea-level is estimated to rise between 6 to 17 cm by 2030 and 15 to 49 cm by 2070. As a result, land area subject to inundation during a 1 in a 100 year storm surge event may increase by 4 to 15% by 2030 and 16 to 63% by 2070 (Kinrade and Preston, 2008).

In summary, climate change impacts expected to affect the southern Victoria region include more frequent coastal inundation and associated impacts such as coastal
erosion, increased risk of bushfires, increased risks of flood events, more frequent heat wave events and longer periods of drought (Roös, 2013).

4.1.3 Adelaide Region

Anticipated climate change impacts to affect the Adelaide region include increase in average temperatures, decrease in rainfall, increase in potential evapotranspiration, decrease in relative humidity and sea-level rise.

Across South Australia, average temperatures have already increased by 1.2°C since the 1950’s (Suppiah et al., 2006). In the Adelaide region specifically, average temperatures are expected to continue to increase in the future reaching 0.8°C by 2030 and 2.3°C by 2070 (Department of Environment and Natural Resources, 2010). Additionally, since 1957, South Australia has seen an increase in the frequency of extremely warm days (above both 35°C and 40°C) and nights along with a decrease in the frequency of extremely cool days and nights (McInnes et al., 2003). Heat wave events are likely to become more frequent in the area due to these increases in day and night average temperatures. Hotter conditions are also expected to lead to increased potential evaporation and reduction in relative humidity leading to drier conditions (Suppiah et al., 2006).

With regards to rainfall, since 1900, southern coastal regions of South Australia became drier (Suppiah et al., 2006). Future rainfall projections for the region indicate a decline in annual averages of 4.5% by 2030 and 15% by 2070, with the greatest decline to occur in winter and spring (8%) (Department of Environment and Natural Resources, 2010). Additionally, more extreme rainfall events are also expected (Suppiah et al., 2006; Murphy and Timbal, 2008).

The combination of warmer conditions and reduced rainfall could lead to an increase in drought (Mpelasoka et al., 2008) and fire with significant impacts on the region’s biodiversity, water resources and human settlements (Suppiah et al., 2006). Similar to the risks likely to affect southern Victoria, in the Adelaide region climate change could increase the frequency and intensity of extreme fire weather days as well as create conditions towards longer fire seasons and reduced number of days suitable to controlled burning due to accumulated fire risk (Lucas et al., 2007). While changes in fire weather patterns are likely to be smaller in coastal areas, projections based on low to high emissions scenarios indicate an increase in very high fire danger days between 2-13% and 10-30% by 2020 and between 5-23% and 20-100% by 2050; as well as an increase in extreme fire danger days between 5-25% and 15-65% by 202 and between 10-50% and 100-300% by 2050 (Lucas et al., 2007).

The region is also expected to be subject to more intense storm events as well as higher coastal storm surges (Suppiah et al., 2006).

In summary, in the Adelaide region, climate change is expected to lead to increased risk of heatwaves, longer drought periods, increased bushfire risk and coastal hazards, including storm surges, coastal erosion and inundation.

4.2 Potential Climate Change Impacts for Coastal Communities

Australia is a coastal nation with a significant part of its urban settlements located along the coastline (Norman, 2010). Australian coastal settlements are particularly vulnerable to sea level rise and extreme weather events (Hennessy et al., 2007). This is
particularly the case of SEQ, southern Victoria and the Adelaide region where past and present settlement patterns are likely to be increasingly exposed to risks associated with sea-level rise (Parry et al., 2007; Kinrade and Preston, 2008). In particular, future sea-level rise is likely to affect coastlines by driving progressive coastal erosion, contribute to intensification of storm surge and storm tide events with subsequent coastal inundation (Kinrade and Preston, 2008). Coastal inundation and erosion will have a direct impact on property, populations and infrastructure. Beaches, foreshores and coastal wetlands are also likely to be impacted (Kinrade and Preston, 2008).

These impacts will have direct social, economic and environmental costs (Gurran et al., 2008). For example, increased risks of coastal hazards are likely to affect property prices as housing stocks become more exposed to risks. Additionally, there could be a change in the insurance industry perspectives and policies with companies denying insurance to affected households as well as inflating insurance premiums to compensate for more recurrent losses. Disruption to public services as well as businesses is also possible (Kinrade and Preston, 2008; Abel et al., 2011). Additionally, climate change impacts are likely to further exacerbated the vulnerability of socio-economic disadvantaged social groups (Gurran et al., 2008).

Community and environmental assets, including cultural heritage sites are also expected to be affected with significant impacts on the quality of life of populations inhabiting the coastal area, including urban and peri-urban Indigenous communities (Gurran et al., 2008). Health related costs are also expected as increased risks of coastal hazards could lead to direct impacts on residents’ health, including mental health associated with traumatic experiences associated with disasters. Environmental impacts would lead to loss in biodiversity as well as decline in environmental quality broadly (Kinrade and Preston, 2008).
5. EMERGENT FOCUS FOR CASE STUDY COMMUNITIES

In response to the workshop participants briefing on the relevant climate change science for their respective areas, and as a consequence of their deliberation of the likely environmental impacts of those changes, the participants identified the most significant implications for their organisations, themselves and their community members. This was undertaken at the levels directed by the original Priority Research Topic 5 which required the project to consider the capacity of Indigenous communities to adapt to climate change at various levels, namely: individual; household; business; and institution.

The overarching output themes which emerged from the first series of workshops and which were confirmed, refined and further explored in the second series of workshops were:

1. Indigenous Representation
2. Housing
3. Employment
4. Environmental & Cultural Assets
5. Wild Food Network (Indigenous)

Table 4 represents a composite view of these five climate change adaptation (climate change adaptation) themes that emerged from the workshops relevant to each of the five participating case study areas at the individual, household, business, and institutional level.

Table 4: Composite Matrix of climate change adaptation Themes for Case Studies

<table>
<thead>
<tr>
<th></th>
<th>Indigenous Representation</th>
<th>Housing</th>
<th>Employment</th>
<th>Environmental &amp; Cultural Assets</th>
<th>Wild Food Network (Indigenous)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>1, 2, 3, 5</td>
<td>1, 2, 3, 4, 5</td>
<td>1, 2, 3, 4, 5</td>
<td>1, 4, 5</td>
<td>2, 3, 4, 5</td>
</tr>
<tr>
<td>Households</td>
<td>1, 2, 3, 4, 5</td>
<td>1, 2, 3, 4, 5</td>
<td>1, 2, 3, 4, 5</td>
<td>2, 4, 5</td>
<td>2, 4, 5</td>
</tr>
<tr>
<td>Businesses</td>
<td>2, 4, 5</td>
<td>2</td>
<td>1, 2, 3, 4, 5</td>
<td>1, 2, 3, 4, 5</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>Institutions</td>
<td>1, 2, 3, 4, 5</td>
<td>2, 4, 5</td>
<td>2, 3, 4, 5</td>
<td>1, 2, 3, 4, 5</td>
<td>2, 3, 4, 5</td>
</tr>
</tbody>
</table>

KEY

1. Kaurna Nation Cultural Heritage Association Inc (Adelaide Plains region) (KNCHA)
2. Wathaurong Aboriginal Co-Operative Limited (North Geelong region) (WACO)
3. Boon Wurrung Foundation Limited (Melbourne City to Wilsons Promontory region) (BWF)
4. Quandamooka Lands Council Aboriginal Corporation (Stradbroke Island / Moreton Bay SEQ region) (QLCAC)
5. Jagera Ganay-Magil Aboriginal Corporation (Brisbane-Ipswich region) (JGMAC)
5.1 Indigenous Representation

Indigenous representation refers to the opportunities for, and capacity of, Indigenous people to represent their interests and concerns in climate change meetings, decision-making forums and policy documents that are largely controlled by various tiers of government. This also relates to the availability of individuals who are capable of representing community interests.

A document review and content analysis of existing policy documents was completed and involved the principal regional and state strategies and / or policies dealing with climate change adaptation, The relevant documents for the three States and four regions containing the five case study communities are set out in Table 5. They include land use and growth management plans, natural resource management plan, state and regional climate change adaptation policies / strategies.

Table 5: Content Analysis of Climate Change Policy links with Indigenous Communities in State and Regional Planning & Management Documents

<table>
<thead>
<tr>
<th>Source Document</th>
<th>Content references to Indigenous Peoples* and /or climate change</th>
<th>Observation / Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland / SEQ region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queensland’s Climate Change Strategy 2009 [Section 7.1 The social costs of unmitigated climate change]</td>
<td>Some of the potential social impacts of unmitigated climate change would arise as a result of temperature increases, severe weather events and decline in productivity in certain areas. The people most affected by these physical changes will be those living in vulnerable areas such as low-lying coastal regions, tropical and sub-tropical population centres, areas with high dependence on agricultural or eco-tourism activities, and remote indigenous communities, particularly in far north Queensland (Allen Consulting Group, 2005). Communities in tropical areas will be most affected by temperature increases, particularly indigenous communities living in poorer housing conditions. (p56) Climate change impacts that disrupt traditional ways of living would impact on remote indigenous communities (p 57)</td>
<td>Strategy contains no specific policy for Indigenous climate change adaptation, only acknowledgment of the impact on Indigenous communities Acknowledges vulnerability of remote Indigenous communities and low-lying coastal tropical and sub-tropical populations (FNQ focus) Focuses on “remote” communities</td>
</tr>
<tr>
<td>[rescinded]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEQ Regional Plan 2009 [Policy 1.4 Natural hazards and climate change adaptation ]</td>
<td>Natural hazards and the projected effects of climate change are likely to compound the effects of existing threats to communities and the natural environment, such as habitat loss and fragmentation from development. SEQ has sustained Aboriginal populations for many tens of thousands of years. Understanding how climate change has affected the region’s ecosystems in past periods of climate change can inform projections and management of climate change into the future. (p44)</td>
<td>Document contains no connections between Indigenous Groups / Traditional Owners and Climate Change / Natural Hazards Policy</td>
</tr>
<tr>
<td>Source Document</td>
<td>Content references to Indigenous Peoples* and/or climate change</td>
<td>Observation / Deduction</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Draft SEQ Climate Change Management Plan</td>
<td>Plan contained no Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners</td>
<td></td>
</tr>
<tr>
<td>Victoria / greater Melbourne &amp; Geelong regions</td>
<td>Recommendation 4 The climate change adaptation Plan should be retained, with some amendment.</td>
<td>Documents make no reference to Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners</td>
</tr>
<tr>
<td>Review of the Climate Change Act 2010, 2011</td>
<td>Victoria's first climate change adaptation Plan is currently being developed. The State Government can also assist disadvantaged communities to build their resilience to climate change by ensuring adaptation strategies are inclusive and relevant to vulnerable communities (p5)</td>
<td>Strategy acknowledges “Aboriginal people … have a key role in planning and managing coastal areas and making decisions about coastal resources” and focuses on cultural heritage but contains no reference to Indigenous Climate Change Policy</td>
</tr>
<tr>
<td>Victorian Coastal Strategy, 2008</td>
<td>Over the medium to long term, climate change poses real and serious threats to our coast. During this century, it is likely the Victorian coastline will be impacted by sea level rise and increased frequency and severity of storm events leading to inundation and erosion. It is also predicted that higher temperatures will increase bushfire risk along the coast, and increased sea temperatures, changing sea currents and further acidification of the ocean will affect the marine environment.(p13)</td>
<td></td>
</tr>
<tr>
<td>Melbourne 2030 Plan</td>
<td>In areas such as the Mornington Peninsula, there will be no expansion of existing urban areas outside the urban growth boundary…. Our coastal areas are particularly vulnerable to the potential impacts of climate change such as rises in sea level, more intense storm activity and related storm surge events. The most vulnerable coastal areas are low-lying areas with small development setbacks.(p113)</td>
<td>Plan contains no Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners</td>
</tr>
<tr>
<td>Port Phillip and Western Port Regional Catchment Strategy 2004-2009,</td>
<td>Strategy make no connection between climate change NRM issues and Indigenous communities</td>
<td></td>
</tr>
<tr>
<td>Source Document</td>
<td>Content references to Indigenous Peoples* and /or climate change</td>
<td>Observation / Deduction</td>
</tr>
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<td>--------------------------------------------------------------------------------</td>
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</tbody>
</table>
| Report: Impacts of Climate Change on Settlements in the Western Port Region Climate Change Risks and Adaptation, 2008. | Loss of community wellbeing relating to climate change  
Loss of wellbeing due to climate change is principally concerned with individuals or groups in the community who are most vulnerable to the impacts of climate. Individuals or groups within the community can be classified as being particularly vulnerable to climate change based broadly on their:  
- socio-economic status (e.g., low income);  
- age and level of mobility (e.g., infants, elderly and people with disabilities);  
- proximity to physical threats that are likely to be impacted by climate change;  
- lack of access to assistance or services; and  
- inability to access relevant information.  
It is these groups who will be at greatest risk from climate change events, but may in fact be the most difficult to assist with preparation. (p28) | Report contains no Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners                                                                                                                                                                                                                                                                                                                                 |
43. Low income earners and the elderly are especially vulnerable to the impacts of climate change in the region.  
44. Assessment of exposure of these groups to coastal inundation, flooding, and bushfires suggests that low income earners are over represented in many of the localities exposed to coastal inundation but not so much in the localities exposed to floods and bushfires. (p vii/viii) | Report contains no Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners                                                                                                                                                                                                                                                                                                                                 |
| Corangamite Regional Catchment Strategy 2003-2008, 2003 | One of RCS principles:  
Recognition of the indigenous communities as the original custodians of natural resources in the Region (p28) | RSC connects Aboriginal cultural heritage values with NRM but not with climate change                                                                                                                                                                                                                                                                                                                                 |
| Geelong climate change adaptation Strategy, 2011 | Strategic Objectives to guide future adaptation planning:  
1. Lead the City of Greater Geelong community in adapting appropriately to climate change.  
2. Build awareness and understanding of climate change across Council and within the community.  
3. Acknowledge the links between climate change and other challenges and opportunities for the City of Greater Geelong.  
4. Plan for decisions that remain viable under the widest possible range of climate futures.  
5. Use lessons from the results of the decisions to inform better decisions in the future.  
6. Link with others to drive understanding of and action on climate change adaptation.  
7. Implement solutions that:  
   a. are cost effective  
   b. are transparent and defensible  
   c. recognise the needs of vulnerable groups  
   d. ensure equitable outcomes. (p7) | Strategy contains no specific Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners                                                                                                                                                                                                                                                                                                                                 |
<table>
<thead>
<tr>
<th>Source Document</th>
<th>Content references to Indigenous Peoples* and /or climate change</th>
<th>Observation / Deduction</th>
</tr>
</thead>
</table>
| The G21 Geelong Region Plan, 2007 | G21 Commitment to the Indigenous Community  
The G21 Region Alliance respectfully acknowledges the indigenous custodians of lands and waters across each of our G21 Local Government areas …… G21 is broadly committed to working in partnership with Indigenous communities, all levels of government, service providers and statutory bodies to build the capacity of Indigenous communities in the region (p2) | Plan contains no specific Indigenous Climate Change Policy |
| | Improper 1: Make environmental gains  
We must bring together government, statutory authorities, community and business people in a deliberate and organised way to agree on and resolve the region’s biggest environmental challenges including climate change, water supply and the health of our ecosystems. (p7) | |
| | Regional Objectives  
2.2.2 Protect, develop and promote the region’s environmental and cultural heritage values and assets, including promotion of employment, economic development and Indigenous culture (p43) | |
| | Policy 5.2 Work together to deliver region-wide community benefits  
In the G21 area the Geelong Indigenous Community will be establishing a new representative structure to be known as a Local Indigenous Network (LIN) …… the Geelong Local Indigenous Network will play an important role in representing Indigenous people in the G21 process. (p86) | |
| South Australia / Adelaide and Mount Lofty Ranges region | Aboriginal peoples have a unique and holistic relationship to South Australia’s environment, air, land and waters Their sense of place and belonging is linked to creation stories, travel, trade, ceremonies, family and places held sacred. (p2) | Plan contains no Indigenous Climate Change Targets? |
| South Australia’s Strategic Plan, 2011 | Aboriginal wellbeing is now deeply embedded in the Plan with over ten per cent of targets being Aboriginal specific. These targets are integrated throughout the themes of the Plan …… (p3) | |
| Prospering in a Changing Climate: A climate change adaptation Framework for South Australia, 2012 | In terms of: Resilient, healthy and prosperous communities  
Recognition of: those who live in remote or highly vulnerable coastal communities. (p22) | Framework contains no Indigenous Climate Change Policy nor mention of Indigenous Groups or Traditional Owners |
| | Under Section 4.2: Community health and individual wellbeing, former reference to “Aboriginal communities” (Consultation Draft) has been removed | No mention of Indigenous Groups as partners in the implementation of the Framework |
Essentially the analysis summarised in Table 5 reveals that all policy planning and climate change management documents reviewed contained no conscious effort to link climate change adaption policy or initiative with Indigenous Groups or Traditional Owners. Nor did these documents contain any specific Indigenous Climate Change (Adaptation) Policy and it appears that Indigenous people were not consulted in the preparation of these documents. These findings support similar conclusions from previous studies (Salik and Ross, 2009).

Nevertheless, opportunities do exist to forge future links between climate change adaptation policy initiatives and Indigenous communities, including those communities constituting the case studies. Two specific examples which serve to illustrate these potentially emerging opportunities include:

1. Victorian Government response to the Climate Change Act Review commits to the preparation of Victoria’s first climate change adaptation Plan and acknowledges: “The State Government can also assist disadvantaged communities to build their resilience to climate change by ensuring adaptation strategies are inclusive and relevant to vulnerable communities” (Victorian Government, 2012: 5)

2. The South Australian government’s intention in their “South Australia’s Strategic Plan, 2011” cites a Goal: We adapt to the long term physical changes that climate change presents with Target 62: climate change adaptation committing to “Develop regional climate change adaptation plans in all State Government regions by 2016” (South Australian Government, 2011: 47).

To varying degrees, most Indigenous communities based in south-eastern Australia experience problems in maintaining the availability of a small group of their ‘Elders’ to consult with government and corporations. This presents a problem when meeting to plan how to deal with long term issues, such as climate change adaptation. For certain communities this problem is caused by the overall small number of members. For instance, the Boon Wurrung meeting participants estimated that today there are less than a 100 people who could trace direct descent to a Boon Wurrung Ancestor, with many of them possessing connections to other Aboriginal communities such as the Wathaurong, Yorta Yorta (country on the River Murray near Barmah) and Wurundjeri (country in the northern and eastern regions of metropolitan Melbourne). They are living spread out among a broader population of about two million people in the Melbourne – Mornington Peninsula region. For this reason, employment via the Boon Wurrung Foundation is offered to non-Boon Wurrung people, who are chiefly connected to other Victorian communities. While the Quandamooka community has a strong leadership base, the granting of native title has created an urgent need for increased consultation on land management issues.

A central theme for the future is the need to recognise the important political role that female elders have historically had in south-eastern Australia. The authorities involved in climate change adaptation cannot deal with contemporary Indigenous communities
as they would with a Western (European) community or even a remotely-based Aboriginal culture in northern Australia. For all Indigenous communities in southeastern Australia, succession planning is vital to train young people who will be the next decision makers. Future Elders dealing with complex urban/peri-urban landscapes will be required to possess connection to country and to hold expertise in land management, perhaps gained through tertiary studies. Their early involvement will help ensure that their community is equipped to maintain a voice in climate change adaptation forums. Currently there is a lack of young Indigenous people who are formally educated and trained in landscape planning and natural resource management and who are suitably experienced to step up to take on key roles in land management, let alone climate change adaptation. Indigenous participants agreed that individuals involved in climate change adaptation forums must have a prior cultural connection to land. For respondent K2 the production of an Indigenous leader who had no connection to country was like creating “a spider that had lost its legs, leaving holes in their webs”.

Figure 5: Wurdi Youang Stone Arrangement (source: D low Choy)

On the question of an Indigenous person addressing climate change adaptation needing to be on country, respondent K2 considered that you “… must be on country – it just comes up. People in urban/peri-urban area do not have the ability to read country, like how the old people survived climate change in the past. … need a place in the new knowledge structure”. Respondent K2 argued that having a place like the Living Kaurna Centre (LKC), currently managed by Marion City Council, was important in this regard as it was a spiritual and learning place and could function in that capacity in a contemporary sense. Respondent K2 stated that while the Kaurna Nation Cultural Heritage Association Inc (KNCHA) had the operation brief to care for Aboriginal culture of the Adelaide region, it was hampered in this role by not having a direct link to the Living Kaurna Centre (LKC). Therefore, KNCHA as the only institution that is actively fostering awareness for Kaurna culture, has no way of setting agendas, employing staff etc. to deal with issues such as climate change adaptation. In the past, the Tjilbruke Forum was created to help all the councils on Kaurna land to look after Aboriginal sites and to receive consistent advice. However the funding was taken away, leaving each council to find their own way to deal with Indigenous issues. Respondent W2 raised the issue that there were areas surrounding Geelong that suffered from not having TO’s that were recognised by the Indigenous community, although the state government had appointed RAP representatives. Apart from the
issue of maintaining continuity of leadership, the Wathaurong community has the additional problem of the state government not granting them a formal and/or Senior Custodian role/status (RAP) in the management of a range of cultural issues. The present-day Wathaurong have diverse connections, as elder Respondent W1 demonstrated when he stated that he was a Yorta Yorta man from northwest Victoria, but his great-great-great grandfather had married a Wathaurong woman from Geelong. In spite of this connection, he stated “My rights are denied by the cultural [Victorian Aboriginal] Heritage Act”. The current TOs from the recognised RAP are not based in the Geelong region and are therefore less likely to possess first-hand knowledge of local Aboriginal affairs. Despite this lack of official recognition, the Wathaurong Aboriginal Co-Operative Limited manages the 800ha Wurdi Youang property near the You Yangs, acquired for them via the Indigenous Land Corporation, to the north of Geelong on the Werribee Plains where W2 has noted that the Wurdi Youang stone arrangement on this property is potentially an important tool in getting people to think about country and its cycles (Norris & Hamacher 2009, 2011; Norris et al 2013; Jones 2012).

The Jagera Ganay-Magil Aboriginal Corporation participants stated that their TOs needed to be involved in future forums that may determine climate change adaptation in SEQ, although they experience problems with government and corporations engaging directly with them. It was claimed that public service officers do not routinely consult TOs within the Jagera community when dealing with land and natural resource management issues. A possible solution is the writing of protocols to make certain that senior Jagera people are engaged in relevant decision making processes. For the Jagera community, their wide dispersal, along with their current lack of access to land, has impeded the establishment of community-based businesses that would allow them to benefit more directly from the local economy. The rapid economic growth of SEQ, leading to an expansion of the urban and peri-urban regions, threatens to marginalise Jagera TOs and impede their ability to adapt to a changing landscape.

The Quandamooka Lands Council Aboriginal Corporation participants expressed problems with agencies, both internal and external, not knowing who to approach in the community for decisions on specific issues. This could be a threat to climate change adaptation. For example, problems relating to heat waves are medical concerns for their health services, whereas controlling a bushfire is chiefly a Quandamooka Yoolooburrabee Aboriginal Corporation (QYAC) issue. Presenting the three tiers of government with a Quandamooka Engagement Protocol may improve this. Meeting participants stated that QYAC is the organisation to deal with climate change on North Stradbroke Island. A fear expressed by Quandamooka meeting participants was that the apparent inconsistencies with the definition of ‘remote’ would potentially impede their community’s climate change adaptation. This is a complex issue compounded by a diversity of definitions currently employed by different government agencies across the three tiers of government (see Appendix C: Remoteness Classifications – Queensland).

An outcome of all the community workshops was a general response that there was a need for a specific Indigenous voice in climate change adaptation discussions at the state and national levels. At the Kaurna meeting, Respondent K1 articulated this by arguing for the development of a process to generate views based upon Indigenous knowledge. K1 stated that:

There are lots of reports etc. now, which becomes evidence to base Indigenous views. A process is needed to collate this. A climate change
State Indigenous climate change adaptation groups could communicate nationally with their counterparts. To illustrate the point about broader sharing of knowledge, Respondent K1 remarked that extreme weather events occurring outside of the region could nevertheless have an impact in Kaurna country, citing the example of flooding in the valleys in the northern Mount Lofty Ranges of Ngadjuri country (a country to the north of the Adelaide Plains) that comes down the rivers onto the Adelaide Plains.

In summary, there was a consistent recognition across all case study communities that climate change is currently placing a disproportionate burden upon Indigenous people. This arises directly from the physical impact upon climate change sensitive areas (i.e. threat of fires, erosion etc.). More indirectly, Indigenous people who are based in urban/peri-urban areas of south-eastern Australia are highly vulnerable to climate change and climate change policies. This is because of the wider perception that they are generally dependant on the same resources as non-Aboriginal people and that they possess less links to traditional country, which is a disadvantage for Indigenous people who are participating in climate change adaptation forums. As a strategy to overcome these challenges, there should be a collaborative approach to climate change adaptation, which builds-in traditional knowledge so that it does not undermine cultural identity. Climate change adaptation with Indigenous communities in south-eastern Australia cannot be divorced from connection to country.

5.2 Housing

Housing is a category of issues relating to the ability of Aboriginal people to either move or modify their existing housing to mitigate the effects of climate change. It also concerns the degree to which Aboriginal people can engage in energy and water saving schemes for climate change adaptation. It was clearly identified by all workshop 1 participants as a key theme for the consideration of climate change adaptation for urban and peri-urban Aboriginal and Torres Strait Islander peoples. Participants from all case study regions noted the large numbers of Aboriginal people from their communities who were reliant on public housing.

In most regions in south-eastern Australia, the responsibilities to service Aboriginal housing needs have been transferred from specific Aboriginal organisations to the control of mainstream public housing agencies. Where this has occurred, Aboriginal participants have claimed that it has resulted in less flexible housing conditions. Indigenous people in the public housing system have found it difficult to become involved in ‘green’ activities. While some tenants have wanted to get involved in waste water recycling, rainwater harvesting, wind power and solar panel installation, their tenancy agreements have effectively impeded this. In the past, when Aboriginal homes in Adelaide were managed by the Aboriginal housing funded unit, the community had access to funds which, if still available, would have allowed them to engage in such activities. Within mainstream public housing there are no incentives to encourage tenants to spend their own money to make home improvements. The situation on North Stradbroke Island is different, with the more flexible practices of the Quandamooka
Housing Co-Operative allowing residents to reclaim some benefits for improving their rented homes.

While it is difficult to obtain figures on recent movement patterns that are specific to certain Aboriginal communities, the overall pattern is for Indigenous peoples migration towards major cities (Biddle 2012; Biddle & Yap 2010). Workshop participants suggested that driving factors behind Aboriginal movements into and within southeastern Australia were the availability of jobs and cheaper housing. It was predicted that future alterations to existing land values and land uses, perhaps exacerbated by climate change, are likely to affect Indigenous residency patterns surrounding the cities.

5.3 Employment

Employment concerns the negative aspects of job loss due to changing employment prospects through climate change and also includes the positive aspects of job creation in industries involved in climate change adaptation and mitigation, such as carbon-trading and sequestering schemes and revegetation programs.

Negative impacts to country are highly likely to affect Indigenous people who are currently involved in industries based on their access to natural resources, such as fishing and shell fish collecting as on North Stradbroke Island. Some workshop participants also feared that rising energy costs might affect the growth of their businesses, such as the glass crafts produced by the Wathaurong Aboriginal Co-Operative. On the positive side, the development of climate change adaptation could offer Aboriginal people opportunities for greater involvement in land and sea care programs. For instance, the Boon Wurrung Foundation aspire to having Indigenous ‘rangers’, modelled on the sea ranger program in the Northern Territory, established within the Port Phillip Bay region5. They also want joint Kunai (people of Gippsland) and Boon Wurrung management of all national parks around Wilsons Promontory. The Wathaurong Aboriginal Co-Operative is planning to link community training in land care programs with their management of their Wurdi Youang property. Quandamooka people have been employed in the national parks of North Stradbroke Island. The Jagera Ganay-Magil Aboriginal Corporation participants stated an interest in developing ‘looking after country’ type roles, particularly in native plant propagation, national park management and the wild food industry. Respondent J1 stated that this is “closer to our hearts, to our culture – making a living as well”. The Kaurna community has similar aspirations with the development of ecotourism ventures, possibly through the Warriparinga Living Kaurna Centre. With greater inclusion in caring for country programs, Indigenous people will have more employment opportunities for individuals and be able to develop investment strategies for their businesses and organisations.

5.4 Environmental and Cultural Assets

5 ‘Rangers programs’ modelled on the sea rangers program run by the Northern Australian Aboriginal and Islander Land and Sea Alliance (NAILSMA), now funded in many areas through the Commonwealth Caring for Our Country program.
Environmental and cultural assets are those connected to land managed by Aboriginal people. It includes cultural sites containing burials and archaeological materials, as well as native title areas, Indigenous-run farms, areas connected to fishing and hunting licences, and national parks for which there are joint management agreements.

A few Aboriginal communities in south-eastern Australia have access to large portions of land. For instance, the Wathaurong Aboriginal Co-Operative is currently managing a 800ha Kangaroo Grass (*Themeda australis*) grassland property, Wurdi Youang, which is situated near the You Yangs. The Co-Operative is seeking to have the land declared as an Indigenous Protected Area (IPA) in order to gain access to federal government resources to help undertake biodiversity and cultural resource conservation actions. Similarly, the Quandamooka people have access to land on North Stradbroke Island through native title that would potentially enable them to engage in such climate change adaptation-related businesses. The Jagera participants stated that they had difficulty in receiving funding from the Indigenous Land Corporation as they ‘were people still without country’. Without land, the Jagera community experiences difficulties in determining what training young people required. With access to land, a future business plan could include their involvement in ‘green industries’, such as carbon farming. There are Indigenous communities in south-eastern Australia, such as the Narangga on Yorke Peninsula, that are already becoming involved in the carbon market (http://www.canopy.org.au/; http://www.greeningaustralia.org.au/community/sa; http://www.aboriginalfoundation.com/).

Senior members of the Boon Wurrung community are often involved with local heritage assessments, although it was stated that Indigenous consultations generally took place at the end of the process, which was not ideal. A better framework could be established to assist both Senior Custodians and developers. To be proactive there needs to be more development of cultural heritage management plans (CHMPs) to protect sites containing stone artefacts, midden material and burials. Opportunities for climate change adaptation will be lost if the planning for it is also reactive. Damage to country, whether through development or climate change, directly threatens the protection of Aboriginal sites. Quandamooka participants were concerned that more recent heritage surveys had been restricted to areas covered by mining leases and national parks, which does not cover sites beyond their boundaries. Urgent work is required in an intertidal archaeological assessment for the west coast of North Stradbroke Island. In SEQ, significant Indigenous sites located in forest country are protected by government guidelines preventing the clearance of vegetation (Regional Forest Assessments 1999).
Workshop participants challenged the ways that European settlers and now governments had used and transformed the land in their regions. For instance, Respondent K1 noted that many of the places that Kaurna hunters had once kept open as grasslands to attract emus and kangaroos were now heavily planted or built over by development. K1 believes that these areas, particularly on the western side of the Mount Lofty Ranges, should have remained open to avoid the risk of cataclysmic fires. In other parts of south-eastern Australia, the Indigenous participants considered floods to be a greater risk to their cultural assets than are wild fires. Respondent BW2 remarked that while the general population was understandably worried about bushfires, in Boon Wurrung country the floods, which scoured the land, were potentially far more destructive to the environment. BW2 said that the vegetation recovered quickly from the 2007-2009 bush fires on Wilsons Promontory, while the floods occurring last year caused much long-term damage to country. BW2 was concerned that climate change would have a negative impact on Boon Wurrung assets – the country. Across all workshops, it was considered that an Indigenous perspective in holistically managed country is required for climate change adaptation. The Boon Wurrung community wanted involvement with the federally-funded catchment management authorities, because run off from land affects the Port Phillip Bay. Similarly, from the Quandamooka point of view, Respondent Q1 stated that pollution from the Brisbane River threatened the ecosystem of the Moreton Bay, and therefore was a concern for those living and working on the islands. The Jagera participants wanted the clearing of trees and vegetation to cease on their country and a limit placed upon the number of dams withholding water from their river systems.

Participants of all five communities wanted greater recognition of Dreaming sites as cultural places to conserve. Respondent K2 said that to “renew ourselves, government
needs to recognise our country”, such as by acknowledging the importance of the Tjilbruke sites, which are linked by a Dreaming Track that runs along the Gulf St Vincent side of Fleurieu Peninsula from the vicinity of Adelaide, along the coast to Cape Jervis and inland to Brukunga near Mount Barker (Clarke 1996; Tindale 1987). After creating many topographical features, particularly freshwater springs along the coast, Tjilbruke finally turned into a Glossy Ibis (*Plegadis falcinellus*). The Dreaming Track was important for redistributing goods and the transference of knowledge through trade. Respondent K2 was concerned that the Tjilbruke sites (many of them coastal springs – ‘tears flowing from Tjilbruke’) would disappear through a combination of sea level rising and urban development. Respondent BW1 outlined a Boon Wurrung Dreaming story of the male Ancestor Bundjil (Bunjil; Wedge-tailed Eagle (*Aquila audax*)) and the flooding of Port Phillip Bay, which is relevant to understanding the impact of ancient climate change events (Jones 2005; Tindale 1987).

Respondent W2 suggested that since the Wurdi Youang stone arrangement at their Wurdi Youang property appears to be based on the local Aboriginal calendar, it too maybe a useful tool for contemporary people to explore the impact of climate change.

Since climate change affects country, Indigenous participants considered it important that they develop a voice in the future debates concerning climate change adaptation. For the Kaurna community, it had been hoped that the establishment of the Warriparinga Living Kaurna Cultural Centre in suburban Marion over fifteen years ago would have provided the means of communicating to the general public an Indigenous perspective on a range of environmental issues (see Section 3.1.3). Respondent K2 stated that here visitors (both Kaurna and non-Kaurna) could “Learn about another way of being…. the land history. Need the land back. How swiftly we were killed … All people to learn what happened”. According to Respondent K2, the Centre is on land that includes a Tjilbruke site – a mound associated with the body of Tjilbruke’s nephew, Kulutuwi. This spiritual connection has given the place an importance to all Kaurna people, and this is recognised by other Aboriginal groups when they visit the Adelaide Plains. The Centre is also a venue where members of the broader community can acknowledge Kaurna custodianship of sites. The Kaurna participants stated that to adapt to climate change:

- land was important,
- change had to be seen, and
- there was a need to understand it.

**Figure 7: Warriparinga Living Kaurna Cultural Centre** (source: D low Choy)
The Kaurna participants argued for the Warriparinga Living Kaurna Cultural Centre to become the public face of climate change adaptation for the whole state, and that it should be framed using Indigenous ecological knowledge. They considered that the expansion of the Warriparinga Living Kaurna Cultural Centre was fundamental for building a stronger identity and in terms of climate change adaptation it is an ideal place to educate the Kaurna community and others alike.

Similar aspirations were expressed by Boon Wurrung participants who saw opportunities potentially stemming from the close partnership that the Boon Wurrung Foundation Limited has formed with the Port Philip EcoCentre at St Kilda (previously described in Section 3.1.2).

For developing the awareness of the distinctiveness of their individual cultures, the workshop participants generally recognised the importance of exhibitions in museums, interpretation centres and keeping places. An Indigenous perspective on the environment is useful for drawing attention to the short and long term changes to the environment. Respondent BW1 described a Boon Wurrung seasonal calendar which is built around such cues as the movement of stars and flowering of plants as ‘triggers’ for the oncoming seasons. Jagera participants suggested for younger members of their community that the learning about climate change would be better if the emphasis was on visual/physical teaching on country. Senior members of many Aboriginal communities in south-eastern Australia see themselves as having a continuing role in caring for country, as did their Ancestors. This is reflected in their ceremonial ‘welcome to country’ speeches made on official occasions. For example, elder Aunty Betty Pike (2013) of the Wathaurong community uses the following narrative:

\[\text{To all who walk this land,} \\
\text{May you stand tall as a tree} \\
\text{Be as gentle as the morning mist} \\
\text{And be as strong as} \\
\text{The earth under your feet.} \\
\text{May the warmth of the campfire} \\
\text{Be in you and may} \\
\text{The creator spirit} \\
\text{Of the Wathaurong people} \\
\text{Always watch over you.}\]

5.5 Wild Food Network (Indigenous)

The wild food network is concerned with the cultural and economic importance of Aboriginal people being engaged in the native bush food industry, particularly with wild harvesting, growing, processing, value adding, catering and spin-off guiding/talking businesses.

Changes in timing of flowering and breeding cycles, coupled with higher temperatures and lower rainfall plus the likelihood of potential favourable conditions for the spread of plant diseases, weeds and pests, would all impact negatively on the wild food network and various individual and collective activities operating at all nodes along this network (see Figure 8). Whilst these circumstances would require close monitoring and the execution of various adaptation applications, climate change could also potentially lead
to positive outcomes which could benefit ‘actors’ operating within the wild food network, provided they were positioned to take advantages of these changes.

The wild food network is an industry-specific agri-food chain bringing plant-based foods from the bush to the table (Bryceson 2008; Clarke 2012). The network (see Figure 8) exists across international boundaries and includes the following elements:

- wild bush harvesters, among them people from Indigenous communities;
- producers of raw produce;
- nursery operators, who range from specialist businesses to larger companies that carry a limited range within their broader stock;
- processors/manufacturers of raw produce, ranging in scale from cottage level to major bread manufacturers;
- distributors;
- retailers, including airline catering companies and supermarkets;
- food service operators, such as caterers and restaurants, which range from the novel to the sophisticated upmarket sector; and
- tourism and hospitality businesses.

![Figure 8: Wild Food (Indigenous) Network](image-url)

Figure 8: Wild Food (Indigenous) Network
Within south-eastern Australia, Indigenous people generally operate at the food service and tourism nodes of the network, with some wild bush harvesting and attempts at developing ‘bush food gardens’ as plant nurseries (Robins 2007). There are thirteen plant species which grower associations and government agencies consider as the mainstay of the Australian native food industry (Hele 2003; Ryder & Latham 2005; Ryder et al. 2009). These food sources were chosen for both their horticultural robustness and their suitability for the development of a market. Of these species, nine are being cultivated somewhere within south-eastern Australia. In terms of the wild food network, most products from these species are processed in south-eastern Australia, and all of them distributed through outlets in the capital cities of the region. While other plant species have potential for future development, industry leaders considered that the market is not yet mature enough to support more variety.

Workshop participants wanted to develop businesses within the wild food network. There are already a few small companies run by single Indigenous operators. For instance, in Adelaide, Respondent K3 runs a company which organises bush food catering themes. Most of the foodstuffs are purchased from commercial suppliers. Respondent K3 identified herself at the moment as being chiefly involved in the catering node of wild food network, as well as some participation at the value added node when making her own sauces for sale. In Melbourne, Boon Wurrung Elder Aunty Carolyn Briggs ran a bush tucker restaurant for twenty five years and also held cooking classes and was involved in catering for big events and conducting bush tucker tours. She marketed her menu as ‘Genesis food: the beginning of food’. The ‘Black Olive’ (run by Mark Olive, http://www.blackolive.net.au/) in Melbourne is currently involved with bush tucker catering at the high end of the market. In SEQ, Indigenous woman Dale Chapman runs a catering business with an Indigenous theme, and she works through Dingo Creek Vineyard with her company, The Dillybag (http://www.thedillybag.com.au/AboutDale.htm).

Workshop participants were aware that opportunities exist for greater Indigenous participation in the wild food network, particularly if the negative impact of climate change can be mitigated. The reliance upon the 13 species already being developed for the industry, as distinct from local varieties that might be preferred by community members, makes the impact of climate change more controllable. The ‘cultural authenticity’ that Indigenous involvement brings to the whole bushfood industry is recognised as significant for developing the market (Robins 2007). The industry has opportunities for small operators, as well as for larger community-run organisations. The Wathaurong Aboriginal Co-Operative have aspirations to develop businesses involved in the growing of bush foods, initially as suppliers and agents for high quality local restaurants that understand the benefit in promoting locally grown ‘Aboriginal’ produce. There is a potential market with Diversitat (http://www.diversitat.org.au/) in Geelong, and the Co-Operative has recently formed a relationship with them that they are still exploring. The Co-Operative is also studying the feasibility of projects involving Short-finned eels, as the Gunditjmara people have done in southwest Victoria (Gunditjmara with Wettenhall 2010; Sutton 2004).

The wild plants and animals have cultural importance in contemporary identity building that transcends their economic importance. The participants from several communities raised the possibility of becoming involved in tourism, with the knowledge of bush foods and the environment being major themes in their tours of country. It was said by many participants across all communities that their wellbeing was improved by the consumption of their ‘traditional’ foods and by their use of ‘bush’ medicines. A desire expressed by several people was to become involved in the wild harvesting or growing of wild plants and animals, which they consider important for sustaining their cultural identity.
of plants as raw materials to help revitalise their hunter-gatherer crafts, such as the specific species of sedges and grasses used in basket making. It is feared that the vegetation supporting some of these practices may be threatened by climate change.

5.6 Summary

In summary, there was a consistent recognition by all workshop participants that climate change is currently placing a disproportionate burden upon Indigenous people. This arises from the lack of specific climate change adaptation policy to support Indigenous people and communities; a lack of awareness and understanding of climate change and adaptation options by Indigenous urban and peri-urban people; and their dispossession and absence of direct access to their country. Participants considered that to adapt to climate change land was important, change had to be seen, and there was a need to understand it.

Due to their current limited standing in urban and peri-urban environments, their lack of resources, their limited access to their country, and their perceived powerlessness to influence the negative aspects of urbanisation and landscape changes, their attention to climate change impacts and adaptation tended to repeatedly take them back to considerations of social and economic equity and opportunities for improvement.

In a number of regards, the ILUA process may provide opportunities to address climate change adaptation in a more formal manner. The current situation in regard to ILUAs for each of the case study communities is:

- Quandamooka: ILUA with Queensland State Government (2011) and with Redland City Council (2011)
- Jagera: ILUA between Ipswich City Council and Jagera, Yuggera and Ugarapul People (30 January 2008)
- Boon Wurrung: ILUA in progress
- Wathaurong: Aboriginal Cultural Heritage Management & Protection Development Planning Protocol with the Greater Geelong City Council (12 July 2000) – now superseded by State legislation
- Kaurna: Kaurna State and Local Government ILUA Negotiation commenced in 2007 – in progress as part of statewide ILUA Strategy

Future ILUAs should take the opportunity to address climate change adaptation relevant to urban and peri-urban Aboriginal people and provide resources to facilitate their adaptation requirements.

Whilst the workshops exposed participants to the likely climate change impacts and landscape changes, most felt that they did not have the ability to directly influence possible adaptation initiatives, especially as in most cases, they did not exercise direct control of their country in their urban and peri-urban settings. In these circumstances they noted the significant difficulties they faced in influencing climate change adaptation at individual and family levels, and in business and institutional settings. Participants of all five communities wanted greater recognition of Dreaming sites as cultural places to conserve.

Urban and peri-urban Indigenous people consider themselves highly vulnerable to climate change and climate change policies because of the wider perception that they are generally dependant on the same resources as non-Aboriginal people and that they possess less links to traditional country, which is a disadvantage for Indigenous people who are attempting to participate in climate change adaptation forums. As a strategy to
overcome these challenges, there should be a collaborative approach to climate change adaptation, which builds in traditional knowledge so that it does not undermine cultural identity. Workshop participants continually stressed that climate change adaptation with Indigenous communities in south-eastern Australia cannot be divorced from connection to country. Since climate change affects country, Indigenous participants considered it important that they develop a voice in the future debates concerning climate change adaption.

The evidence from these initial engagements on climate change adaptation matters clearly demonstrate that consideration of the future, even with the overlay of climate change and requirements for serious considerations of adaptation, are significantly influenced and dominated by long standing economic and social aspirations which are seen as fundamental survival strategies for their communities. Issues of succession planning and the urgent need to ensure that the next generation was across these climate change adaptation and other environmental management issues were given particular emphasis.
6. INDIGENOUS CONNECTION TO WEATHER & CLIMATE

During the course of the project it became evident that the communities represented by the case study organisations all had or were in the process of rediscovering their language. A very brief review of the Indigenous languages for the case study communities was completed in order to establish and appreciate the long-standing Indigenous connection to weather and climate. This review was undertaken through interviews and the interrogation of Indigenous language dictionaries where they existed for the various case study communities. Composite lists of words and phrases have been compiled and analysed. Summaries of appropriate words and phrases related to weather and climate are presented in Indigenous Dictionaries (Weather & Climate) - Appendix D.

This review confirmed that early Aboriginal societies through their language had well developed understanding of weather and climatic concepts, including:

- distinctions of fundamental elements of weather (e.g. rain, wind);
- direction of influence for individual weather elements;
- a concept of seasons;
- phrases that indicate an appreciation of weather and climatic patterns;
- appreciation of atypical event of weather (e.g. storms); and
- appreciation of atypical event of caused by weather (e.g. floods).

Aboriginal language and words hold certain commonalities that have within them appraisals of longitudinally environmental patterns and changes. However, no specific words or phrases in the remaining language dictionaries were discovered that indicated that they had an appreciation of climate change.

Urban and peri-urban Aboriginal people have experienced significantly historical displacement and disconnection from their country and with the previously noted continuing and increasing urbanisation of Aboriginal society, their loss of Indigenous language speakers will continue to decline (Biddle, 2012). Hence the opportunity to study urban and peri-urban Indigenous peoples understanding of climate change through these mediums will be seriously constrained.
7. RESEARCH PLAN FOR ONGOING RESEARCH

In this section, a research plan for ongoing research activities is presented. It is based on the principal findings and priority areas emanating from the current research project with support from the conclusions of a review of the literature on Indigenous climate change adaptation in urban and peri urban areas. The plan for ongoing research activities is generally informed by the National climate change adaptation Research Plan for Indigenous Communities (2012) [NARP-I, 2012].

The review of the literature was completed and is reported in this document (see the Annotated Bibliography – Appendix E). Due to the short 12 months time frame of this project, the literature review had to be undertaken in parallel with the data collection and workshop phases.

7.1 State of Research and Literature

The state of research and priorities for climate change adaptation for Australian Indigenous people has been broadly outlined by the NARP-I, 2012. The literature review and plan for ongoing research of the present study has been guided by the research topics and priorities outlined by the NARP-I, 2012. Specifically the present study has been guided by the NARPs Priority Research Topic 5: Understanding the capacity of Indigenous individuals, households, businesses, and institutions to adapt to climate change, and the identification of strategies to enhance this capacity. It has also responded to Research Topic 3: Understanding how Indigenous communities and institutions in metropolitan areas are sensitive to climate risks, and the ways in which those communities and institutions perceive and respond to those risks. Also important to the present study is Research Topic 9: Understanding the relationship between Indigenous population movement and severe climate variation as the majority of Indigenous people live in urban and peri-urban areas of metropolitan regions and as previously noted, this figure is increasing.

The review of literature found that previous research on Indigenous climate change adaptation in Australia has concentrated on regional and remote Aboriginal and Torres Strait Island communities (see Annotated Bibliography [Appendix E]). To date there is a small but growing body of knowledge about Indigenous climate change adaptation on this topic. The research on remote communities mirrors much of the research on Indigenous climate change adaptation from other countries and focuses on cultural understandings vulnerability assessment and adaptive capacity building in the context of climate change adaptation processes. The review of literature reported in the Annotated Bibliography (Appendix E), has identified the paucity of research on Indigenous climate change adaptation in urban and peri-urban areas throughout the world. There is even less research and subsequent literature to be found on this geographic focussed topic in the Australian context.

As a result of this deficiency, the state of research and literature on the topic of Indigenous climate change adaptation in the context of peri-urban and urban areas in Australia has been informed from literature on Indigenous climate change adaptation research from other countries and research on climate change adaptation within non-Indigenous populations which may share some characteristics concerning vulnerability and adaptive capacity.
This section reviews the limited research that has been conducted on this topic and outlines a plan for ongoing research based on the gaps in the literature. The review here is based on a literature search and subsequent annotated bibliography that can be found in Appendix E.

Five broad themes emerged from the review of literature. These themes indicate topics that either are the prime focus of a paper or one of the many topics within a given paper.

The themes include:
  a. Cultural understandings of climate change;
  b. Ground up approaches to vulnerability assessment and adaptation strategies;
  c. Indigenous adaptive capacity and climate change;
  d. Socio-economic issues of Indigenous peoples response to climate change; and
  e. Indigenous Networks and governance issues related to climate change.

7.1.1 Cultural Understandings of climate change

By far the majority of research on Indigenous climate change adaptation has been undertaken on the topic of Indigenous ways of understanding climate change. The fact that the majority of Indigenous populations have narrative histories which indicate success in adapting to previous climate change has been documented throughout the world (Berkes 2009; Martello 2008; Mercer et al., 2007; Nyong et al., 2007; Reidlinger and Berkes 2001; Salick and Byg 2007; Turner and Clifton 2009; Zimmerman 2005) and in Australia (McIntyre-Tamwoy et al., 2012; Petheram et al., 2010; Green et al., 2010). Differences and the conflict between traditional knowledge and scientific climate change knowledge has also been documented (O'Neill et al., 2012). There is also growing literature on Indigenous peoples’ understandings of ecological change exemplified by Wier (2009) who provides insight into Indigenous peoples’ understandings of ecological change in order to challenge conventional assumptions behind questions of how much water should be returned to rivers.

See the Appendix E, Section 3.1: Traditional Knowledge and Climate Change for a summary of relevant papers.

7.1.2 Ground Up Approaches to Vulnerability Assessment and Adaptation Strategies

Ground up approaches refers to the inclusion of Indigenous people in vulnerability assessment and the development of adaptive strategies and policies. The overwhelming conclusion from this area of research was that inclusion of Indigenous people and their traditional knowledge in vulnerability assessment and the development of adaptive strategies would lead to greater success of climate change adaptation policies and practices.

See the Appendix E, Section 3.1: Traditional Knowledge and Climate Change and Section 3.2: Indigenous People: Vulnerability and Adaptive Capacity for a summary of relevant papers. These references provide support to the outcomes of Section 5.1: Indigenous Representation considerations and associated recommendations.
7.1.3 Indigenous Adaptive Capacity and climate change

There is less research on adaptive capacity compared to cultural understandings of climate change and Indigenous people’s involvement with vulnerability assessments and adaptive strategies. Although the authors acknowledge that engagement with assessment and strategies is a way of improving adaptive capacity, research specifically examining the psychological and socio-political issues of adaptation to climate change is a distinct area of research. Adaptive capacity is not confined to climate change adaptation but also places climate change in the context other cultural, social and economic issues. Research examining adaptive capacity has been undertaken at the individual and community level (Conner 2005; Ebi and Semenza, 2008) and at institutional level (Altman and Jordan 2008; Ford et al., 2010).

The conclusions from this research indicate that Indigenous people despite having knowledge of climate change impacts experience disadvantage through lack of direct involvement in climate change adaptation programs aimed at the individual level and community development as well as a lack of involvement in policy and planning. An important but self evident research finding is that working on country – increasing links to land – increases adaptive capacity as well as a raft of other benefits (May 2010). This finding may be applicable to peri-urban and urban Indigenous communities in that formal linkages to land through native title determinations and land purchase, is increasing in south-eastern Australia and that this is an avenue for improving Indigenous peoples engagement with climate change adaptation.

See the Appendix E, Section 3.2: Indigenous People: Vulnerability and Adaptive Capacity for a summary of relevant papers. These conclusions support the research outcomes of this study (see Section 5.1: Indigenous Representation and Section 5.3: Environmental and cultural assets).

7.1.4 Socio-economic Issues of Indigenous Peoples Response to climate change

Research has been undertaken on climate change adaptation in terms of social justice (Brouwer et al., 2007; Tsosie, 2007). Research on Aboriginal and Torres Strait Islander peoples and how they are vulnerable to climate change and how they respond to climate change policy has been examined by Altman and Jordan (2008) and Bubnic-Litic (2012). The conclusion from this literature is that Indigenous people will be affected by climate change through higher prices caused through climate change itself and in the short term by policies to kerb carbon emissions such as the carbon tax. Given that Indigenous people are disadvantaged this will place additional burden on these people compared to other people in Australia.

See the Appendix E, Section 3.6: Employment, Poverty and Climate Change for a summary of relevant papers.

7.1.5 Indigenous Networks and Governance Issues Related to climate change

Research on the topic of Indigenous networks and governance has received the least attention of the five themes identified. Policy implications of climate change have received some attention in the literature (Berkes et al., 2000; Forbes 2008; Ford, et al., 2010; Keski-Katomarco 2008; Ososky 2006; Reid and Huq 2007). There has been limited research examining Indigenous governance issues in relation to how Indigenous
people attempt to engage collectively with climate change at the institutional level. Although not directly focussing on climate change Lahn (2012) examined the social dimensions of disadvantage in Indigenous communities in urban Australia through the lens of social capital. Whilst not attempting to universalise the role of social capital in disadvantage, placing value on the importance of relationships in social life and their interaction with wider social and institutional structures would be a valuable avenue for future climate change research.

See Appendix E, Section 3.4: Indigenous Representation and Governance for a summary of relevant papers.

The following are conclusions derived from an overall analysis of the literature on Indigenous people and climate change related to peri-urban and urban contexts.

- CC is currently placing a disproportionate burden on Indigenous people in many parts of the world. This arises from firstly the impacts on climate change sensitive regions and the vulnerability of these communities, and secondly that Indigenous people in urban areas who are not resource dependent and / or those with less links to traditional homelands experience disadvantage which leaves them disproportionately vulnerable to climate change and climate change policies such as carbon taxes.

- A collaborative approach to climate change vulnerability assessments is the most effective way to engage Indigenous people in such a process. The incorporation of traditional knowledge in these assessments at a level dictated by Indigenous people is an important part of this process. Globally, this approach has been undertaken in a small number of places. In Australia, this type of assessment has been undertaken in a few cases in remote Australia.

- Issues of social justice and economic disadvantage were a recurrent theme in the literature. Building adaptive capacity should not be seen as a process in climate change adaptation only but rather part of wider imperatives or the priorities of Indigenous people. Climate change adaptation cannot be managed in isolation of other issues and should acknowledge the cultural and institutional features that have led to the disadvantage that most Indigenous people experience. Increasing the links between Indigenous people and their country was an important way to increase adaptive capacity and a pathway for adaptation strategies to be developed. This was an important feature of climate change adaptation processes irrespective of the degree to which Indigenous people had direct control over country.

7.1.6 Research Gaps

Given that the major conclusion from the review of literature was that there is a paucity of research on the vulnerability and adaptation of urban and peri-urban Indigenous people, there are some major gaps in the literature that warrant further investigation. Gaps in the literature on the topic of Indigenous vulnerability and adaptive capacity towards climate change in urban and peri-urban settings include:

- A gap exists in the literature on the extent to which disadvantage occurs within urban and peri-urban Indigenous people in Australia and how this is related to climate change vulnerability and adaptive capacity at the household level across Australia.

48 Aboriginal reconnections
Given that collaborative approaches to climate change adaptation are more suited to Indigenous ways of governance there is a lack of research on how climate change adaptation strategies can be incorporated within Indigenous organisations in urban and peri-urban contexts over the longer term. There is a lack of research on how maintaining traditional knowledge, wild food use, and association with country may contribute to the adaptive capacity of Indigenous people in urban and peri-urban contexts.

Given the increasing urban expansion and changes induced by climate change, future research is needed on the potential role of Indigenous people from urban and peri-urban areas in collaborative heritage management of climate change impacts.

These conclusions support the findings of this study. Namely, that Indigenous people from urban and peri-urban areas have an association with country through wild food harvesting, the use of language, Indigenous seasonal calendars and the use of fire in the management of country and that this association and knowledge may be better utilised to engage adaptive strategies. Additionally, Indigenous people are concerned about climate change impacts in conjunction with the impact from urban development on cultural assets like Aboriginal sites.

### 7.2 A Proposed Research Plan

The short twelve month duration of the current research study, whilst examining the issues related to coastal urban and peri-urban Indigenous community vulnerability to, and capacity for climate change adaptation, has essentially served as a scoping study for many themes and issues associated with the topic. The research findings, supported by the conclusions from the review and analysis of the literature has served to establish a framework and processes that can potentially lead to a longer and more comprehensive research agenda over a number of years. The recognised research agenda maintains consistency with the *National climate change adaptation Research Plan for Indigenous Communities* (2012), specifically its Priority Research Topic 5: Understanding the capacity of Indigenous individuals, households, businesses, and institutions to adapt to climate change, and the identification of strategies to enhance this capacity with respect to coastal urban and peri-urban Indigenous communities.

With the support of appropriate funds from conventional research and specific Indigenous sources, all five case study communities have indicated their willingness to participate in further climate change adaptation research continuing the progress made thus far. As indicated in Figure 9, the PRG, which includes representatives for the five case study organisation, has been engaged to assist to identify gaps and to prioritise the potential research projects (PRG, February, 2013).

The Research Plan includes a review of known available potential funding sources of a conventional and Indigenous specific nature. Whilst a continuing changing landscape, funding opportunities identified to date include: Australian Research Council’s (including Discovery Indigenous Scheme), National Health & Medical Research Council, Commonwealth Government’s Caring for Country and ad hoc DCCEE calls, State Government grants (Planning, Environmental, Aboriginal and climate change agencies), Australian Institution of Aboriginal and Torres Strait Islander Studies, Australian Heritage Council, Australia Institute of Architects, Horticulture Australia, Christensen Fund, Local Government associations (Australian Local Government Association, Local Government Association of Queensland, Municipal Association of
The list of potential research projects that were scoped, discussed and prioritised with the Project Reference Group included:

a. Assessment of the climate change threat to Aboriginal heritage sites – both spiritual and natural, especially those in coastal sites at risk from sea level rise and storm surge. Studies should recognise the intangible heritage values (described by Respondent K2 as a “fusion of archaeological and Indigenous significances”). Respondent W2 called for the recording of sites threatened by rising sea levels prior to their inevitable loss.

b. Research the advantages of the housing funded unit under an Aboriginal Housing corporation model for individual & family responses to climate change.

c. Research and developing overarching strategies to improve Indigenous capacity and participation in climate change adaptation initiatives (particularly policy development).

d. Research to safe guard and improve the participation of Indigenous people in wild food collecting and growing.

e. Investigation of the potential for increased and extended participation of Indigenous people at all nodes of the Wild Food Network (including focus on younger generations)

f. Understanding the different land tenure conditions relevant to Aboriginal occupation and custodianship in south-eastern Australia, towards developing solutions to removing impediments and to limit climate change adaptation constraints.

Figure 9: The Development of a Research Plan

The list of potential research projects that were scoped, discussed and prioritised with the Project Reference Group included:
g. Research to link opportunities between spiritual connections and non-Indigenous (physical) ways for application of climate change adaptation messages in a ‘real world’ urban / peri-urban context. This should explore innovative methods of conveying climate change adaptation with perhaps a visual emphasis using new technologies and technologies such as computers, cartoons etc. It was suggested using the Wagal (Rainbow Serpent) Dreaming as a device, as it is an important spirit for the weather and climate. The Tjilbruki (Glossy Ibis) Dreaming, as he is a ‘peacemaker’ and brings order to country, was also suggested (Jones 2005; Tindale 1987).

h. A project to research and design a public education program for educating the public on climate change adaptation and the longevity of the Aboriginal peoples through past changes of climate. For this, an interactive history is required that gives a shared ‘white-black’ perspective. Respondent K2 considers that this “must recognise the cultural ownership of Dreamings, … [considering] collective versus individual rights and responsibilities for retaining and maintaining your law”.

i. Environmental design skills. The TO/Senior Custodian/Caretaker roles to be investigated in relation to how they work, or can work, in south-eastern Australia with respect to climate change adaptation and caring for country. This is particularly in reference to climate change adaptation – management and healing via the country – unifying cultural knowledge, and the sharing and skills.

In evaluating the above potential research projects, the PRG members considered the relevance of all proposed projects in relation to the community levels that were the foci of the original NCCARF climate change adaptation project brief. The PRG established the following priority rankings as set out in Table 6.
## Table 6: Priority List of Future Research Projects

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<th>Priority</th>
<th>Project</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Project 'c' (Research and developing overarching strategies to improve Indigenous capacity and participation in climate change adaptation initiatives particularly policy development) at the business and corporation levels</td>
</tr>
<tr>
<td>2</td>
<td>Project 'b' (Research the advantages of the housing funded unit under an Aboriginal Housing corporation model for individual &amp; family responses to climate change) at the family level Project 'i' (Environmental design skills) at the family level</td>
</tr>
<tr>
<td>3</td>
<td>Project 'f' (Understanding land tenure conditions relevant to Aboriginal occupation and custodianship towards developing solutions to removing impediments and to limit climate change adaptation constraints) at the business level</td>
</tr>
<tr>
<td>4</td>
<td>Project 'g' (Research to link opportunities between spiritual connections and non-Indigenous (physical) ways for application of climate change adaptation messages in a 'real world' urban / peri-urban context) at the organisational level Project 'h' (research and design a public education program for educating the public on climate change adaptation and the longevity of the Aboriginal peoples through past changes of climate) at the organisational level</td>
</tr>
<tr>
<td>5</td>
<td>Project 'i' (Environmental design skills) at the individual level</td>
</tr>
<tr>
<td>6</td>
<td>Project 'd' (Research to safe guard and improve the participation of Indigenous people in wild food collecting and growing) at individual and business levels Project 'c' (Research and developing overarching strategies to improve Indigenous capacity and participation in climate change adaptation initiatives particularly policy development) at individual and business levels</td>
</tr>
</tbody>
</table>

Project ‘c’ was considered as the most important potential future research study by the PRG. It was however seen as an ‘umbrella’ study into which all other studies could fit (regardless of their subsequent priority), finances permitting. The PRG noted that despite these rankings, that research should be dependent on the nature of the available funding.

As a footnote to this issue of further research, it was also noted that the partner universities had a range of scholarships for higher degree studies which could be utilised, along with any in-kind contribution for the universities to recruit Aboriginal students in the fields of planning and natural resource management and with a particular focus on climate change adaptation.

### 7.3 Research Protocols for Future Research

In proposing the Research Plan to take the initial findings and recommendations forward, the matter of continuing and enhanced research protocols, including ethics
approvals procedures, have been considered in regard to research with urban and peri-
urban communities. Appendix F provides a review of existing research protocols in
Australia, and then considers this project in the context of these processes and
expectations.
In essence, the principle guidelines that should underpin future research into coastal
urban and peri-urban Indigenous peoples’ vulnerability to, and capacity for climate
change adaptation should include:

- National Statement on Ethical Conduct in Human Research (NHMRC 2007a)
  prepared jointly by the National Health and Medical Research Council
  (NHMRC), the Australian Research Council (ARC) and the Australian Vice-
  Chancellors’ Committee (AVCC);
- AIATSIS Guidelines (2012);
- special to Universities ‘country’ research protocols; and
- relevant guidelines of professional institutions (where they exist).

Appendix F contains a concluding section on issues arising from this project’s
experience along with some common misconnections between research protocols and
urban and peri-urban contexts through the lens of the climate change adaptation
themes, which may be useful for future research in this area.
8. RECOMMENDATIONS FOR ONGOING ENGAGEMENT AND RESEARCH

A number of strategies have been identified to address the principal issues and challenges identified during the course of the research. These strategies are outlined in the form of recommendations as set out below.

Recommendation 1 – Opportunities to formally engage
Section 5.1 notes opportunities to initiate and forge formal links between climate change adaptation policy initiatives of various levels of government and Indigenous communities constituting the case studies for this project. Of particular prominence are these potentially emerging opportunities that include:

- the Victorian Government commitment to prepare a climate change adaptation Plan and “… assist disadvantaged communities to build their resilience to climate change by ensuring adaptation strategies are inclusive and relevant to vulnerable communities” (Victorian Government, 2012: 5); and
- the South Australian government’s commitment in their 2011 Strategic Plan to develop regional climate change adaptation plans in all regions by 2016 (South Australian Government, 2011: 47).

Notwithstanding the constraints and challenges noted during the course of the research, especially in regard to limited community members and members with relevant expertise in climate change and planning matters within the urban and peri-urban Indigenous communities several clear outcomes and recommendations were realised. These opportunities to formally engage do not readily exist at present and should not be passed over lightly when they present themselves, particularly when one considers the interconnectedness of climate change adaptation with most other planning and management aspects affecting country.

Recommendation 2 – Meaningful engagement
On the question of a lack of engagement and consultation with Indigenous communities, in this instance with respect to climate change adaptation, a possible solution is the development of protocols to ensure that senior spokespersons from Aboriginal communities are engaged in relevant decision-making processes and that the correct Indigenous agency is contacted (e.g. Indigenous health services for climate change induced health issues as opposed to Indigenous NRM / land management agencies for bushfire threats etc.). This should seek improved outcomes for engagement at the individual, family, business and organisational levels.

Recommendation 3 – Engaging though the ILUA process
The ILUA process may provide opportunities to address climate change adaptation in a formal and better resourced manner. Efforts to utilise existing and emergent ILUA processes to highlight and drive a formal climate change adaptation process with government along with a positive commitment to resources that will ensure continued engagement, especially if it was to occur in a collaborative arrangement, should be seriously pursued.

Recommendation 4 – Embedding clarified Protocols into the ILUA process
The ILUA process may also provide opportunities to incorporate improved engagement protocols for the long term involvement of Indigenous communities in climate change adaptation, either as a discrete policy area or as part of a larger policy agenda, probably connected to the adaptation of human settlements, landscapes and economic and social activities.
Recommendation 5 – Collaborative approaches
The research findings and literature review outcomes have consistently highlighted the need to adopt a collaborative approach as the most effective way to address climate change vulnerability assessments and to engage Indigenous people in that process. As a strategy to overcome the challenges of the disproportionate burden posed by climate change upon Indigenous people, there should be a collaborative approach to climate change adaptation, which builds in traditional knowledge, especially in a manner that does not undermine cultural identity. The incorporation of traditional knowledge in these assessments at a level dictated by Indigenous people is an important part of this process.

Recommendation 6 - Indigenous connection to country
The study has highlighted the importance of Indigenous connection to their country as an essential ingredient to improving their adaptive capacity to future climate change. This is a crucial point in regard to urban and peri-urban Aboriginal communities. The research has highlighted that climate change adaptation with Indigenous communities in south-eastern Australia cannot be divorced from connection to country. To these ends, it is proposed that various climate change adaptation initiatives facilitate the development of stronger links between urban and peri-urban Aboriginal communities and their country as a high priority. There is strong evidence that increasing the links between Indigenous people and their country will be essential to increasing their adaptive capacity and to serve as adaptation pathways for long term uptake and success. This is an important feature of climate change adaptation processes irrespective of the degree to which Indigenous people had direct control over their country.

Recommendation 7 – Youth engagement
It has been consistently argued in all research forums and noted across the workshops that successful long term engagement, especially in the climate change arenas, requires improved and concerted processes that facilitate young Indigenous people going into a range of disciplines and study fields that they have not traditionally entered but which are now crucial if Indigenous communities, particularly those in the urban and peri-urban areas, are to make meaningful headway. These disciplines include urban and environmental planning, landscape architecture, natural resource management and architecture as opposed to the more common business and legal studies.

The long term and strategic nature of climate change and adaptation strategies requires more serious attention be given to formal succession planning within Indigenous communities at the business and organisational levels.

Recommendation 8 – Research Plan
Implement the proposed Research Plan (Section 7.2) as funding opportunities arise and with due regard to the priorities agreed with the Project Reference Group. This can capitalise on the strengthened partnership that has been forged between the two university research teams and the five Indigenous case study communities / organisations. It will be important to at least attempt to maintain the momentum that has been built up over the past twelve months of research activities. Any ongoing research program will however have to be cognisant of the constraints that urban and peri-urban Indigenous communities confront in capacity and numbers.
**Recommendation 9 – Inclusive participation**
This study has demonstrated that a number of existing Aboriginal TO and non-TO organisations are already operating in their respective geographic areas in a range of cultural resource, landscape management and heritage roles. Opportunities should be pursued to align state and regional climate change adaptation policies and initiatives with efforts of existing Aboriginal groups regardless of their status. For example, the Wathaurong Aboriginal Co-Operative Limited (WACO) at North Geelong, a community-based organisation is not a Registered Aboriginal Party (RAP) under Victorian Government legislation but this should not exclude them from taking on a more definitive role in climate change adaptation.

**Recommendation 10 – a comprehensive approach**
Issues of social justice and economic disadvantage besides being a recurrent theme in the literature were also consistently raised in all workshop sessions in all case study areas. For this reason, capacity building for climate change adaptation cannot and should not be attempted in isolation nor should it be treated as merely a singular process. Climate change adaptation for urban and peri-urban Indigenous communities must be attempted as part of a wider initiative which also seeks to address wider imperatives and priorities of Indigenous people. Climate change adaptation cannot be implemented in isolation of other issues and should acknowledge the cultural and institutional features that have led to the disadvantage that most Indigenous people experience.
9. CONCLUSIONS

Climate change is expected to have social, economic and environmental impacts on urban and peri-urban Indigenous communities inhabiting coastal areas throughout south-eastern Australia. These impacts include a loss of community and environmental assets, including cultural heritage sites, with significant impact on the quality of life of populations inhabiting these areas, and the establishment of potential favourable conditions for the spread of plant diseases, weeds and pests. Over most of south-eastern Australia, including southern Victoria and the Adelaide region, climate change is expected to lead to increased risk of heatwaves, longer drought periods, increased bushfire risk, increased risks of flood events and more frequent coastal inundation and associated impacts such as coastal erosion.

A review of the literature examining the impacts climate change on peri-urban and urban Indigenous people found that there is limited research on the topic in Australia and globally. The review did show that lower socio-economic members of this group are more vulnerable to climate change compared to the general Australian population. Their adaptive capacity is low as a result of the same systemic issues confronting Indigenous people that have led to disadvantage. As such, research on climate change adaptation positions climate change as one of the many issues facing Indigenous people and needs to be addressed collaboratively and not in isolation. Research from other more remote regions in Australia and abroad indicate collaborative community-based approaches are needed for effective climate change vulnerability assessments and the building of individual and collective adaptive capacity.

Several aspects collectively emerged from the literature research and the project workshops, namely:

- Specific Indigenous climate change adaptation policy is absent in government policies and strategies and Indigenous representation in government climate change adaptation policy forums is poor - there is a need for a specific Indigenous voice in climate change adaptation discussions at the state and national levels;
- Adaptive capacity could be improved if Indigenous groups had enhanced access to their country;
- Due to ongoing historical disadvantage, socio-economic issues tend to override climate change adaptation considerations;
- Whilst important economically, wild plants and animals have cultural importance in contemporary identity building and exploitation of the wild food network presents important opportunities for urban and peri-urban Aboriginal people;
- Aboriginal language and words hold certain commonalities that have within them appraisals of longitudinally environmental patterns and changes, but opportunity to study urban and peri-urban Indigenous peoples understanding of climate change through these mediums will be seriously constrained through the decline in Indigenous language speakers amongst urban and peri-urban Aboriginal communities;
- There is concern about changes occurring within a background of peri-urban and urban expansion which have the potential to further disconnect Aboriginal communities from their country and seriously limit their stewardship opportunity;
Peri-urban expansion is having a major deterioration upon the physical environment (land and water), which threatens cultural assets such as Aboriginal sites and is exacerbated by climate change;

- Many of the climate change adaptation challenges can be overcome through collaborative approaches especially those that build in traditional knowledge so that it does not undermine cultural identity; and

- There is an urgent need to ensure that the next generation of Aboriginal communities is across climate change adaptation and other environmental management issues related to country whilst addressing issues of succession planning.

The evidence emerging from this research clearly demonstrates that Aboriginal people’s consideration of the future, even with the overlay of climate change and the requirements for serious considerations of adaptation, are significantly influenced and dominated by economic aspirations which are seen as fundamental survival strategies for their communities.

Opportunities do not readily exist for a higher level of engagement with climate change adaptation policy and initiatives and this is further exacerbated by existing acute shortage of qualified / experiences members in urban and peri-urban Indigenous communities. Any opportunity to engage in climate change debate and policy formulation should not be missed for urban and peri-urban Indigenous communities. This is largely because many other initiatives can be linked and / or run in parallel with climate change adaptation initiatives which can start to address some long standing issues of a socio-economic and human capacity nature.

The recommended collaborative and comprehensive approach involves a high degree of inclusive participation and youth engagement leading to greater Indigenous connection to country, thus improving the chances of enhancing the adaptive capacity of individual and collective Indigenous people. This should lead to more meaningful engagement that maximises the gains from existing and emergent ILUA process through the embedment of climate change adaptation intentions and support commitments along with serious employment of protocols in the ILUA process. All of these initiatives should lead to meaningful and higher order engagement by urban and peri-urban Indigenous communities in formal climate change adaptation policy agendas.

Much can be driven through the implementation of the proposed Research Plan which is a cornerstone of this research project.
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Arts Victoria & Victorian Aboriginal Corporation for Languages. 2010. Indigenous creation stories of the Kulin Nation, Arts Victoria, [Melbourne].


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Quandamooka Aboriginal Community. 2007. *Quandamooka Aboriginal Community Plan*. Quandamooka Aboriginal Community, North Stradbroke Island, Queensland.


Riedlinger, D. & Berkes, F. 2001. ‘Contributions of traditional knowledge to understanding climate change in the Canadian Arctic’, *Polar Record*, vol. 37 no. 203, pp. 315-328.


APPENDIX A  ETHICS INFORMATION SHEET AND CONSENT FORM

Understanding Coastal Urban and Peri-urban Indigenous People’s Vulnerability and Adaptive Capacity to Climate Change

INFORMATION SHEET

For participants in this project, it is important to read this information about the researchers’ responsibilities and your rights throughout the project. A complete Project Protocol is available on request.

Who is conducting the research?

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professor Darryl Low</td>
<td>Project Leader</td>
<td><a href="mailto:d.lowchoy@griffith.edu.au">d.lowchoy@griffith.edu.au</a></td>
<td>(07) 3735 7496</td>
</tr>
<tr>
<td>Choy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assoc Prof David JONES</td>
<td>Principal Investigator</td>
<td><a href="mailto:david.jones@deakin.edu.au">david.jones@deakin.edu.au</a></td>
<td></td>
</tr>
<tr>
<td>Dr Phillip Clarke</td>
<td>Snr Research Fellow</td>
<td><a href="mailto:Philip.c@ozemail.com.au">Philip.c@ozemail.com.au</a></td>
<td></td>
</tr>
<tr>
<td>Dr Rob Hales</td>
<td>Project Team</td>
<td><a href="mailto:r.hales@griffith.edu.au">r.hales@griffith.edu.au</a></td>
<td>(07) 55527350</td>
</tr>
</tbody>
</table>

Why is the research being conducted?

This research is a partnership between Griffith University/Deakin University and Indigenous people which strengthens ‘community of knowledge’ about climate change. This project is a study of coastal near urban Indigenous community capacity for climate change adaptation which will lead to the establishment of an ongoing framework for research and partnership in climate change adaptation.

Its specific objectives are:

1. to establish a community of Indigenous knowledge (network) for ongoing research into Indigenous climate change adaptation;

2. to scope the opportunities, challenges and processes for adding to the public knowledge in collaboration with Indigenous people;

3. to develop in partnership a set of protocols for ongoing Indigenous climate change adaptation research; and

Aboriginal reconnections
4. to publish reports on how Indigenous people may respond to climate change matters;

What you will be asked to do

You will be asked to participate in a workshop and possibly an interview to consider your perspectives on climate change and how you think it might affect you and your community. To assist us in keeping track of the discussions we would like to audio-record the interview. If at any time you would like the recording stopped, please advise us. Please also advise us of any information that you would like to be kept outside the scope of this research. The recordings will be typed into a transcript and will only be used for the purposes of this research unless you give special permission for wider use.

The expected benefits of the research

There are two main benefits to participation:

1. An understanding that the research may benefit participants through their contribution to a piece of literature that publishes their perspectives.
2. Participation may lead to gaining knowledge and skills to better engage with climate change issues in the future.

Intellectual Property Rights

In this project, the information and knowledge you bring with you (including stories, ideas, songs, names and places) will remain under your control. This is called Background Intellectual Property and it will always be owned by you, whether you choose to share it with the researchers or not.

During the project, information and outputs (reports and documents) will be created by the researchers. These documents are Project Intellectual Property and they are owned by Griffith University. In each project document, the traditional knowledge that is shared by all participants during the research process will be acknowledged.

Your confidentiality

Information about your identity will not be disclosed to third parties, except to meet government, legal or other regulatory authority requirements.

The knowledge you choose to share will only be used in a project document if you give written consent. Basically, we will not pass on your stories unless you say it’s OK. You can tell the researchers that a piece of information is confidential at any stage of the research. Confidential information will not be published.

Please take care to only share information that you are allowed to share on behalf of your cultural group.

Free Prior Informed Consent

The researcher will give you plenty of time and information to make up your mind about participating in this research. The researcher will not force you to join and you are free to say ‘yes’ or ‘no’. You need to sign a consent form to give your consent. You can leave the project at anytime.
Storing the Information

Records of the knowledge you share with the researcher will be kept safe and secure at Griffith University. Only the researchers will be able to access those records. Griffith University is required to keep all project documents for five years after the research is finished before destroying them.

Publication & Feedback to you

The researchers will only create public outputs with information you say is OK to share. You will have a chance to read and make changes to all project outputs before they are made public. The researchers will seek your approval if there are any changes to the research. Traditional knowledge will be acknowledged in all publications.

Questions / further information

- For further information about this research, please contact one of the research team or the Urban Research Program.

The ethical conduct of this research

- Griffith University conducts research in accordance with the National Statement on Ethical Conduct in Research Involving Humans. If you have any concerns or complaints about the ethical conduct of the research project, contact:

  The Manager, Research Ethics  
  (07) 3735 5585  
  research-ethics@griffith.edu.au.

Privacy Statement

Your anonymity will be safeguarded at all times. For further information consult the University’s Privacy Plan at www.griffith.edu.au/ua/aa/vc/pp or telephone (07) 3735 5585
Understanding Coastal Urban and Peri-urban Indigenous People’s Vulnerability and Adaptive Capacity to Climate Change.

CONSENT FORM

<table>
<thead>
<tr>
<th>Research Team</th>
<th>Position</th>
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<th>Phone</th>
</tr>
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<tbody>
<tr>
<td>Professor Darryl Low Choy</td>
<td>Project Leader</td>
<td><a href="mailto:d.lowchoy@griffith.edu.au">d.lowchoy@griffith.edu.au</a></td>
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<td></td>
</tr>
</tbody>
</table>

By signing below, I confirm that I have read and understood the Information Sheet and in particular have noted that:

- I understand that my participation in this research will involve scheduled discussions with the Research Team to gain an understanding of Indigenous perspectives on climate change issues; and
- I understand that this discussion will be audio-recorded; and
- I understand that only the research team will have access to this recording; and
- I understand that the recording will be destroyed after transcription unless I give special permission for the wider use of the recordings; and
- I understand that there will be no direct benefit to me from my participation in this research; and
- I understand that I will continue to own my Background IP and the Research Team own the Project IP; and
- I understand that in the case of my death, the Research Team is still permitted to use the Project IP; and
- I understand my privacy and confidential information will be kept safe; and
- I understand that my participation in this research is voluntary; and
- I understand that I am free to withdraw at any time, without comment or penalty; and
- I understand that I can contact the Research Team if I have any additional questions; and
I understand that I can contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee on 3735 5585 (or research-ethics@griffith.edu.au) if I have any concerns about the ethical conduct of the project; and

I agree to participate in the project.

In addition, I confirm that by ticking the box below my signature I am giving special permission for an extract from my recording being used in conference presentations or for instructional purposes; and I understand that I will be shown the extracts from my recording that may be used for conference presentations or for instructional purposes.

Griffith University and the Urban Research Program thank you for your consent and your participation.

CONSENT FORM
Identifying and Incorporating Indigenous Landscape Values into Regional Planning Processes

Name

Signature

Date

Special permission □
APPENDIX B  CLIMATE STORYLINES & IMPACT MAPS

SOUTH EAST QUEENSLAND REGION - CLIMATE STORYLINES

The South East Queensland (SEQ) region has long been at risk from natural hazards, including flooding, storm surges and bushfires. As the region has highly urbanised coastal areas and is being subject to ongoing population growth, it has been considered to be one of six vulnerability ‘hot spots’ in Australia to be affected by climate change.

While there is much uncertainty involved in climate science, particularly with regards to downsampling future global climate projections to smaller regional and local scales, SEQ is likely to be affected by changes in climatic averages, such as rainfall and temperature, sea-level rise and an increase in extreme weather events.

Expected changes

Under climate change the expected changes for SEQ in the future are:

- Increase in high temperatures and the number of days over 35°C;
- Annual mean temperatures likely to rise between 0.5°C and 1.5°C with little change in precipitation by 2030;
- Precipitation to occur in more intense events with an increase in the frequency of dry days and a decrease in the frequency of wet days;
- Increase of the intensity and variability of storms affecting the coastline;
- Sea level rise, associated with global warming, expected to be 1.3 mm per year and around 0.5m by 2070;
- Increase in hail risk between 2 to 4 days per year;
- Increase in the number and frequency of more intense cyclones and a southern shift in their tracks.

Temperature change (annually)

Daytime rainfall intensity (1 in 20 year event)

<table>
<thead>
<tr>
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<td></td>
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<td>Based on Global Climate Models</td>
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<td>2030 A1B (medium emissions)</td>
<td>2070 A1F1 (high emissions)</td>
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<td></td>
<td>Seasonal change Summer (DJF)</td>
<td>Seasonal change Winter (JJA)</td>
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<td>Seasonal change Autumn (MAM)</td>
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<td>(Unlikely to be warmer - 4 models; Very unlikely to be warmer - 2 models)</td>
<td>(Unlikely to be warmer - 4 models; Very unlikely to be warmer - 2 models)</td>
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</table>

Figure A1: Climate change impacts to affect the SEQ Region

The Geelong region is significantly exposed to climate extremes and natural hazards such as storm surge and coastal inundations, bushfires and extreme temperatures.

While there is much uncertainty involved in climate science, particularly with regards to downscaling future global climate projections to smaller regional and local scale, climate change is likely to exacerbate the region's exposure to natural hazards. As a result, the Geelong region is likely to be affected by more intense winds and storms, coastal inundation due to sea level rise, as well as changes related to bushfires patterns, droughts, average and extreme temperatures and average rainfall.

**Expected changes**

Climate projections presented for the Geelong region are based on the G21 Geelong Regional Plan (2007), Climate Change in the Corangamite Region (2008) and the Geelong Climate Change Adaptation Strategy (2011). Expected changes in the future for the region include:

- lower and declining annual rainfall;
- increased intensity of extreme rainfall events;
- increased number of extreme hot days;
- decrease in the number of frost days;
- more frequent and longer droughts;
- higher number of extreme bushfire risk days;
- greater coastal exposure to shoreline erosion and inundation from sea-level rise;
- increased temperatures and changing storm and storm surge patterns.

**Geelong Region - Climate Storylines**

- More intense coastal erosion and coastal inundation due to sea level rise
- Increase in heat wave events
- Increased risk of tropical cyclones reaching the region
- Increased risk of floods
- More favourable conditions for the spread of plant diseases, pests and weeds

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Aboriginal reconnections
### Aboriginal reconnections

#### GEELONG REGION - PROJECTIONS

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<td>Summer</td>
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<td>-3%</td>
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<td>Spring</td>
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<td>3 to 7%</td>
</tr>
<tr>
<td>Summer</td>
<td>2%</td>
<td>3 to 6%</td>
</tr>
<tr>
<td>Autumn</td>
<td>4%</td>
<td>6 to 12%</td>
</tr>
<tr>
<td>Winter</td>
<td>6%</td>
<td>11 to 20%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wind speed</th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>no change</td>
<td>no change</td>
</tr>
<tr>
<td>Spring</td>
<td>no change</td>
<td>no change</td>
</tr>
<tr>
<td>Summer</td>
<td>no change</td>
<td>-1%</td>
</tr>
<tr>
<td>Autumn</td>
<td>-2%</td>
<td>-4 to -7%</td>
</tr>
<tr>
<td>Winter</td>
<td>1%</td>
<td>2 to 4%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relative humidity</th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>-0.5%</td>
<td>-0.9 to -1.7%</td>
</tr>
<tr>
<td>Spring</td>
<td>-0.8%</td>
<td>-1.3 to -2.6%</td>
</tr>
<tr>
<td>Summer</td>
<td>-0.6%</td>
<td>-1.0 to -1.8%</td>
</tr>
<tr>
<td>Autumn</td>
<td>-0.4%</td>
<td>-0.6 to -1.2%</td>
</tr>
<tr>
<td>Winter</td>
<td>-0.3%</td>
<td>-0.6 to -1.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solar radiation</th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>0.8%</td>
<td>1.3 to 2.5%</td>
</tr>
<tr>
<td>Spring</td>
<td>1.2%</td>
<td>2 to 3.8%</td>
</tr>
<tr>
<td>Summer</td>
<td>0.5%</td>
<td>0.8 to 1.6%</td>
</tr>
<tr>
<td>Autumn</td>
<td>0.5%</td>
<td>0.8 to 1.5%</td>
</tr>
<tr>
<td>Winter</td>
<td>1.1%</td>
<td>1.9 to 3.6%</td>
</tr>
</tbody>
</table>

**Legend**
- Key to climate changes: ↑ increase, ↓ decrease.

### Understanding Urban and Peri-urban Indigenous People’s Vulnerability and Adaptive Capacity to Climate Change

**WESTERN PORT REGION - CLIMATE STORYLINES**

The Western Port region is significantly exposed to climate extremes and natural hazards such as storm surge and coastal inundation, floods, bushfires and extreme temperatures. While there is much uncertainty involved in climate science, particularly with regards to downsizing future global climate projections to smaller regional and local scale, climate change is likely to exacerbate the region’s exposure to natural hazards. As a result, the Western Port region is likely to be affected by an increase in both the frequency and intensity of coastal inundation and flooding due to internal rainfall, as well as changes related to bushfire patterns, average and extreme temperatures and average rainfall.

<table>
<thead>
<tr>
<th>Climate Variable</th>
<th>2011-2020</th>
<th>2021-2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average maximum temperature</td>
<td>18°C</td>
<td>18°C</td>
</tr>
<tr>
<td>Average minimum temperature</td>
<td>9°C</td>
<td>9°C</td>
</tr>
<tr>
<td>Dry days (35°C, per year)</td>
<td>45.8</td>
<td>44.6</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Average annual rainfall</td>
<td>725 mm</td>
<td>736 mm</td>
</tr>
<tr>
<td>Average total annual rainfall</td>
<td>717.7 mm</td>
<td>736.3 mm</td>
</tr>
<tr>
<td>Average total spring/summer rainfall (March to August)</td>
<td>556.8 mm</td>
<td>564.9 mm</td>
</tr>
<tr>
<td>Average total autumn/winter rainfall (September to February)</td>
<td>164.9 mm</td>
<td>164.6 mm</td>
</tr>
<tr>
<td>Average total number of days of rain per year (1 mm or more)</td>
<td>135.4 days</td>
<td>135.4 days</td>
</tr>
<tr>
<td>Average total number of days of rain above 10mm per year</td>
<td>5.4 days</td>
<td>5.5 days</td>
</tr>
<tr>
<td>Annual days of drought</td>
<td>36 days</td>
<td>36 days</td>
</tr>
<tr>
<td>Annual days of flooding</td>
<td>50 days</td>
<td>50 days</td>
</tr>
</tbody>
</table>

**Expected changes**

- Increase in temperatures by 0.5 to 1.1°C by 2030 and 0.9 to 3.5°C by 2070;
- Decrease in average annual rainfall by up to 8% by 2030 and 13% by 2070, with higher reductions expected in winter and spring;
- Increase in drought frequency and intensity;
- Increases of up to 25% in extreme rainfall from events of 1 to 24 hours in duration in all-risk areas by 2030 and up to 70% by 2070, with an associated increase in the frequency or magnitude of flood events or flood heights.

- Worsening fire weather with an increase in the number of days of ‘very high’ or ‘extreme’ fire risk by 1 to 2 days by 2030 and 2 to 7 days by 2050;
- Sea level rise estimated to be between 6 to 17 cm by 2030 and 15 to 49 cm by 2070;
- Storm surge inundation to change from the current 1 in 100 year to become a 1 in 1 to 4 year event by 2070;
- Land area subject to inundation during a 1 in 100 year storm surge event may increase by 4 to 15% by 2030 and 16 to 63% by 2070.

Aboriginal reconnections 75
### WESTERN PORT REGION - PROJECTIONS

<table>
<thead>
<tr>
<th>Sea level rise / storm surge</th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea level rise</td>
<td>↑ up to 0.17 m</td>
<td>↑ up to 0.49 m</td>
</tr>
<tr>
<td>Storm tide – max. height; 1:100 year ARI (current 2.10 m, Cowes)</td>
<td>2.29 m</td>
<td>2.74 m</td>
</tr>
<tr>
<td>Storm tide – max. height; 1:100 year ARI (current 1.36 m, Frankston)</td>
<td>1.37 m</td>
<td>1.80 m</td>
</tr>
<tr>
<td>Storm surge – change to 1:100 year ARI</td>
<td>↓ to 1.40 - 1.6</td>
<td>↓ to 1.20 - 1.1</td>
</tr>
<tr>
<td>Inundation area Western Port Bay (1:100 year storm surge)</td>
<td>up to 12.8 sq km</td>
<td>up to 17.7 sq km</td>
</tr>
<tr>
<td>Estimated inundation area Port Phillip Bay (1:100 year storm surge)</td>
<td>up to 3.1 sq km</td>
<td>up to 3.6 sq km</td>
</tr>
</tbody>
</table>

### Fire weather

<table>
<thead>
<tr>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of very high and extreme forest fire risk days (≈ 9-12 days current)</td>
<td>↑ 1 - 2</td>
</tr>
<tr>
<td>No. of very high and extreme grass fire risk days (≈ 95 days current)</td>
<td>↑ 7 - 15</td>
</tr>
</tbody>
</table>

### Extreme rainfall

<table>
<thead>
<tr>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 hour</td>
<td>↑ 15-25 %</td>
</tr>
<tr>
<td>12 hour</td>
<td>↑ 3-22 %</td>
</tr>
<tr>
<td>24 hour</td>
<td>↓ 2 - 17 %</td>
</tr>
<tr>
<td>72 hour</td>
<td>↓ 2-16 %</td>
</tr>
<tr>
<td>Maximum flood heights</td>
<td>↑</td>
</tr>
<tr>
<td>Flood return intervals (ARI)</td>
<td>→ riverine</td>
</tr>
</tbody>
</table>

### Average and extreme temperatures

<table>
<thead>
<tr>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual temperature</td>
<td>↑ 0.5-1.3°C</td>
</tr>
<tr>
<td>Days per yr &gt; 30 °C (30 current)</td>
<td>↑ 2 - 5</td>
</tr>
<tr>
<td>Days per yr &gt; 35 °C (7 current)</td>
<td>↑ 1 - 3</td>
</tr>
<tr>
<td>Days per yr &gt; 40 °C (1 current)</td>
<td>↑ 1 - 2</td>
</tr>
<tr>
<td>Runs of 3-5 days &gt; 30 °C (8 current)</td>
<td>↑ 1 - 2</td>
</tr>
</tbody>
</table>

### Average rainfall

<table>
<thead>
<tr>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual</td>
<td>↓ 0.8 %</td>
</tr>
<tr>
<td>Catchment stream flows (worst case)</td>
<td>↓ 25 %</td>
</tr>
<tr>
<td>Droughts</td>
<td>↑ frequency &amp; severity</td>
</tr>
</tbody>
</table>

**Legend**
- ↑ Increase; ↓ decrease; ± no significant change. Absence of number next to arrow indicates magnitude of change has not been quantified.
Figure A2: Climate change impacts to affect the Southern Victoria region

- More intense coastal erosion and coastal inundation due to sea level rise
- Longer periods of drought
- Increased risk of bushfire weather
- Increased risk of floods
- Increase in heat wave events

Wathaurung Registered Aboriginal Party (RAP) area
Wathaurong Aboriginal Co-Operative area
Boon Wurrung/ Bunurong Registered Aboriginal Party (RAP) application claim area
Pending South East Koolin (Boon Wurrung & Bunurong) Registered Aboriginal Party (RAP) application claim area
The Adelaide and Mount Lofty Ranges region has been subject to changes in climatic conditions over the last decades. These changes are predominantly related to temperature and rainfall averages.

While there is much uncertainty involved in climate science, particularly with regards to downscaling future global-climate projections to smaller regional and local scale, climate change is likely to exacerbate the region’s exposure to natural hazards. As a result, the Adelaide and Mount Lofty Ranges region is expected to be hotter and drier than it is today.

**Adelaide and Mount Lofty Ranges Region - Climate Storylines**

**Current Climatic Averages**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>1995-2015 Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual minimum temperature</td>
<td>31.5°C</td>
</tr>
<tr>
<td>Average annual maximum temperature</td>
<td>11.4°C</td>
</tr>
<tr>
<td>Highest temperature reached over period</td>
<td>40°C</td>
</tr>
<tr>
<td>Average number of days above 35°C per year</td>
<td>153.7 days</td>
</tr>
<tr>
<td>Relative humidity (1995-2015)</td>
<td>47%</td>
</tr>
<tr>
<td>Average annual relative humidity</td>
<td>53%</td>
</tr>
<tr>
<td>Average total annual rainfall</td>
<td>465.8 mm</td>
</tr>
<tr>
<td>Average total rainfall (October to March)</td>
<td>341.6 mm</td>
</tr>
<tr>
<td>Average total rainfall (April to September)</td>
<td>306.6 mm</td>
</tr>
<tr>
<td>Average number of days of rain per year (over 10 mm)</td>
<td>768 days</td>
</tr>
<tr>
<td>Average number of days with more than 3 mm rain per year</td>
<td>1.4 days</td>
</tr>
<tr>
<td>Annual decline in rainfall</td>
<td>33.4 mm/mm</td>
</tr>
<tr>
<td>Annual decline in rainfall in 100 years</td>
<td>57.5 mm/mm</td>
</tr>
</tbody>
</table>

**Adelaide and Mount Lofty Ranges Region - Projections**

**Expected changes**

Climate projections presented for the Adelaide and Mount Lofty Ranges region are based on assessments undertaken by CSIRO. Projections for 2030 and 2070 are based on a medium emissions scenario. Compared to 1990 figures, expected changes in the future for the region include:

- Increase in average annual temperatures by 0.8°C by 2030 and by 2.3°C by 2070;
- Increase in the number of hot days (above both 35°C and 40°C);
- Decrease in the total average annual rainfall of around 4.5%, with greatest decline in winter and spring (8%);
- More extreme rainfall events;
- Increase in potential evapotranspiration and reduction in relative humidity leading to drier conditions;
- More intense storm events;
- Higher coastal storm surges;
- More frequent and intense bushfires.

### Table: Average Temperature

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>0.8°C</td>
<td>2.3°C</td>
</tr>
<tr>
<td>Spring</td>
<td>0.8°C</td>
<td>1.8°C</td>
</tr>
<tr>
<td>Summer</td>
<td>0.8°C</td>
<td>1.8°C</td>
</tr>
<tr>
<td>Autumn</td>
<td>0.8°C</td>
<td>1.8°C</td>
</tr>
<tr>
<td>Winter</td>
<td>0.8°C</td>
<td>1.8°C</td>
</tr>
</tbody>
</table>

### Table: Average Rainfall

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>-4.5%</td>
<td>-15%</td>
</tr>
<tr>
<td>Spring</td>
<td>-8%</td>
<td>-15%</td>
</tr>
<tr>
<td>Summer</td>
<td>-4.5%</td>
<td>-15%</td>
</tr>
<tr>
<td>Autumn</td>
<td>-4.5%</td>
<td>-15%</td>
</tr>
<tr>
<td>Winter</td>
<td>-8%</td>
<td>-15%</td>
</tr>
</tbody>
</table>

### Table: Potential Evapotranspiration

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>3%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Spring</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Summer</td>
<td>0%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Autumn</td>
<td>3%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Winter</td>
<td>6.5%</td>
<td>10%</td>
</tr>
</tbody>
</table>

### Table: Relative Humidity

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>-0.8%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Spring</td>
<td>-0.8%</td>
<td>-2.5%</td>
</tr>
<tr>
<td>Summer</td>
<td>0%</td>
<td>-1.5%</td>
</tr>
<tr>
<td>Autumn</td>
<td>0%</td>
<td>-0.8%</td>
</tr>
<tr>
<td>Winter</td>
<td>-0.8%</td>
<td>-1.5%</td>
</tr>
</tbody>
</table>

### Table: Wind Speed

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Spring</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Summer</td>
<td>3.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Autumn</td>
<td>0%</td>
<td>-3.5%</td>
</tr>
<tr>
<td>Winter</td>
<td>0%</td>
<td>-3.5%</td>
</tr>
</tbody>
</table>

### Table: Solar Radiation

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2070</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual</td>
<td>0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Spring</td>
<td>0%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Summer</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Autumn</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Winter</td>
<td>1.5%</td>
<td>3.0%</td>
</tr>
</tbody>
</table>
Figure A3: Climate change impacts to affect the Adelaide Region
APPENDIX C       REMOTENESS CLASSIFICATIONS – QUEENSLAND

Different government departments have different definitions that they use and apply for ‘remoteness’. These definitions determine what types/levels of government services are then available to a community. The following table sets out the various definitions of local, state and Commonwealth government agencies and policy and management documents.

Table C1: “Remoteness” definitions of various government agencies

<table>
<thead>
<tr>
<th>Agency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local</strong></td>
<td></td>
</tr>
<tr>
<td>Redland City Council</td>
<td>No reference to the term ‘remote’ or ‘remoteness’ on the council website.</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Office of Rural and Remote Health | The Office of Rural and Remote Health refers to the ‘Rural Health Series No 4, Rural, regional and remote health’ report, when determining remoteness classifications (Huysaer, K 2012, pers. comm., 19 July).  
                                     | The report states that 3 major remoteness classifications are currently used⁶: 1. RRMA (Rural, Remote and Metropolitan Areas) classification  
                                     | 2. ARIA (Accessibility/Remote index of Australia) classification (based on ARIA index values), and  
                                     | 3. ASGC (Australian Standard Geographical Classification) Remoteness Areas (based on ARIA+ index values – an enhanced version of the ARIA index values). |
| Department of State Development, Infrastructure and Planning | The Department of State Development, Infrastructure and Planning refer to the current legislation (Edwards, J 2012, pers. comm., 19 July).  
                                     | *Standard Plumbing and Drainage Regulation 2003 (Qld)*⁷  
                                     | Section 25 of the Standard Plumbing and Drainage Regulation 2003 states that a ‘remote area’ is an area of land which is included in a ‘local government’s area’.  
                                     | An ‘area’ is classified as remote if the nearest office of local government is more than 80km away and/or if it is reasonably difficult to access the specific area (s25 (1)). Examples of reasonably difficult areas to access include; (1) an island without a regular water vehicle service from the mainland; and (2) weather conditions or other circumstances that make usual access to the land difficult or dangerous (s25 (1)).  
                                     | Land is not classified as a remote area if there is an ‘activity’ on the land (s25 (2)). Examples of activities include mining or another industrial use (s25 (2)). |


80 Aboriginal reconnections
| Department of Transport and Main Roads | The Department of Transport and Main Roads refer to ASGC (Australian Standard Geographical Classification) for projects in the far North and for certain projects in the local government (Hamilton, D 2013, pers. comm., 10 April). |
| Department of Health and Ageing | The Department of Health and Ageing refers to ASGC (Australian Standard Geographical Classification) for certain ’Doctor Connect’ incentives and programs\(^8\). |
| Australian Institute of Health and Welfare | The Australian Institute of Health and Welfare recommends the use of ASGC (Australian Standard Geographical Classification)\(^9\). |

**Explanations of current remoteness classifications**

1. **RRMA (Rural, Remote and Metropolitan Areas) classification\(^{10}\)**

   This classification is based on ‘Statistical Local Areas’. Each Statistical Local Area in Australia is allocated to a category which is primarily based on population numbers and an index of remoteness. To allocate non-metropolitan Statistical Local Areas to either the rural or remote zone, the index of remoteness is used. There are seven categories included in this classification – 2 metropolitan, 3 rural and 2 remote. This is not the best method of measuring remoteness. The size of the Statistical Local Area and the distribution of the population within a Statistical local area can vary a great deal.

---


According to the Rural Health Series No. 4 Rural, Regional and Remote Health report, North Stradbroke Island (SLA code 36283 – Redland (S) Bal.) is classified as a ‘Metropolitan zone (capital cities)’.

2. ARIA (Accessibility/Remoteness Index of Australia) classification\textsuperscript{11}

Index values, between 0 and 12 for 11,340 populated localities are produced. If an area has an ARIA index value of 0 that means that the area has the highest levels of access to goods and services. If an area has an ARIA index value of 12, it means that the area has the highest level of remoteness. The index score is based on the road distance from the closest service centres in each of four classes (as defined using 1996 census population data). This then means that, index scores and categories are then capable of being updated over time when populations change. The ARIA categories are; highly accessible, accessible, moderately accessible, remote and very remote.

According to the Rural Health Series No. 4 Rural, Regional and Remote Health report, North Stradbroke Island (SLA code 36283 – Redland (S) Bal.) is classified as ‘Highly Accessible’.

3. ASGC (Australian Standard Geographical Classification) Remoteness Areas and ARIA+ (Accessibility/Remoteness Index of Australia +) classification\textsuperscript{12}

The ASGC Remoteness Areas classification is based on ARIA+ methodology rather than ARIA methodology. ARIA and ARIA+ are calculated very similarly, but there are a few differences. The ARIA+ index value is based on distance to five categories of service centres instead of 4 used in ARIA. ARIA+ also has an extra population category. ARIA+ index values range from 0-15 instead of 0-12. The ARIA+ categories are; major cities of Australia, inner regional Australia, outer regional Australia, remote Australia, very remote Australia and migratory.

According to the Rural Health Series No. 4 Rural, Regional and Remote Health report, North Stradbroke Island (SLA code 36283 – Redland (S) Bal.) is classified as ‘Remote’.

4. National Zone Code

The National Zone code is an internal, Department of Education, Training and Employment remoteness classification system (Tracy, J 2013, pers. comm., 10 April). Please see table below for the codes and their definitions.


Table C2: National Zone Codes

<table>
<thead>
<tr>
<th>National Zone Code</th>
<th>National Zone Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1 (1.1)</td>
<td>Mainland State Capital City regions (Statistical Divisions (SD)): Sydney, Melbourne, Brisbane, Adelaide and Perth SDs</td>
</tr>
<tr>
<td>M2 (1.2)</td>
<td>Major urban Statistical Districts (100,000 or more pop): ACT Queanbeyan, Cairns, Gold Coast Tweed, Goulburn, Hobart, Newcastle, Sunshine Coast, Townsville, Wollongong</td>
</tr>
<tr>
<td>P1 (2.1.1)</td>
<td>Provincial City Statistical Districts and Darwin SD (50,000-99,999 pop): Albury-Wodonga, Ballarat, Bathurst, Orange, Bunbury-Devonport, Bendigo, Bendigo, La Trobe Valley, Mackay, Rockhampton, Toowoomba, Wagga Wagga</td>
</tr>
<tr>
<td>P3 (2.2.1)</td>
<td>Inner provincial areas (CD ARIA Plus score = 2.6)</td>
</tr>
<tr>
<td>P4 (2.2.2)</td>
<td>Outer provincial areas (CD ARIA Plus score &gt; 2.4 and &lt; 3.6)</td>
</tr>
<tr>
<td>R1 (3.1)</td>
<td>Remote areas (CD ARIA Plus score &gt; 3.92 and &lt; 10.53)</td>
</tr>
<tr>
<td>R2 (3.2)</td>
<td>Very Remote areas (CD ARIA Plus score &gt; 10.53)</td>
</tr>
</tbody>
</table>

(Malone, V 2013, pers. comm., 10 April).

Summary
The remoteness classification which is used by the majority of agencies is the ASGC (Australian Standard Geographical Classification) Remoteness Areas. The ‘Rural Health Series No 4, Rural, Regional and Remote Health’ report explains the strengths and weaknesses of each classification

Table C3: “Remoteness” concept in various Policy Documents

<table>
<thead>
<tr>
<th>Policy Documents</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redlands Corporate Plan</td>
<td>No definitions or mention of either, ‘remote’ or ‘remoteness’.</td>
</tr>
<tr>
<td>Redlands 2030 Community Plan</td>
<td>No definitions or mention of either, ‘remote’ or ‘remoteness’.</td>
</tr>
<tr>
<td>SEQ Regional Plan 2009-2031</td>
<td>No definitions. The plan only talks about what will be done in remote areas.</td>
</tr>
</tbody>
</table>

### APPENDIX D  INDIGENOUS DICTIONARIES (WEATHER & CLIMATE)

#### Quandamooka

<table>
<thead>
<tr>
<th>Jandai Word</th>
<th>English Meaning</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>bana</td>
<td>rain. punna Wa. (Ngugi); banna M.(Ngugi). See also: yaro</td>
<td></td>
</tr>
<tr>
<td>biram</td>
<td>sky. biram H. See also: Wang</td>
<td></td>
</tr>
<tr>
<td>biyigi</td>
<td>1 • sun. 2 • day. biggee Wa.; beegie We.; buga C&amp;W; bigi H. Bigi jabu! Hurry up! This might mean 'sun is going' – that is, it’s getting late. See also: budlungun; budluwa; bulubara.</td>
<td></td>
</tr>
<tr>
<td>budlubara</td>
<td>sun. booloobarra M.(Ngugi). See also: biyigi</td>
<td></td>
</tr>
<tr>
<td>budlungun</td>
<td>day. Boodloongun Wa.(Ngugi). See also: biyigi</td>
<td></td>
</tr>
<tr>
<td>budluwa</td>
<td>sun. boodloolar Wa.(Ngugi). See also: biyigi</td>
<td></td>
</tr>
<tr>
<td>buran</td>
<td>1 • south. 2 • south wind. Booran Wa.; Boran M.(Ngugi)</td>
<td></td>
</tr>
<tr>
<td>choongai*</td>
<td>westerly wind. See: junggayi</td>
<td></td>
</tr>
<tr>
<td>dabiyl</td>
<td>water. tobbil Wa.; dubbeel We.; tabbil C&amp;W; dabil H. See also: gabing; gung.</td>
<td></td>
</tr>
<tr>
<td>dagam</td>
<td>mist. Daggam M.(Ngugi).</td>
<td></td>
</tr>
<tr>
<td>dimbin</td>
<td>1 • north wind; tinbin Wa.; timbin C&amp;W; dinbin C&amp;W; dimbin ELW, 22/2/2010; timbin* ELW, 4/2/2011.</td>
<td></td>
</tr>
<tr>
<td>duram duram</td>
<td>storm. duram duram H. See also: mugar; muburum.</td>
<td></td>
</tr>
<tr>
<td>gabi gabi</td>
<td>wind. Kubbee-kubbee Wa.; goobie We.; gubi H.</td>
<td></td>
</tr>
<tr>
<td>gabling</td>
<td>water. H. kuppeng Wa.(Ngugi); capeng M.(Ngugi). See also: dabil; gung.</td>
<td></td>
</tr>
<tr>
<td>gujam</td>
<td>fire, flame. Gujam H.; guyang H.; jurang H. See also: jalo; jalodir.</td>
<td></td>
</tr>
<tr>
<td>gung</td>
<td>1 • water. This is a Fraser Island word. 2 •</td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
<td></td>
</tr>
<tr>
<td>------</td>
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<td></td>
</tr>
<tr>
<td>whisky</td>
<td>(or alcoholic drink). Gung H.; goong ELW, 22/2/2010 See also: dabil; gabling.</td>
<td></td>
</tr>
<tr>
<td>jalo</td>
<td>fire, firewood. djarlo Wa.; jarlow We.; juhlo C&amp;W; jalu H.; jal H. Holmer worked out that the actual word for fire is jal. When the fire does something like cook food, then it takes a suffix –lu. Jalo has become the generally known word for fire. See also: jalodir; gujam.</td>
<td></td>
</tr>
<tr>
<td>jangang</td>
<td>lightning. jangeng M.(Ngugi).</td>
<td></td>
</tr>
<tr>
<td>junggayi</td>
<td>west, westerly wind. tchoongie Wa.; junggai H.; choongai* ELW. 20/10/2010. Note: The first sound in this word is very unusual and survives in only a few words.</td>
<td></td>
</tr>
<tr>
<td>milberran*</td>
<td>storm. See: muburum</td>
<td></td>
</tr>
<tr>
<td>mirigan</td>
<td>1• star. 2• south-east wind. Mirreegen Wa.; mirrigen We.; mirrogin C&amp;W. See also: dimbiny; miyinya.</td>
<td></td>
</tr>
<tr>
<td>muburum</td>
<td>storm. Also the nickname of one of Holmer’s language consultants. muburum H.; miberan/mibu ELW 25/7/2009; miberran* ELW 20/10/2010. See also: mugar; duram duram.</td>
<td></td>
</tr>
<tr>
<td>mugar</td>
<td>storm, thunder. Moogara Wa.(Ngugi); moogar We.; moongarra M.(Ngugi); mugar H. Note: Watkins’ and Meston’s spelling confirms the trilled [r] at the end of the word. See also: duram duram.</td>
<td></td>
</tr>
<tr>
<td>mumbal</td>
<td>thunder. mumbal H. See also: mugar</td>
<td></td>
</tr>
<tr>
<td>Timbin*</td>
<td>1• north wind. 2• woman’s name. See: Dimbin.</td>
<td></td>
</tr>
<tr>
<td>walangara</td>
<td>long water. Wallangarra M. See also: wirawira</td>
<td></td>
</tr>
<tr>
<td>warambul</td>
<td>water course. warrumbool M. See also: yunggulba.</td>
<td></td>
</tr>
<tr>
<td>winchia*</td>
<td>east, east wind. See: winyija.</td>
<td></td>
</tr>
<tr>
<td>winyija</td>
<td>east wind. wincher yea a ben C&amp;W; winchia* ELW. Note: The middle sound in this word is very unusual and survives in only a few words.</td>
<td></td>
</tr>
<tr>
<td>yarabin</td>
<td>sea. yarahbin C&amp;W.</td>
<td></td>
</tr>
<tr>
<td>yaro</td>
<td>rain. yurrow We. See also: bana.</td>
<td></td>
</tr>
</tbody>
</table>
yunggulba flood tide. yoong-goolpa C&W. See also: warambul. interested visitors to our shores, Minjerribah Moorgumpin Elders-in-Council Aboriginal Corporation, Dunwich, Qld

<table>
<thead>
<tr>
<th><strong>Boon Wurrung</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word</strong></td>
</tr>
<tr>
<td>baany</td>
</tr>
<tr>
<td>ngoin (US)</td>
</tr>
<tr>
<td>baanyabeel</td>
</tr>
<tr>
<td>warreeny</td>
</tr>
<tr>
<td>munmut</td>
</tr>
<tr>
<td>manemeet/manameet</td>
</tr>
<tr>
<td>wygabil nye-weeny/bullarto nyoweenth (SCS)</td>
</tr>
<tr>
<td>ngamaee</td>
</tr>
<tr>
<td>gareeal/baanyabeel</td>
</tr>
<tr>
<td>beerreen</td>
</tr>
<tr>
<td>pareip (US)</td>
</tr>
<tr>
<td>wiiny</td>
</tr>
<tr>
<td>Warrain</td>
</tr>
</tbody>
</table>
For 'The Journey Cycles of the Boonwurrung' - all words without codes are words in Community alphabet spelling. The symbol (US) means unsure sounds.

<table>
<thead>
<tr>
<th>Word</th>
<th>English Meaning</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>nogeemee woodu ngervin tournaboon. Nerdoit narlumby, ngervin wavoit.</td>
<td>No more play now, it is too hot. When go down sun, then play at wavoit.</td>
<td></td>
</tr>
<tr>
<td>gnubet</td>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>weeyn</td>
<td>Fire</td>
<td></td>
</tr>
<tr>
<td>punto mer drumnarmga</td>
<td>The sun’s covered by the clouds</td>
<td></td>
</tr>
<tr>
<td>point no Mer-drung-marrng-a</td>
<td>The sun is buried in the clouds</td>
<td></td>
</tr>
<tr>
<td>brin-bop mo mere</td>
<td>The sun appears, or shines</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Wathaurong</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>--------------------------------------</td>
<td></td>
</tr>
<tr>
<td>to wort no mon dar</td>
<td>The thunder is roaring</td>
<td></td>
</tr>
<tr>
<td>utur; bullito parn-min boldoneit</td>
<td>No; too much tumble down rain</td>
<td></td>
</tr>
<tr>
<td>netbo bidderup; ure, purrumbon. Ah!</td>
<td>Now it is dry; go on, turn away. Ah!</td>
<td></td>
</tr>
<tr>
<td>Ngeren port; molochi vein woman.</td>
<td>I see smoke; fire soon come.</td>
<td></td>
</tr>
<tr>
<td>ngobeetyoorren</td>
<td>Wet</td>
<td></td>
</tr>
<tr>
<td>derrm</td>
<td>Dry</td>
<td></td>
</tr>
<tr>
<td>meerree</td>
<td>Sun</td>
<td></td>
</tr>
<tr>
<td>warree</td>
<td>Sea</td>
<td></td>
</tr>
<tr>
<td>nubiyt</td>
<td>Water</td>
<td></td>
</tr>
<tr>
<td>wiyn</td>
<td>Fire</td>
<td></td>
</tr>
<tr>
<td>mirre</td>
<td>Sun</td>
<td></td>
</tr>
<tr>
<td>korraiyn</td>
<td>Sea</td>
<td></td>
</tr>
<tr>
<td>lal lal</td>
<td>Sound of dashing waters</td>
<td></td>
</tr>
<tr>
<td>pironn yallock</td>
<td>Little water</td>
<td></td>
</tr>
<tr>
<td>trawalla</td>
<td>Much rain, wild water, flood</td>
<td></td>
</tr>
<tr>
<td>wendouree</td>
<td>Be off, fire on the reeds</td>
<td></td>
</tr>
<tr>
<td>wallinduc</td>
<td>Lava stone</td>
<td></td>
</tr>
<tr>
<td>mere/mirri</td>
<td>sun</td>
<td></td>
</tr>
<tr>
<td>minyan/yern</td>
<td>moon</td>
<td></td>
</tr>
<tr>
<td>moorrinno</td>
<td>lightning man</td>
<td></td>
</tr>
<tr>
<td>weing/waing</td>
<td>fire</td>
<td></td>
</tr>
<tr>
<td>ngubity/gnubet/gnobeet/yallock/moabeet</td>
<td>water</td>
<td></td>
</tr>
<tr>
<td>kan de rang</td>
<td>hailstone</td>
<td></td>
</tr>
<tr>
<td>mundar/mondar/mondur/muda</td>
<td>rain</td>
<td></td>
</tr>
<tr>
<td>mer/mirri</td>
<td>sun</td>
<td></td>
</tr>
<tr>
<td>mondar/mondur</td>
<td>thunder (same as rain)</td>
<td></td>
</tr>
<tr>
<td>wer-a-la-gnen/you-do-ro</td>
<td>warm (verb)</td>
<td></td>
</tr>
<tr>
<td>ny-an-you/maianyu</td>
<td>winter</td>
<td></td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Kaurna Word</th>
<th>English Meaning</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>kandarla</td>
<td>perspiration, sweat</td>
<td></td>
</tr>
<tr>
<td>manya partanna</td>
<td>Rainmaker (In the old section 'manya', means 'cold; rainy' and partanna, means 'many; much; all; an affix denoting that a person is to a great extent, or in a high degree, possessed of what the word to which it is affixed signifies; as mantaparianna, full of lies; lying; &amp;c.').</td>
<td></td>
</tr>
<tr>
<td>tindo</td>
<td>watch, clock. Also sun</td>
<td></td>
</tr>
<tr>
<td>burta</td>
<td>flame of the fire, blaze, red hot embers; ashes</td>
<td></td>
</tr>
<tr>
<td>burtandi</td>
<td>to blaze</td>
<td></td>
</tr>
<tr>
<td>gadla~garla</td>
<td>fire, fuel, wood. (Narrunga: karla) (Only use 'gadla' in old section)</td>
<td></td>
</tr>
<tr>
<td>garla</td>
<td>very hot; heated (Only the 'gadlagdlando' word is used in the old section)</td>
<td></td>
</tr>
<tr>
<td>garlando~gadlagdlando</td>
<td></td>
<td></td>
</tr>
<tr>
<td>purrunna~gadlapurunna</td>
<td>hot (tea), or 'it is hot'; still burning (Only purrunna which means 'alive; living' and gadlapurunna which means; 'being still burning;</td>
<td></td>
</tr>
<tr>
<td>Word</td>
<td>Meaning</td>
<td>Reference</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>garlarlo bandi</td>
<td>to set on fire, as it burns a thing (‘Garlarlo’ is not in the old section. ‘Bandi’ means; ‘to shine; as tindo bandi, the sun shines’)</td>
<td></td>
</tr>
<tr>
<td>*man-ni manngirendi</td>
<td>to glow; be red hot like burning embers (Both words are not in the old section)</td>
<td></td>
</tr>
<tr>
<td>*manyorendi</td>
<td>smoking, said of the ignited wood before it gives a clear flame; as in charring (Not in the old section)</td>
<td></td>
</tr>
<tr>
<td>meda</td>
<td>heat; flame; hot etc</td>
<td></td>
</tr>
<tr>
<td>*medamendi</td>
<td>to grow warm, hot (Not in the old section)</td>
<td></td>
</tr>
<tr>
<td>meri</td>
<td>salt. Also hail</td>
<td></td>
</tr>
<tr>
<td>ngadlendi</td>
<td>to take fire, to burn</td>
<td></td>
</tr>
<tr>
<td>*ngauwa</td>
<td>whether the flame of the fire or the red hot heat I cannot tell (Not in the old section)</td>
<td></td>
</tr>
<tr>
<td>ngauwaka~ngauwakka</td>
<td>fire; burning embers; also for large fuel; burning charcoal (‘Ngauwaka’ is not in the old section. In the old section, ‘ngauwakka’ also means ‘a species of paroquet with blue head and red breast’)</td>
<td></td>
</tr>
<tr>
<td>*ilyella</td>
<td>surf, of the beach against which it is beating (Not in the old section)</td>
<td></td>
</tr>
<tr>
<td>kauwe</td>
<td>water</td>
<td></td>
</tr>
<tr>
<td>kopurlo</td>
<td>sea water, said of the taste of the sea water (also used for ‘alcohol’)</td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Meaning</td>
<td>Source</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>wirraitya</td>
<td>dust, dust cloud, dust pillar caused by a whirlwind</td>
<td></td>
</tr>
<tr>
<td>yärtalla–yertalla</td>
<td>inundation; flood; cascade; cataract ('Yärtalla' is not in the old section. 'Yertalla' also means 'water running by the side of a river', in the old section)</td>
<td></td>
</tr>
<tr>
<td>yerlo</td>
<td>sea</td>
<td></td>
</tr>
<tr>
<td>*yerna yerna</td>
<td>undulating ground. From Wyatt (Not in the old section)</td>
<td></td>
</tr>
<tr>
<td>bakkadla</td>
<td>frost (The old section says, 'hoar frost' and 'used for salt')</td>
<td></td>
</tr>
<tr>
<td>biturro, karndo</td>
<td>thunder &amp; lighting; (Karndo is also the name of a large bird, said to be the author of the thunder)</td>
<td></td>
</tr>
<tr>
<td>bokarra</td>
<td>northwesterly wind (The old section also says; 'which is very hot during the summer and indicates a storm')</td>
<td></td>
</tr>
<tr>
<td>worta bokarra–worta bukkarra–wortabokarra</td>
<td>northwest wind bringing rain; tempestuous (In the old section, 'worta' means 'that which is behind'. 'Wortabokarra' means, 'north-west wind' and 'tempestuous weather' in the old section)</td>
<td></td>
</tr>
<tr>
<td>bulturro–buturro</td>
<td>dry breeze, dry air; dry ('Buturro' is not in the old section)</td>
<td></td>
</tr>
<tr>
<td>burko</td>
<td>dew</td>
<td></td>
</tr>
<tr>
<td>burtandi</td>
<td>used also of the wind, storm and thunder (In the old section, 'Burtandi' means, 'to burn; to blaze')</td>
<td></td>
</tr>
<tr>
<td>*garlaiere</td>
<td>light in general (Not in the</td>
<td></td>
</tr>
<tr>
<td>Aboriginal reconnections</td>
<td>Zeitlinger: Lisse, The Netherlands.</td>
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<td>--------------------------</td>
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<tr>
<td>&quot;ivariti&quot; misty rain. From Ivaritji via Black. (Not in the old section)</td>
<td></td>
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<tr>
<td>karkawarri evening breeze</td>
<td></td>
<td></td>
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<tr>
<td>karno thunder and lighting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kawue water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yaitya kawue fresh water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kauwemela drizzling rain; small drops of water; such, for instance, as the whale blows out of its nostrils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kopurlo sea water; saltwater; alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kudlilila rainy season, winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;kudlilurlo in, during the winter (Not in the old section)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kudmo dew; fog</td>
<td></td>
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<tr>
<td>kundo flood, an overflowing (‘Kundo’ means ‘chest; breast’ in the old section)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kuntoro rain</td>
<td></td>
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</tr>
<tr>
<td>kurrondi~kurrendi to blow, as the wind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kurrutti fresh, cool breeze</td>
<td></td>
<td></td>
</tr>
<tr>
<td>madlo darkness; thick fog or mist</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mädlu snow (Not in the old section)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>maikurru cool, cool breeze; southwesterly wind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manya cold, rainy. (Narrunga: munya)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manya mankondi to cause or produce rain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manya nallati expressive of sudden rain (In the old section ‘budni’ means, ‘a large black bird, the eggs of which are found in the earth, and considered as a great luxury by the natives. ‘Numpu’ and ‘numpurri’ are not in the old section. ‘Worri’ means ‘the extreme</td>
<td></td>
<td></td>
</tr>
<tr>
<td>budni<del>manyau numpu nurnpurri</del>manyau worri</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Meaning</td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>marya paltarendi</td>
<td>it rains heavily</td>
<td></td>
</tr>
<tr>
<td>*murla</td>
<td>dry (Not in the old section)</td>
<td></td>
</tr>
<tr>
<td>ngakallamurro</td>
<td>one of the magellanic clouds</td>
<td></td>
</tr>
<tr>
<td>ngulti</td>
<td>darkness, night</td>
<td></td>
</tr>
<tr>
<td>parna</td>
<td>star indicating the autumn</td>
<td></td>
</tr>
<tr>
<td>parnatti</td>
<td>autumn (In the old section it also says, 'when the star Parna is seen')</td>
<td></td>
</tr>
</tbody>
</table>
| puityi~puityilyulo~putyilyulo | dense fog, drizzling rain  
(‘Puityi’ and ‘puityilyulo’ are not in the old section) |
<p>| tadlta                | large hailstone                                                          |
| *tarlta               | hail (Not in the old section)                                            |
| tartarendi            | when the sky is covered with clouds and is growing dark                   |
| taworri               | redness of the evening sky; dusk; evening breeze                         |
| tindo                 | sun, day, time, clock                                                    |
| *tindo garla          | the light and heat of the sun (Not in the old section)                   |
| tindogadla            | sunshine                                                                 |
| tindo kambarendi      | to be hot; close; sultry                                                  |
| waitpi, warri         | wind                                                                     |
| willo<del>willo           | a star or constellation governing the spring                             |
| willutti</del>wiltutti~wilutti | spring (‘Wiltutti’ is not in the old section. It also says, ‘season of the year’ in the old section) |
| wolta                 | a constellation governing the summer (‘Wolta’ means ‘wild turkey’ in the old section) |
| *woltatti             | hot season (Not in the old section)                                      |
| *wordnendi            | used of the appearance of                                                |</p>
<table>
<thead>
<tr>
<th>Jagera</th>
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<tbody>
<tr>
<td><strong>English:</strong></td>
</tr>
<tr>
<td>Dust</td>
</tr>
<tr>
<td>Fire</td>
</tr>
<tr>
<td>Frost</td>
</tr>
<tr>
<td>Hail</td>
</tr>
<tr>
<td>Hailstone</td>
</tr>
</tbody>
</table>

* New words are identified with an asterix.

- The moon phases
- Wottita: calm, hot, sultry
- *Yabarra: light
- Yarrero, Yarro: whirlwind ('Yarrero' is not in the old section. ‘Yarro’ means ‘wide; not narrow’ in the old section)
- Yelta yelta–yeltanna: cool; airy; fresh (‘Yelta yelta’ is not in the old section, but ‘yeltayelta’ is. It means ‘the same’)
- *Yorte: rain
- Karndo: the name of a large bird, said to be the author of the thunder
- Bultarro, Mulla: dry (‘Bultarro’ is not in the old section)
- *Nungarro: wet; moist
- Madlomadlo: foggy; misty; very dark
- Willutti–Wiltutti: spring (‘Wiltutti’ is not in the old section. It also says, ‘season of the year’ in the old section)
- Wottatti: summer; hot season. Cf Wyatt werltáte ‘hot season; used for a year’
<table>
<thead>
<tr>
<th>Natural Environment</th>
<th>JGMAC pers</th>
<th>com</th>
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<tbody>
<tr>
<td>Lightning</td>
<td>mullor</td>
<td></td>
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<tr>
<td>Rain</td>
<td>Yerong, yurong</td>
<td>yurong</td>
</tr>
<tr>
<td>Rain, coming</td>
<td>Yurong pilli</td>
<td></td>
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<tr>
<td>Rainbow</td>
<td>Kaiaour</td>
<td></td>
</tr>
<tr>
<td>Rainbow, spirit of</td>
<td>Taggan, targan</td>
<td></td>
</tr>
<tr>
<td>Rising up</td>
<td>Wantima</td>
<td></td>
</tr>
<tr>
<td>Sea</td>
<td>Pamirri-ki</td>
<td>burgarr</td>
</tr>
<tr>
<td>Sea waves</td>
<td>Tugun</td>
<td>tugun</td>
</tr>
<tr>
<td>Sun</td>
<td>Bigi</td>
<td>nunka Bi-gi</td>
</tr>
<tr>
<td>Sun set</td>
<td>Bigi-berpi</td>
<td>Bigi garrihn</td>
</tr>
<tr>
<td>Thunder</td>
<td>Mugara, mumbal</td>
<td>moogera</td>
</tr>
<tr>
<td>Thunder, heavy, spirit</td>
<td>mumbul</td>
<td></td>
</tr>
<tr>
<td>Tide (ebb)</td>
<td>gurrihba</td>
<td></td>
</tr>
<tr>
<td>Tide (flood)</td>
<td>yawnggurrba</td>
<td></td>
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<tr>
<td>Wet</td>
<td>jihlgin</td>
<td></td>
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<tr>
<td>Wind</td>
<td>Buran</td>
<td>Boor-run Buran, booran</td>
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<tr>
<td>Wind, east</td>
<td>Dan-gay</td>
<td></td>
</tr>
<tr>
<td>Wind, west</td>
<td>Tiungipin</td>
<td>Toongipin, tungipin</td>
</tr>
<tr>
<td>Wind, north</td>
<td>dinbin</td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>yigilgan</td>
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ANNEX APPENDIX E ANNOTATED BIBLIOGRAPHY

Understanding Coastal Urban and Peri-urban Indigenous People’s vulnerability and adaptive capacity to Climate Change

Annotated Bibliography

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1.0 Introduction

This bibliography is part of the research project: Understanding Coastal Urban and Peri-urban Indigenous People’s Vulnerability and Adaptive Capacity to Climate Change. The project is a partnership between Griffith University and Deakin University and links established Indigenous ‘country’ research and academic inquiries to strengthen the ‘community of knowledge’ about climate change having regard to Indigenous longevity of perspective and Indigenous science.

The bibliography is part of the process of establishing a framework, process and procedure that can lead directly to a longer and more comprehensive research agenda over a number of years.

The bibliography contributes to the following project’s specific objectives:

1. to understand the vulnerability and adaptive capacity of selected urban and peri-urban Indigenous coastal communities;
2. to collaboratively explore a range of strategies to enhance Indigenous adaptive capacity in the case study communities within a community of knowledge framework;
3. to establish the foundations of a community of Indigenous knowledge (network) for ongoing research into Indigenous climate change adaptation;
4. to consolidate the public domain knowledge and research in Indigenous climate change adaptation;
5. to scope the opportunities, challenges and processes for adding to the public domain knowledge;
6. to develop in partnership a set of protocols for ongoing Indigenous climate change adaptation research; and
7. to provide opportunities for the up-skilling of Indigenous researchers in the field of climate change adaptation.

The National climate change adaptation Research Plan (NARP) identifies research areas that are needed to enhance understanding of climate change adaptation for Australia’s Indigenous communities. The objective of this project when attained will fulfill the many of the aims of the National climate change adaptation Research Plan for Australia’s Indigenous communities.

2.0 Method

Searches for literature on the topic of Indigenous climate change vulnerability and adaptation pertaining to urban, peri-urban and coastal communities were conducted during the period March to November 2012. Griffith University library databases and Google scholar were used to search for peer reviewed literature.

Search terms included combinations of the following words:

- Indigenous
- Climate change
- Adaptation
- Vulnerability
- Peri-urban
- Urban

Aboriginal reconnections 97
• Traditional knowledge
• Aboriginal

3.0 Literature

A summary of each research article on the topic of climate change and Indigenous people is provided below. Literature directly related to Indigenous peoples involvement in climate change adaptation in the peri-urban and urban context is presented below. As a result of the lack of research on this topic related articles examining Indigenous people from remote regions in Australia and international contexts are also given. This will be helpful in developing future research agendas for Indigenous peoples involvement in climate change adaptation in peri-urban and urban context.

3.1 Traditional Knowledge and Climate Change


• In this article Alexander et.al. examines the connections between Indigenous climate-related stories of changing climate with climate change impact studies from scientific literature.
• The authors use data gained through case studies of Indigenous traditional knowledge and policy analysis.
• Their research focuses on developing a framework synthesising traditional knowledge with global assessments (IPCC) of climate change.
• The authors indicate that further research needs to be undertaken to apply this framework to the climate change assessment process.
• The article is partially relevant to the research because it provides a framework for integrating traditional knowledge into scientific ways of understanding climate change and the adaptation potential of Indigenous communities.


• In this article Berkes reviews the notion of traditional knowledge and challenges perceptions that this knowledge is content oriented. Instead the article argues that it is more process oriented than is normally assumed.
• The authors use data gained through analysis of reports on projects examining traditional and ecological knowledge mostly from Canada and New Zealand.
• Berkes’ research found that the institutions of knowledge (elders framing knowledge) were similarly important as a way of understanding and passing on knowledge about climate change between Indigenous people in both Canada and New Zealand.
• The main limitation of the article in relation to the project is that it did not present first hand ethnographic information to verify conclusions.
• The authors indicate that further research needs to be undertaken to develop a "more and deeper partnership of traditional knowledge and science to solve conservation problems, strengthen the network of community conserved areas, engage in ecosystem-based management, set up cross-cultural monitoring for
environmental change, and carry out ecological restoration that responds to community needs”.

- The article is useful to the research because it offers an alternative approach to the traditional – scientific knowledge divide through identifying that co-production can complement science approaches.


- In this article Cullen-Unsworth et al. developed a traditional knowledge-scientific knowledge framework linking cultural and biophysical indicators of ecosystem condition.
- The authors use data gained through cooperative research with Indigenous people.
- Their research revealed seven determinants for successful implementation: strong Indigenous governance; problem-framing and conceptualisation; relationship building; data collection and management; considerations of scale; agreed dissemination of results; and evaluation.
- Further research needs to be undertaken to apply this model in other contexts.
- The article is useful to the research because it demonstrates that cooperative research into Indigenous ecological knowledge can enhance social-ecological system resilience and sustainability.


- In this article Ellemor uses a prevention-oriented focus to emergency risk management that involves working with local Indigenous communities. Ellemor illustrates how the conceptualisation and application of the concept of vulnerability is bound with our attitudes to, and understanding of that emergency management in remote Indigenous communities.
- The authors use data gained through specific case studies.
- Their research concludes that for emergency management we must accept the value of existing capacities in Indigenous communities and work towards building relationships and processes that apply new management strategies.
- The main limitation of the article is that it is a specific case study.
- The article is relevant to the research because it demonstrates how participatory approaches can be used to enhance Indigenous climate change adaptation in the realm of emergency management.


- This article examines how the traditional knowledge of northern Australia can be recognised as a vital source of environmental data where few historical records exist in the region.
- The authors use data gained through ethnographic research in the Torres Strait Islands in Australia.
• Their research suggests that Indigenous knowledge of seasonal change has the potential to fill gaps in climate data for tropical northern Australia, and has the potential to inform culturally appropriate adaptation strategies.
• The article is based on a specific case study relevant to northern Australia only.
• The authors indicate that further research needs to be undertaken to develop a comprehensive, participatory programme to record Aboriginal and Torres Strait Islander knowledge of past climate patterns, and recent observations of change.
• The article is partially relevant to the research because it provides a justification of the use of traditional knowledge in climate change assessment.


• In this article Mauro and Hardison review law and policy as it relates to Indigenous people concerned with the use of traditional knowledge in the management and conservation of lands.
• The authors use data gained through policy analysis and case study analysis.
• Their research focuses on how the ‘soft-law’ context of declarations, regional agreements, ethical guidelines, research protocols, and policy frameworks reinforce Indigenous entitlements.
• Data used in the article pertains to Indigenous people outside Australia.
• The authors indicate that further research needs to be undertaken to determine how institutionalising soft law at all levels of scientific activity can respect the value of Indigenous knowledge and the people themselves.
• The article is partially relevant to the research because of its approach to participation and the acknowledgement of Indigenous knowledge.


• In this article Newton et al. reviews the implications of the United Nations Framework Convention on Climate Change for climate change actions set by the northern Canadian provincial governments, the evolving role of Indigenous people, and the responsibility for climate change impacts.
• The authors use data gained through case study analysis.
• Their research concluded with a suggested policy approach to climate change and natural hazards in northern Canada. Indicating the need for more comprehensive adaptive strategies as opposed to the current focus on mitigation measures for the region.
• The main limitation of the article in relation to the current project is that it is a case study from northern Canada.
• The article is useful to the research because it demonstrates how adaptive strategies can be developed into policy using traditional knowledge of climate change within a specific region.

- In this article (Author) reviews the use of Indigenous knowledge and local participation.
- The authors use data gained through field work and case study research.
- In this article Nyong *et al.* examines the Indigenous knowledge systems from the African Sahel and conclude that these people already have models of adaptability which exceed extreme climate change scenarios. The study uses these to outline the benefits of integrating indigenous knowledge into formal climate change mitigation and adaptation strategies.
- Their research found that local people of the African Sahel using their Indigenous knowledge already have developed and implemented mitigation and adaptation strategies that have the capacity to exceed projected climate change scenarios. However, this knowledge was rarely taken into consideration when developing scientific based strategies.
- The article focuses on local people who are currently dependent on the local resources for their livelihoods whereas much of the communities in the present study do not comparatively rely on the local environment.
- The article is useful because it illustrates how Indigenous knowledge is currently utilised by local people to adapt in spite of scientific knowledge which attempts to provide the same outcomes. Indigenous knowledge should be incorporated into formal climate change mitigation and adaptation strategies which also involve local people.


- In this article Petheram *et al.* examine Indigenous Peoples understanding of climate change in a community from Arnhem Land NT Australia.
- The authors use data gained through interview and workshops.
- Their research focused on Indigenous people’s preference for climate change adaptation.
- Climate change was an issue for participants but is secondary to issues of welfare and general well-being. Another important finding in relation to the current project was that climate change adaptation strategies are more effectively employed through other policies and strategies.
- The main limitation of the article in relation to the current project is that the model of community vulnerability is case specific to Indigenous people who have traditional practices on country.
- The authors did not indicate that further research needs to be undertaken.
- The article is useful to the research because it identifies that communities that have confidence in institutions and are empowered are capable of adopting adaptation strategies whereas disempowered communities have less capacity.

Reidlinger, D. and Berkes, F. 2001. ‘Contributions of traditional knowledge to understanding climate change in the Canadian Arctic’, *Polar Record* pp. 315-328.
In this article Reidlinger and Berkes discuss five realms of traditional knowledge and how these may complement scientific approaches to understanding climate change in the Canadian Arctic. The purpose is to provide a conceptual framework to bridge the gap between traditional knowledge and western science.

The authors use data gained through collaborative research in Sachs Harbour in the western Canadian Arctic.

Their research revealed that traditional knowledge may complement scientific approaches. Features of traditional knowledge that were found to be complimentary include: local-scale expertise as a source of climate history and baseline data; local-scale expertise in formulating research questions and hypotheses; local-scale expertise as insight into impacts and adaptation in Arctic communities; and: local-scale expertise for long-term, community based monitoring.

The main limitation of the article in relation to the current project is that it is a specific Canadian case study.

The article is useful to the research because it shows that participatory approaches using local people and traditional knowledge can improve climate change adaptation policy and management.


In this article Turner and Clifton investigate Indigenous lifeways in BC in terms of traditional knowledge and its role in climate change identification and adaptation strategies.

The authors use data gained through an ethnographic approach with a single participant – as well as a review of literature to support the findings from the ethnography.

Their research found that traditional knowledge both historical and contemporary, can contribute to an understanding of adaptation. Traditional knowledge can contribute to strategies and policies because Indigenous philosophy of longer term views, interconnectedness and the link between human health and environmental health.

The main limitation of the article for the current project is that it is aimed at more global and international policies and strategies as opposed to the local and national level.

The authors did not indicate that further research is needed.

The article is useful to the research because it offers a philosophical basis from which Indigenous climate change vulnerability and adaption can be understood.

3.2 Indigenous People: Vulnerability and Adaptive Capacity


This article gives a cursory literature review of climate change and Indigenous communities.

The authors use data gained through online search techniques and analysed the articles in terms of a general focus.
Their research found four themes emerged: 1) Vulnerability and empowerment: there is a perception from some Indigenous communities that they are powerless victims in the face of climate change, suffering from the actions of developed nations on which they have no influence; 2) Vulnerability models identify that Indigenous people are some of the most vulnerable people to impacts from climatic change globally (Altman and Jordan 2008); 3) Strategies for dealing with climatic change should be developed with knowledge of potential impacts at the local level and an understanding of how those potential impacts will affect a particular community. Adaptive strategies can then be developed in collaboration with the local community level. 4) In Australia there are current collaborative climate change projects between researchers and Indigenous communities, most notably on sea level rise in the Torres Straits (Green 2006a; 2006b; Green et al., 2009a and fire abatement in Western Arnhem Land (Barnsley and NAILSMA 2009).

The main limitation of the article in relation to the current project is that it is not an extensive review and is dated – “conducted in 2010”.

The author did not indicate further research needs.

The article is useful to the present study because it provides an accessible short overview of literature on the topic of climate change and Indigenous communities in Australia.


In this article Ford and Smit review existing literature on the implications of climate change for Arctic communities and develop a conceptual model of vulnerability. Analytical approach to assessing climate hazards and coping strategies in Arctic communities are also explored.

The authors use data gained through literature review methods and obtaining case study information.

Their research focuses on vulnerability as a function of exposure to climatic stresses and the adaptive capacity to cope with these stresses. Place-specific case studies involving community residents and integrates information from multiple sources, both to document current exposures and adaptations and to characterize future exposures and adaptive capacity.

The main limitation of the article in relation to the current project is that it is specific to the Arctic.

The article is useful to the research because it shows how Indigenous participation in assessment of climate change vulnerability can be effective.

Green, D., Alexander, L., McInnes, K., Church, J., Nicholls, N. & White, N. 2010. ‘An assessment of climate change impacts and adaptation for the Torres Strait Islands, Australia’, Climatic change, vol. 102 no. 3-4, pp. 405-433.

In this article Green et al. draw together regional climate data to enable a more accurate assessment of the Torres Strait Islands’ exposure to climate impacts.

The authors use data gained through online searches and also field work in the region.

Their research focuses on understanding the level of exposure and uncertainty around specific impacts is vital to gauge the nature of these islands’ vulnerability in
order to inform decisions about how best to develop climate change adaptation strategies over various time horizons. It also addresses islanders’ concerns about the likely resilience and viability of their communities in the long term.

- The main limitation of the article in relation to the current project is that it focuses on north Queensland which is outside the area investigated by the present study.
- The report is useful to the research because it shows how regional knowledge of climate change modelling can assist communities in participatory planning processes.


- In this report Green et al. provides an assessment of the potential impacts of climate change on Indigenous settlements and communities across tropical northern Australia, including the Torres Strait Islands and the Pilbara region of Western Australia.
- The authors use data gained through case analysis.
- Their research focuses on improving resilience with these communities and recommends that the next step in developing well-articulated adaptation strategies for Indigenous people in the study region will require collaboration and partnerships between Indigenous communities, government, research and non-governmental organizations.
- The main limitation of the report is that the Indigenous populations under review have strong links to country and in the present study there may be communities that do not have similar linkages.
- The authors indicate that the next step to improving resilience with these communities is through developing well-articulated adaptation strategies for Indigenous people in the study region. This will require collaboration and partnerships between Indigenous communities, government, research and non-governmental organizations.
- The report is useful to the research because it identifies the parameters of climate change adaptation for Indigenous people who have access to country.


- In this article Green et al. reviews Indigenous climate change adaptation theory and practice.
- The authors use data gained through case analysis.
- Their research illustrates the lag between adaptation theory and practice. It also suggests that policy in this area would benefit from the further consideration of three factors, namely the role of uncertainty in climate policy, the need for meaningful consultation with communities, and the benefit of integrating contextual and bottom-up assessment of vulnerability with decision-making in an iterative manner.
The authors suggest that the current approach to vulnerability assessment is insufficiently nuanced to allow an adequate appreciation of factors that influence social vulnerability in remote communities.

The article is useful because it identifies the gap between policy and practice for northern Indigenous communities and it is exactly this gap which the present study is attempting to address in eastern Australian Indigenous communities.


In this article McIntyre-Tamwoy et al. report on research undertaken in two Aboriginal communities in Far North Queensland to ascertain vulnerability and resilience of people facing climate change. The authors use data gained through direct interview techniques. Their research revealed that variability in peoples understanding of climate change and their capacities to predict and adapt to change.

The main limitation of the article in relation to the current project is that it focuses on more remote locations as compared to the present study areas. The authors indicate that further research needs to be undertaken to assess the likelihood of impacts on cultural heritage places and values, and the implication of such impacts on communities.

The article is useful to the research because it identifies gaps in processes and knowledge about Indigenous people and their involvement in climate change responses in remote areas.


In this article Mercer et al. examine the need for a specific framework identifying how Indigenous and western knowledge may be combined to mitigate against the intrinsic effects of environmental processes and therefore reduce the vulnerability of rural Indigenous communities in small island developing states (SIDS) to environmental hazards.

Their research revealed that the vulnerability of Indigenous communities in SIDS to environmental hazards can only be addressed through the utilisation of both Indigenous and Western knowledge in a culturally compatible and sustainable manner.

The main limitation of the article in relation to the current project is that the issues of small island states may not be applicable to the current study.

The article is useful as it examines a framework for integrating traditional and scientific knowledge about climate change adaptation.


In this article Mimura assesses the island countries in the South Pacific on their vulnerability to sea level rise and climate change.
The authors use data gained through case analysis and policy analysis. Their research revealed that inundation and flooding are the common threats and this is exacerbated by the social trends of population growth, particularly in cities. Other threats include beach erosion, saltwater intrusion, and impacts on the infrastructure and coastal society. These countries focussed on adaptation strategies as opposed to the reduction of greenhouse gas emissions.

The main limitation of the article in relation to the current project is that the governance regimes in small island states in the Pacific may not be relevant to the Indigenous communities in the research we are undertaking.

The article is partially relevant to the research project because it identifies that small island states do not focus on climate change mitigation and focus on adaptation. The focus may be relevant to Indigenous communities in the present study because despite the immediate threat of climate change to these communities the causes of climate change are not of great concern in terms of action taken.


In this article O’Brien et al. discuss two interpretations of vulnerability in the climate change literature.

The authors use data gained through conceptual analysis and application to the case in Mozambique, Africa.

Their research concluded that there were two discourses: ‘outcome vulnerability’ and ‘contextual vulnerability’, which are linked to scientific framing and a human-security framing respectively.

The main limitation of the article in relation to the current project is that it may not be applicable in Australian Indigenous communities.

The article is relevant to the research because it offers clarification on the term vulnerability and offers guidance on how this can be applied in developing adaptation strategies.


In this article O’Neill et al. examines why one leader of a Torres Strait community did not allow climate change research to occur and the implications for ongoing scientific research of this situation.

The authors use data gained through case analysis and participant observation.

Their research concluded that in this particular case “there is a systemic lack of collaboration with Islanders to allow them to prioritise their concerns, and a lack of adequate resources to allow them to build their resilience to climate impacts. We conclude that only through a genuine collaborative approach to climate adaptation can activities be properly developed, prioritised and undertaken.”

The main limitation of the article in relation to the current project is that it pertains to a specific case.
The article is useful to the research because it demonstrates that only through genuine collaborative approach to climate adaptation can research be effective in delivering espoused individual and community benefits.


In this article Salik and Ross examine the problem Indigenous people face in that despite greatly being affected by climate change, they are rarely considered in academic, policy and public discourses on climate change.

This paper was an introduction to a series of papers on climate change and Indigenous people. The theme of the papers were that Indigenous people are the primary actors in terms of global climate change monitoring, adaptation, and mitigation and can provide innovative perspectives that could contribute to global climate change knowledge and management.

The article is useful as a reference for the justification of Indigenous knowledge in climate change assessment and management. Their research revealed that Indigenous people responded in a hierarchical way in that as conditions worsen additional physical and biological responses occurred and the political and social aspects of this response became more important.

### 3.3 Cultural Assets and Climate Change


In this article Garnett *et al.* examines the issues surrounding healthy country, healthy people: specifically analysing investment in programs that help Indigenous people undertake work maintaining the environmental health of their country.

The authors use data gained through case study research.

Their research concluded that the program has benefits for the environment as well as the physical, mental and cultural health of the Indigenous people involved.

The main limitation of the article for the current study is that it focuses on Indigenous people who live on country and this might not be relevant to Indigenous people who have lost links to country in urban contexts.

The authors indicate that further research needs to be undertaken to develop cross agency investment for facilitating working on country.

The article is relevant to the research because it demonstrates that there are holistic benefits to Indigenous people re-establishing and maintaining connection with country.

### 3.4 Indigenous Representation and Governance


In this article Davies *et al.* reviews the potential of the sustainable livelihoods approach as a framework for thinking and communicating about factors that impact
on the livelihoods of individuals and families including their health, wellbeing and income and the maintenance of natural resource condition.

- The authors use data gained through three case studies in remote Central Australia.
- Their research focuses on the potential of a sustainable livelihoods approach as a tool for collaborative engagement of researchers.
- The main limitation of the article in relation to the current project is that it focusses on Indigenous people from central Australia and not from the study area.
- The authors did not indicate further research needs. However, they indicated that in terms of a sustainable livelihoods approach that trust networks are most important to achieve greater success in livelihood outcomes. For aspirations of employment and entrepreneurial behaviour developing trust networks within families and customary kinship groups would be best facilitated by action research approaches with institutions associated with these communities.
- The article is partially relevant to the research because it identifies factors involved in sustainable livelihood approach important to Indigenous people in Australia.


- In this article Ellemor reviews emergency management in remote Indigenous communities to illustrate how the conceptualisation and application of the concept of vulnerability is bound with our attitudes to, and understanding of these communities.
- The authors use data gained through case research of communities in remote Australia.
- Their research focuses on local understandings of risk, local knowledge of hazards and coping strategies is critical for the development of safer, sustainable communities. Ellemor argues that the uncritical application of the concept of vulnerability to Indigenous communities will do little to build communities that are more resilient and better able to manage disasters and emergencies.
- The main limitation of the article in relation to the current project is that it focuses on remote communities and may not be applicable to the present study of Indigenous people in eastern Australia.
- The authors indicate that further research needs to be undertaken to understand how existing capacities within Indigenous communities can play a greater role in climate change assessment and management.
- The article is relevant to the research because it demonstrates the role applicability of mainstream emergency management practices in Indigenous communities and can be used for climate change vulnerability assessment and adaptation.


- In this article Ford *et al.* examines how climate change policy interventions can improve the capacity of 15 Inuit communities to adapt to climate change.
• The authors use data gained through collaboration with a large number of research participants in local communities.

• Their research states that realising adaptive capacity and overcoming adaptation barriers requires policy intervention to: (i) support the teaching and transmission of environmental knowledge and land skills, (ii) enhance and review emergency management capability, (iii) ensure the flexibility of resource management regimes, (iv) provide economic support to facilitate adaptation for groups with limited household income, (v) increase research effort to identify short and long term risk factors and adaptive response options, (vi) protect key infrastructure, and (vii) promote awareness of climate change impacts and adaptation among policy makers.

• The article is useful because it identifies a process of how vulnerability assessment and adaptive capacity can be developed into a framework that considers local community needs, policy responses and management actions needed from various stakeholders.


• In this article Martello examines the scientific and political representations of Arctic Indigenous peoples that have been central to the production and articulation of the claim that climate change in the Arctic is happening at a faster rate than elsewhere in the world, and with major implications for the peoples of the Arctic (especially Indigenous peoples) and the rest of the planet.

• The authors use data gained through case analysis.

• Their research focuses on the assessment approach employed and indicates that novel forms and strategies of representation reflect changing conceptual models and practices of global change science and importantly depict Indigenous peoples as expert, exotic, and at-risk. This depiction shows that Indigenous peoples who are representatives or embodiments of climate change itself through advocating for climate change mitigation policies.

• The main limitation of the article in relation to the current project is that it is a case where climate change impacts are greater and more immediate to that than those found in the present study area.

• The authors indicate that further research needs to be undertaken to see if the localism of activism with its focus on giving voice to local vulnerabilities translates into greater political mobilisation in other places/social groups.

• The article is useful to the research because it shows how impact and science can translate into Indigenous activism on the topic of climate change mitigation.


• In this article Tsosie applies the legal rights and obligations to climate change in relation to how might Indigenous people respond to climate change.

• The authors use data gained through a legal analysis of cases.

• Their research argues that adaptation strategies will prove genocidal for many groups of Indigenous people and thus recognition of an Indigenous right to environmental self-determination allows Indigenous peoples to maintain their links
to traditional lands. Importantly the research shows that sovereignty claims and tort based theories of compensation for the harms of climate change have limited capacity to address the concerns of Indigenous people.

- The main limitation of the article in relation to the current project is that it applies rights to Indigenous people who have legal title to land.
- The authors indicate that further research needs to be undertaken to develop a more applicable notion of justice beyond adaptation to include climate change mitigation justice.
- The article is relevant to the research because it provides a legal framework in which climate change impacts can be addressed to ensure sustainable Indigenous communities who have rights to land.

3.5 **Housing, Land and Climate Change**


- In this article Bronen reviews the issue of forced migration of Indigenous people in response to climate change.
- The authors use data gained through case study of Alaskan communities.
- Their research describes the experience of Alaskan Indigenous communities and offers a legal and institutional framework in response to climate change induced migration. It is based on a human rights doctrine in response to forced migration.
- The main limitation of the article in relation to the current project is that it is a case specific example.
- The article is partially relevant to the research because it describes how communities respond to climate change induced migration to urban centres from more remote locations.

3.6 **Employment, Poverty and Climate Change**


- In this submission Altman and Jordan review the general social and economic implications of climate change impacts on Indigenous people in Australia.
- The authors use data gained through a general analysis of literature and their analysis based on their extensive work in this area.
- Their submission emphasised that Indigenous people would be impacted because of their geographical position (remote regions), the nature of their hybrid economies and the potential failure of compensatory mechanisms to reduce impacts on low income earners.
- The authors indicate that further research needs to be undertaken to reveal the possible costs and the benefits that might result from climate change.
- The article is useful to the research because it identifies the broad social and economic parameters that climate change impacts on Indigenous people in Australia.

- In this article Bubna-Litic examines whether Indigenous people will be disproportionately disadvantaged by climate change and whether putting a price on carbon will disproportionately burden Indigenous people in Australia.
- The authors use data gained through case study analysis.
- Their research revealed that on both counts the answer is positive. Indigenous people are and will be disadvantaged. The research also concluded that Indigenous people are different to other disadvantaged people because of a lack of voice that translates into policy initiatives and a lack of statistical data to aid in this process.
- The main limitation of the article in relation to the current project is that it is a case study and thus greater scope would reinforce conclusions.
- The authors indicate that further research needs to be undertaken to examine the opportunities under the carbon pricing policies in Australia.
- The article is relevant to the research because it identifies in broad terms the impacts of climate change on urban and peri-urban Indigenous people.

3.7 Other Relevant Climate Change Literature


- In this article Adger reviews the concept of vulnerability in the context of natural disasters and global vulnerability.
- The author uses data gained through an analysis of literature.
- His research focuses on defining vulnerability, including: 1) the resilience resistance of the livelihood system; both individuals and groups; 2) the medial robustness of the people and the social system; and 3) the degree of preparedness of individuals and groups to the likelihood of risks. Adger states that mitigation strategies have focused too much on hazard centred vulnerability as opposed to people centred vulnerability.
- The main limitation of the article in relation to the current project is that it lacks examples.
- The authors did not indicate further research needs.
- The article is useful to the research because it explores the ways that poverty (class and economic variables) is not equated necessarily to vulnerability.


- In this article the authors review coastal development policies surrounding the planned retreat due to sea level rise using a case study in South East Queensland, Australia.
- The authors use data gained through policy analysis of Government policies, legislation and other reports related to sea level rise and planned retreat.
• Their research focuses on the notion that "the option of planned retreat is disappearing because (1) State Government promotes population increase; (2) the need to provide places for naturally protective coastal ecosystems to occupy does not seem urgent, so houses are built there; (3) liability laws favour development; (4) planning ignores cumulative impacts, the path dependent nature of development and irreversible social–ecological threshold changes; (5) political pressure to build defences grows as the value of built assets increases" p.271.

• The main limitation of the article in relation to the current project is that it is a case study so therefore lessons can be learnt from this case but generalisations are limited.

• The authors indicate that further research needs to be undertaken to understand the psychology of social change (people and organisations) directly involved in planned retreat zones in order to understand their responses to changes that are needed for a planned retreat from sea level rise.

• The article is useful to the research because the case study area is part of the study area of the current project and therefore identifies the governance framework in which Indigenous people are part of in South East Queensland.


• In this article Agrawal (2008) examined over 100 articles and reports to investigate the role of local institutions in adaptation to climate change in the context of development projects. It has a focus on the World Bank.

• The author used data gained through secondary sources.

• His research focuses on the argument that climate impacts will affect disadvantaged social groups more disproportionately, and that local institutions centrally influence how different social groups gain access to and are able to use assets and resources. He identified that local institutions influence adaptation and climate vulnerability in three critical ways: a) they structure impacts and vulnerability, b) they mediate between individual and collective responses to climate impacts and thereby shape outcomes of adaptation, and c) they act as the means of delivery of external resources to facilitate adaptation, and thus govern access to such resources.

• The main limitation of the article is in relation to the current project is that it focuses on developing countries.

• The authors indicate that further research needs to be undertaken to develop institutional analysis for development projects in the following ways:
  o Support greater role for institutional partnerships in facilitating adaptation.
  o Enhance local institutional capacities.
  o Understand local institutional articulation and access patterns before providing resource support in any development project.
  o Improve institutional coordination across scales.
  o Focus on territorial development strategies taking both vulnerabilities and capacities into account.
  o Adopt an adaptive perspective on institutional development.
• The article is useful and relevant to the research because it identifies the role of local institutions in climate change adaptation and mitigation with a particular emphasis on disadvantaged groups.


• This book generally examines the economics of climate change through providing a critical assessment of adaptation costs and benefits in key climate sensitive sectors, as well as at national and global levels. Adaptation actions are examined beyond cost estimation. Insurance and risk sharing, environmental markets and pricing, and public private partnerships are examined.

• The authors use data gained through direct and secondary sources.

• Their research focuses on general economics of climate change but of relevance to this project is the notion that whilst there are many varied approaches and strategies designed to adapt to climate change the particular estimates of costs of such strategies should not be the main driver of policy priorities. The main reason for this is uncertainty and the inability of economics to comprehensively predict future costs of adaptation.

• The main limitation of the article is that it is a general text and does not focus on Indigenous issues.

• The authors did not indicate further research needs.

• The article is useful to the research because it justifies non-economic knowledge which is vital to design policy and strategy in addressing vulnerability and climate change in Indigenous populations.


• In this article Heltberg et al. present and apply a conceptual framework to address human vulnerability to climate change drawing upon social risk management and asset-based approaches.

• Their research focuses on developing a conceptual model and applies this to how to reduce the vulnerability of households. It suggests that creating resilience through micro financing interventions offer a safety net of pro poor interventions.

• The article has few limitations.

• The authors indicate a research agenda which includes: Monitoring household and community response to climate changes; Understanding poverty and distributional implications of climate change; Assessing alternative adaptation interventions; institutional arrangements and financing of adaptation.

• The article is very relevant to the research because it offers a framework for understanding climate change adaptation at the household level.

In this article Blanco offers examples of how community-based organisations (CBOs) and non-governmental organisations (NGOs) adapt to climate change through using knowledge to design and implement local adaptation strategies.

The authors use data gained through case study analysis.

Their research focuses on the need to bridge the gap between scientific and local knowledge in order to develop new strategies and develop projects.

The main limitation of the article in relation to the current project is that it is not specific to Indigenous climate change concerns.

The authors indicate that further research needs to be undertaken to develop methods to bridge this gap between academia and community based knowledge and non-government organisations.

The article is partially relevant to the research because it identifies the need for knowledge transfer that boosts local resilience of local livelihoods in the face of disasters exacerbated by climate change.


In this article the authors reviewed the importance of social learning for collective action in building resilience in natural resource management for climate response to both human and ecological systems as an effective way to cope with environmental change characterized by future surprises or unknowable risks.

The authors use data gained through case study research of community-based coastal management in Trinidad and Tobago.

Their research focuses on how community-based management enhances the adaptive capacity by firstly building networks that are important for coping with extreme events and by retaining the resilience of the underpinning resources and ecological systems.

The main limitation of the article in relation to the current project is that it is not Australian based research.

The authors indicate that further research needs to be undertaken to develop ways in which community participation in decision making about natural resources can create self-reliant empowered communities to promote sustainable management and include vulnerable sectors of society.

The article is relevant to the research because it offers insights into community capacity and self-reliance through community participation in decision making about climate change.


In this article Preston et al. review climate change vulnerability mapping in the context of: 1) a review of published assessments yields a range of objective statements that emphasize problem orientation or decision-making about adaptation actions; 2) the variation of assessments driven by a perception of the driving force of vulnerability – the vulnerability of what and the vulnerability to what: 3) What are the methodological and technical challenges of integrating climate
change information into standard maps; and 4) who participates in the assessment and how will it be used to facilitate change.

- The authors use data gained through analysis of scholarly articles examining climate change vulnerability mapping.
- Their research focuses on improving mapping based on the 4 issues above. An important conclusion is quoted here “This, however, requires better integration of vulnerability mapping with participatory processes and recognition that if one is intent on facilitating social change, the technical exercise of assembling a climate change vulnerability map may be less important than the deliberative processes through which it is designed, communicated, and used” (Preston et al. 2011, p.197).
- The main limitation of the article in relation to the current project is that it focuses mostly on scholarly articles for its data and may not reflect contemporary real world mapping.
- Further research resulting from the conclusions of the research are that ways to ensure vulnerability maps are linked to adaptation planning need to be explored to reduce the disconnect between mapping processes and the pursuit of adaptive responses.
- The article is relevant to the research because it conceptually and practically identifies ways for vulnerable communities to increase their climate change adaptive capacity.


- In this article Zahran et al. reviews why certain US localities would voluntarily commit to the Cities for Climate Protection (CCP) campaign.
- The authors use data gained through geographic information systems and analytic techniques, where they map and measure a locality’s vulnerability to climate-change impacts at the county level.
- Their research focuses on multiple measures of climate-change vulnerability, including expected temperature change, extreme weather events, and coastal proximity, as well as economic variables, demographic variables, and civic-participation variables that constitute a locality’s socioeconomic capacity to commit to costly climate-change policy initiatives.
- The main limitation of the article in relation to the current project is that it is quantitative research and lacks explanatory research techniques.
- The authors did not indicate further research needs.
- The article is relevant to the research because it shows that communities are more likely to adopt climate change programs when they are exposed to knowledge about deaths by extreme weather events, project temperature changes and coastal proximity.

In this article Zeppel reviews adaptation actions in climate change strategies prepared by four urban Queensland coastal councils (e.g. Cairns, Gold Coast, Redland, and Sunshine Coast), and one community-based climate adaptation action plan for Bribie Island in Moreton Bay.

The authors use data gained through examination of panning documents.

Their research found that the focus on protecting coastal development from erosion and other climate hazards, and building community resilience, supplemented by ‘soft’ environmental actions protecting nature. While some climate plans included actions for shoreline erosion, coastal inundation, and storm surges, only one addressed sea level rise impacts on buildings and heritage (i.e. Redland).

The main limitation of the article in relation to the current project is that it is a Queensland study and does not examine councils in southern Australia.

The article is useful for the present study because it identifies how climate change planning is implemented at the local government level in one of the case study areas (Redlands).


In this article Van Aalst et al. reviews the value of using community based disaster risk assessments for climate change adaptation processes. In particular it reviews the participatory methods of ground-up and place-based approaches used to engage the community in planning.

The authors use desktop data gained through case study research of Red Cross and Red Crescent community engagement programs.

Their research focuses on the value of community risk assessments for the purpose of climate risk reduction and found that community risk reduction process which includes a progressive assessment process is appropriate for long term climate change risk assessment.

The main limitation of the article in relation to the current project is that it is a qualitative research and is thus prone to problems of the generalisation of the findings.

The authors indicate that further research needs to be undertaken to develop alternative ways to facilitate knowledge transfer between organisations undertaking community risk assessments (and their sources of information) and the community.

The article is relevant to the research because it demonstrates a method that may be applicable to implementing climate change vulnerability assessments and adaptation strategies in other community development processes.


In this article Laukkonen et al examine the combination of mitigation and adaptation strategies with a sustainable development framework in order to improve their adaptive capacity to climate change.

The authors use data gained through case study research.
• Their research concluded that complex vulnerabilities require comprehensive responses that link climate change adaptation and mitigation efforts to the sustainable development but in ways that do not conflict or compete with each other.

• The article is useful to the research because it shows how a participatory program can be used to prioritise mitigation and adaptation strategies.


• In this brief paper Ried and Huq offer guidelines for community based adaptation to climate change.

• The authors use data gained through the synthesis of literature and case studies.

• Their research focuses on the need for developing trust, the use of intermediaries, and the use of action research approaches to project implementation.

• The main limitation of the article in relation to the current project is that it is only focusing on people in poverty and does not include Indigenous issues as part of the brief.

• The authors did not indicate further research needs.

• The article is partially relevant to the research because it generally emphasises a participatory approach to including the poor in adaptation strategies and programs.
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APPENDIX F  RESEARCH PROTOCOLS

Research protocols and ethics approvals procedures have been considered having regard to working with urban and peri-urban communities and thematically linked to climate change as a topic. This Section reviews existing research protocols in Australia, and then considers a future project in the context of these processes and expectations. Issues arising from the project experience and misconnections between research protocols, and urban and peri-urban contexts through the lens of the climate change adaptation themes are identified.

1. Existing Documents

In dealing with research projects, ‘protocols’ are documents that express principles of communication, research engagement, cultural and intellectual property, mutual roles, human rights obligations and this is an aspirational standard for a community (Smith 1987, 2012). The authorship of the document can be by a research organisation or an Indigenous community, but the aspiration is the same. In contrast, ‘guidelines’ articulate the protocols as operational instructions or rules of engagements. An analogy is Australia ICOMOS’ (1999) Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance, authored by an Australian peak conservation entity, that includes a protocols document addressing philosophy and definitions, as well an accompanying Cultural Significance and Conservation Policy Guidelines (1999) that sets out the mechanics for implementing the Charter.

The over-arching national protocols for research linked to ‘Aboriginal & Torres Strait Islander People’ is the National Statement on Ethical Conduct in Human Research (NHMRC 2007a) prepared jointly by the National Health and Medical Research Council (NHMRC), the Australian Research Council (ARC) and the Australian Vice-Chancellors’ Committee (AVCC). The National Statement (Chapter 4) expresses principles and ethical obligations where research involves Aboriginal and Torres Strait Islander peoples. It emphasises six core values of: reciprocity, respect, equality, responsibility, survival and protection, and spirit and integrity. It also articulates an international referral system whereby an application “must have included assessment by or advice from: people who have networks with … and/or knowledge of research with … [or are] people familiar with the culture and practices of the Aboriginal and Torres Strait Islander people” subject to the research project. Interestingly, Deakin University extends the “Aboriginal & Torres Strait Island Peoples” category by adding the suffix “or Issues” in their internal criteria as to whether the project is Low Risk or necessitates a national-level application but provides no clarity as to what “or Issues” constitutes (Deakin 2010).

The National Statement (NHMRC 2007a) draws its origins from the Joint NHMRC/AVCC Statement and Guidelines on Research Practice (NHMRC 1997) that was embodied into the ‘living [protocol] document’ Australian Code for Responsible Conduct of Research (NHMRC 2007b). The National Statement (NHMRC 2007a: 69) acknowledges the complexities of research with Aboriginal and Torres Strait people stating in its preamble on this topic:

*Research with Aboriginal and Torres Strait Islander Peoples spans many methodologies and disciplines. There are wide variations in the ways in which Aboriginal and Torres Strait Islander individuals, communities or groups are involved in or affected by research to which this chapter applies. The variations depend on the scope of the project, the demographics of*
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participants, the illnesses or social phenomena under study, and their historical, social and cultural context and connections. Researchers should address relevant issues of research design, ethics, culture and language. Depending on the field of study and complexity of the proposed research, these issues might be addressed in numerous ways. A cornerstone of an ethical research relationship with Aboriginal and Torres Strait Islander Peoples is respect for and valuing of cultural and language diversity.

As a sub-branch of the National Statement there are also guidelines specifically for human health research: Keeping research on track (NHMRC 2006) and Values and Ethics (NHMRC 2003) as distinct from ‘country’ health.

Other Indigenous research protocols have been release in the past 20 years by agencies that sponsor research with and in Indigenous communities that are operational standards for projects funded by these agencies. There have also been attempts at both state and local government levels to formulate Reconciliation Action Plans that articulate aspirations about creating respectful relationships with some documents including discussions about research protocols.

Key Indigenous research guidelines have been authored through the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS) (AIATSIS 2011) and the Australian Housing and Urban Research Institute (AHURI) (AHURI 2011) and several universities have similarly developed research guidelines adjunct and secondary to the National Statement (Australia et al 2007) to articulate their international operational expectations.

The AIATSIS (2011) guidelines derive from 14 principles under the over-arching categories of rights, respect and recognition; negotiation, consultation, agreement and mutual understanding; participation, collaboration and partnership; benefits, outcomes and giving back; managing research; use, storage and access; and reporting and compliance. The guidelines importantly express the obligation for researchers to ensure that the principle of ‘free, prior and informed consent (FPIC)’ is employed with Indigenous participants implying Indigenous consent prior to and during project formation ‘free of duress’ and that Indigenous participants are ‘equal participants’ in the research process. FPIC reinforces principles discussed by the United Nations in 2005 at their International Workshop on Methodologies Regarding Free Prior and Informed Consent and Indigenous Peoples (UN 2005).

The 14 principles are contained in Figure F1, and under consent, the Guidelines express the need to:

- Conduct all research on the basis of free, prior and informed consent.
- Ensure that Indigenous people are equal participants in the research process.
- Ensure appropriate negotiation and consultation about the aims and objectives, and to ensure meaningful negotiation of processes, outcomes and involvement.
- Ensure the research project has FPIC informed consent and plain English statement signed by participants.
- Identify appropriate individuals and communities to consult - there is almost always someone to speak for a particular place or area.
- For more general research, identify and consult individuals or communities who have made an important contribution in relation to the research topic.
- Allow appropriate individuals for the area/topic to be identified from within the community.
- Involve the Traditional Owners who speak for the Country.
• Identify Indigenous regional, local and community and/or other organisations.
• Identify any written research protocols or other protocols that need to be followed.
• Observe appropriate community values, norms and protocols.
• Identify potential political issues that may be affected by the research or the outcomes of the research.
• Communicate with relevant individuals and organisations by appropriate means (face-to-face meetings are always desirable), and consider the budgetary and funding implications of such visits for the individuals and organisations.
• In introductions to individuals and communities, clearly identify the researchers and any other participants, any institutional affiliations and key stakeholders, and sources of financial support.
• Clarify objectives from the outset, but maintain flexibility and a willingness to modify goals and ways of working. Agree about the involvement of individuals in the interpretation of the results and the preparation of any publications (including whether they should be co-authors).
• Agree about identification or otherwise of individuals involved in the research, and whether those who take part in research should be acknowledged in any publication (AIATSIS 2011: 9).


Figure F1: AIATSIS Guidelines

| Principle 1: | Recognition of the diversity and uniqueness of peoples, as well as of individuals, is essential |
| Principle 2: | The rights of Indigenous peoples to self-determination must be recognised |
| Principle 3: | The rights of Indigenous peoples to their intangible heritage must be recognised |
| Principle 4: | Rights in the traditional knowledge and traditional cultural expressions of Indigenous peoples must be respected, protected and maintained |
| Principle 5: | Indigenous knowledge, practices and innovations must be respected, protected and maintained |
| Principle 6: | Consultation, negotiation and free, prior and informed consent are the foundations for research with or about Indigenous peoples |
| Principle 7: | Responsibility for consultation and negotiation is ongoing |
| Principle 8: | Consultation and negotiation should achieve mutual understanding about the proposed research |
| Principle 9: | Negotiation should result in a formal agreement for the conduct of a research project |
| Principle 10: | Indigenous people have the right to full participation appropriate to their skills and experiences in research projects and processes |
| Principle 11: | Indigenous people involved in research, or who may be affected by research, should benefit from, and not be disadvantaged by, the research project |
| Principle 12: | Research outcomes should include specific results that respond to the needs and interests of Indigenous people |
| Principle 13: | Plans should be agreed for managing use of, and access to, research results |
| Principle 14: | Research projects should include appropriate mechanisms and procedures for reporting on ethical aspects of the research and complying with these guidelines |

Source: AIATSIS 2012
There is also a nexus between the National Statement (2007) and Indigenous research protocols. The former is predicated upon research project formulation and ethics approval prior to participant engagements and consent, whereas the guideline by the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS) and the Australian Housing and Urban Research Institute (AHURI) stress ‘free, prior and informed consent’: is required. Thus the latter are predicated upon Indigenous engagement formulation prior to the National Statement (Australia et al 2007) obligations being address.

What is also not clear are the obligations where the project analyses Indigenous knowledge, artefacts and ‘issues’ and does not involve human engagement and consultation. Nor is there clarity about the position of Indigenous researchers pursuing projects that implicate Indigenous consultation and engagement, and also where ‘country’ association and respect thereto fits in this clause. A key philosophical dilemma starting to unfold is ‘what is the position and relationship of an Indigenous assessor from country X impeding or critiquing a research project that has a letter of commitment from country Y despite apprehensions about the methodology and research aspirations stated?’

While there are now numerous Reconciliation Action Plans prepared by local governments, few address the topic of research protocols as distinct from actions, initiatives and partnerships. For example, the Mornington Peninsula Shire’s Reconciliation Background Paper (2008), that covers the south-western part of the Boon Wurrung country, has incorporated suggested protocols for research by Council staff in their activities because “although the Council may feel that some of the advice is normal business practice or covered by standard research protocols, it should be remembered that many Aboriginal people and services have had predominantly negative experiences with Government bodies and mainstream services. Building partnerships will require the development of trust and mutual respect over time” (MPS 2008: 55). Thus, “no consultation with Aboriginal community members for research, should take place without the prior consent of the ACCS concerned. Consent should be in writing, unless otherwise agreed, and information collected should be agreed and cleared by the ACCS before publication” (MPS 2008: 57). And, that “any research proposal must, in addition to being fully discussed with the local ACCS, be submitted, with the community’s agreement, to the appropriate Research Ethics Committee in Victoria” thus repeating the AIATSIS principle of “fair, prior and informed consent” (MPS 2008: 59). The ACCS represents Traditional Owners, Aboriginal Community Controlled Services, usually managed by a board of Directors and accountable to the Aboriginal community and funding bodies. It may also include Aboriginal works in mainstream services (MPS 2008: 55).

Several Australian universities that specialise in ‘country’ Indigenous knowledge systems-related research projects and teaching engagement are now struggling with the above but also the lack of specificity and clarity of these documents where it pertains to ‘country’ knowledge acquisition and it’s re-translation into Western documentation via Indigenous engagement processes. This is in contrast to conventional anthropological and archaeological research that is seeking explanations about information rather its re-formulation into contemporary planning, legal and management strategies as it is dealing with past, present and future ‘country’ knowledge and not simply past evidence and present ‘readings’. For example, because of the misconnections and lack of clarity for planning for ‘country’ research protocols, Low Choy et al. (2011a) prepared a Protocol for Incorporating Indigenous Landscape Values into Regional Planning Processes (Low Choy et al. 2011a), that was applied in a project that reviewed the South East Queensland regional planning frameworks as it
relates to Indigenous expressions of statutory and strategic planning in this landscape to provide ‘contemporary guidance on appropriate ways to conduct research with Indigenous communities’ and was designed to supplement the National Statement (2007), Australian Code for the Responsible Conduct of Research (Australia et al. 2007) and the Guidelines for Ethical Research in Indigenous Studies (AIATSIS 2000). Such does not obviate national ethics approval requirements but does raise another level of complexity and conflict with the assumptions embedded in the NEAF process. This is the only ‘country’-specific research protocol in Australia and its objectives are to:

1. Establishing an acceptable high standard of engagement with an understanding of South East Queensland’s Indigenous communities in research activities;
2. Developing strategies at the regional, sub-regional and local level to adequately protect the rights, interests and aspirations of Indigenous communities in South East Queensland for the recording, and management of their traditional knowledge;
3. Building capacity within Indigenous communities and their organisations to effectively engage and negotiate with researchers to improve the standard of research and provide benefits to the community (Low Choy et al. 2011a: 3).

In contrast the City of Melbourne Reconciliation Plan 2011-14 (City of Melbourne 2011), that encompasses parts of the Wurundjeri and Boon Wurrung countries, makes no mention of research protocols. The City of Greater Geelong, that is part of the Wathaurong country, is still negotiating with key Aboriginal groups in their region (i.e Wathaurong Aboriginal Co-Operative, Wathaurung Aboriginal Corporation and Narana Creations) to get agreement on a draft Aboriginal Action Plan (2 years in draft form) (Krastins 2013 pers. comm.).

In terms of relevant professional institutions, only the Planning Institute of Australia (PIA 2009) and Engineers Australia (EA 2011) have published respectively a ‘Welcome to Country’ protocol and a ‘Reconciliation Action Plan’ as philosophical statements and policy expectations upon their institute membership both of which re-state the wish to establish co-operative relationships based upon “equality, respect, trust, honesty and openness” (EA 2011: np). While PIA, via its Indigenous Planning Working Group (IPWG), has developed this Protocol, one of its concerns is in the education sector under the theme ‘Normative values and processes’ where PIA has concluded that “Current normative values and processes are, in certain situations, no longer relevant, and new values and processes of planning need to be devised that records, interprets and absorbs Aboriginal and Torres Strait Islander people’s intrinsic knowledge of country and the environment” (PIA IPWG, 2010: 4; Low Choy et al. 2011c).

2. Issues Arising
The research protocols employed for this study have been previously outlined in Section 2.2 (Research Protocols and Ethics). Issues that are linked to protocols that were experienced or raised during the research process and dealing with urban and peri-urban Aboriginal communities, implicated:

- ‘Free, prior and informed consent’: the project team were very mindful of this obligation, and especially having regard to their strong and increasingly developing relationships with several Indigenous communities around Australia. The Indigenous communities selected either had strong relationships with the partner universities (Quandamooka; Jagerra, etc), had growing relationships (Wathaurong, Kaurna) or wished an opportunity to be involved (Boon Wurrung). All organisations were willing to be involved at the outset and all individuals were willing participants, but it is becoming increasingly obvious that several organisations are tired of the plethora of ethics paperwork and consent
procedures that they are and continue to be subjected to despite their knowledge and standing in the community.

- **Lines of communication**: lines of communication for several organisations changed during the initial ‘letter of commitment’ stage through to the second series of workshops, and these changes were external to the project team, not as a result of the project teams’ activities, but as a consequence of structural changes within the respective Indigenous organisations and various ‘changes of command’ internally within these organisations.

- **Temporality/time including meeting dates and attendees**: It was very clear at the outset that NCCARF made certain assumptions about Indigenous community consultation processes that are and were impractical. Assuming normal Western culture timelines and meeting scheduling cannot be achieved with Indigenous communities and their spokespersons who are already stressed with other obligations, issues of governance occurring internally and as a consequence of state government decision-making, and Indigenous family dynamics. These issues were carefully dealt with by the project team via discussions but the project timelines did place a strain upon relationships and project timelines that had to be massaged often on a weekly basis because of externalities.

- **Change in Governance Contexts**: Change is common and several changes in state government structures, politics, governances and internal Indigenous organisations affected and experienced change as a consequence of their decision-making or external decisions. These changes had several impacts upon the project more so in massaging timeline and meeting changes as well as nomenclature changes.

- **National ethics expectations**: there appears to be a misconnect between ethics protocols as they link to Indigenous communities because many of these guidelines and protocols are predicated upon non-south-eastern Australian well-educated Indigenous participants and communities. Thus, while several participants are clearly mindful of these university research protocols and consent arrangements, it is tainted because such represent discrimination as this cultural community has been singled out to be subject to these requirements in deference to other communities. This thread is the same thread of thought that underpins current discussions about amending the Australian constitution to legitimise and recognise Indigenous peoples.

- **Changes in command**: various changes of ‘command’ occurred in several of the Indigenous organisations involved that could have jeopardised the project but thankfully did not affect the operation of the project.

- **Human engagement**: there is an assumption in many Indigenous-related research projects that there is a large suite of Indigenous people out there waiting to be consulted and engaged, and that they have ample time and resources to participate in research projects. Nothing could be further than the truth, and problems can arise from misassumptions about engagement activities with Indigenous communities, particularly those associated with urban and peri-urban country where most of those communities are not living on country.

- **Protocols and guidelines**: There is increasingly a suite of national-level protocols that are being drafted to generically manage situations and communities but more often they are conceptual in their threads of thought and lack specificity to an Indigenous community. In many local and state government drafted Reconciliation Action Plans there is also a gap in explaining and discussing protocols about research and knowledge respect and reporting that are not clarified.
3. Misconnections of Protocols and Indigenous Research

- **Hierarchies of knowledge** – there is a need to recognise that cultural and environmental knowledge in a community can be multi-layered and multi-dimensional in its translation and exposition to the public domain. Further, some knowledge is not in the public domain and a community often does not want it in the public domain because of the cultural information and meanings it possesses. How best to express and map this is exceedingly difficult because one could draft a map per community only to see it be totally re-drafted with a change in management hierarchy in a community.

- **Succession planning and representativeness** – there is a need to support succession planning of management and representatives in Indigenous communities. Unlike non-south-eastern Australian urban and peri-urban Indigenous communities, there is a lack of numerical representatives to lead and enable this succession planning.

- **Positioning in the National Statement (2007)** – the National Statement (2007) singles out ‘Aboriginal and Torres Strait Islander peoples as a high risk community to be engaged in and be the subject of research’.

- **Tangible and intangible knowledge** – there is a common assumption that most research matter concerns tangible information or subjects, whereas information that embodies country contains both tangible and intangible information that can be difficult to express orally, graphically and temporally.

- **Academic vs. professional practitioner protocols** - there is a disconnect between academic research protocols and professional practice activities wherein the former is subject to a National Statement (2007) regime and the latter is subject to the discretion and ethical position of the practice and their adherence of their respective professional institute Reconciliation Action Plan or Ethics Statement. In addition, much of the latter are minimal. This is causing a disconnect between formal academic research and procedural research undertaken by practitioners that often has immediacy and serious legal and governance implications.

- **Country specificity** – in discussing ‘country’, there are various issues at play. For example, there are continuing disputes about the geographical spread of a country between communities and how these are expressed in Western legal instruments, there are matters that communities do not wish to be expressed graphically or wish that the nature of the graphic expression is more relevant and representational rather than a single point on a map, there are difficulties of ‘blood’ and ‘kin’ relationships to country because of the colonisation and mission herding processes that were employed in the 1800s that have resulted in dilution of traditional familial systems, and also with the advent of urbanisation and cultural disintegration of Indigenous communities one can now witness multiple Indigenous communities being resident off-country and possessing unclear cultural relationships to their residence country and their familial country.
4. References


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