

FINAL REPORT

Understanding Climate Change Impacts - A Climate Change Adaptation Framework

Prepared for

North East Greenhouse Alliance

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URS in association with



CSIRO

and



Executive Summary

The impacts of climate change represent a significant challenge to business and the community in the North East of Victoria. Climate change will exacerbate the kinds of stresses that are already beginning to place strain on the community (bushfire, drought, floods) and the impacts will fall disproportionately on those that are disadvantaged or under financial stress. Climate change is likely to have significant impacts on the well-being of the region by undermining economic vitality, ecosystem viability and affecting the community's health and viability. Through appropriate adaptation planning however, the North East Region alleviate the impacts of climate change and support the ongoing sustainability of the North East of Victoria.

Introduction

The North East Greenhouse Alliance (NEGHA) has identified the development and implementation of a regional climate change adaptation strategy as one of its key project areas in the long term. The NEGHA has decided to approach the strategy in three key phases which can be described as

- Understanding Climate Change Impacts (this project, with funding and assistance from the Department of Sustainability and Environment)
- Communicating Climate Change Impacts (subsequent project)
- Adapting to Climate Change Impacts (subsequent project)

The Alliance commissioned this study as a first step in developing the community's understanding of expected changes in climate affecting North East Victoria and to assess the likely impacts of climate change and the capacity of the regional community to adapt. The project provides an early understanding of the threats and opportunities posed by climate change as well as the responses that could be undertaken at this stage. The project goes on to highlight the options for subsequent steps and projects that should be undertaken to foster successful adaptation responses. It is important to emphasise that adaptation is an ongoing process and cannot be achieved in a single project, action plan or set of steps. As new information becomes available, climate change impacts and policies unfold and adaptive capacity improves, communities can move on to more sophisticated responses on an ongoing basis. Stakeholders also learn through the process of adaptation itself, building their understanding, awareness and their future adaptive capacity.

This project aimed to develop a grass-roots view of climate change issues, as seen by the people of the North East Region. This study has therefore used a stakeholder-based approach to assessment of current levels of understanding and awareness of climate change impacts; identification and prioritisation of the potential impacts; and adaptation responses by the economic and community sectors that make up the North East. The major requirements of this study were to:

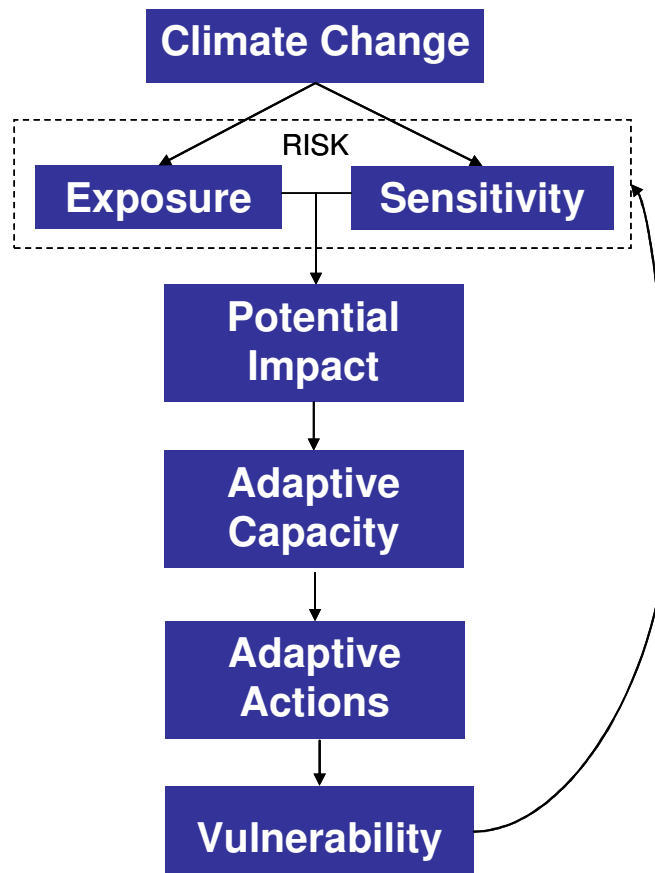
- Obtain an up-to-date assessment of likely climate changes in North East Victoria. This was provided by CSIRO.
- Obtain feedback from key decision makers and stakeholder representatives on their understanding and awareness of the threats and opportunities of climate change and the measures that might be taken to address it.
- Draw upon the international literature to develop a framework to assess adaptation issues for the North East.
- Determine the capacity or readiness of the local community to adopt climate change adaptation measures.

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- Undertake a preliminary identification and prioritisation of adaptation actions for the various sectors of the North East.
- Identify communication channels and methods for effective future engagement of the community on climate change issues.

The structure of this executive summary is based around the framework adapted from the literature for this project to help understand the language and concepts of climate change:

Figure 1.1 Climate change adaptation framework



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Climate changes likely for North East Victoria

CSIRO was commissioned to update its predictions for the likely impacts of climate change on the North East of Victoria. The information in the report draws largely on the profile of climate change in the North East Region, published by DSE in 2004. These effects are summarised in the Table.

Table 1-1 Climate Change Impacts on North East Victoria

Variable	Changes
Temperature	<ul style="list-style-type: none"> Annual warming of 0.3 to 1.6°C by 2030 and 0.8 to 5.0°C by 2070 Daytime maximum temperatures and night-time minimum temperatures are likely to rise at a similar rate Warming is likely to be greater in spring and summer 10-60% increase in the number of hot summer days ($\geq 35^{\circ}\text{C}$) by 2030 and a 20-300% increase by 2070 on the plains. Rate of increase will be greater in the mountains 0-50% reduction in the number of frost days by 2030 and a 50-100% decrease by 2070.
Rainfall	<ul style="list-style-type: none"> Annual rainfall decreases are likely (changes of +3 to -10% by 2030 and +10 to -25% by 2070) Extreme daily rainfall events are likely to become more intense.
Snow	<ul style="list-style-type: none"> Area with at least 1 day of snow cover per year is likely to be reduced 10-40% by 2030 with 22-85% by 2050 Area with at least 60 days of cover shrinks 18-60% by 2020, and 38-96% by 2050 At Mt Hotham, peak snow depth declines 10-50% by 2020, and 25-95% by 2050.
Drought	<ul style="list-style-type: none"> Droughts are likely to become longer and more frequent, particularly in winter-spring Rainfall deficiencies that currently occur once every 5 winter-springs may occur once every 3-5 years by 2030 and once every 2-3 years by 2070 Due to hotter conditions, droughts are also likely to become more intense.
Fire	<ul style="list-style-type: none"> 10-40% increase in the frequency of days with extreme fire-weather risk by 2020, and 20-120% increase by 2050 4-25% increase in the frequency of days with very high and extreme fire-weather risk by 2020, and 15-70% increase by 2050.
The climate of Wangaratta	<ul style="list-style-type: none"> a 1°C warming and a 5-10% annual rainfall decrease (a moderate scenario for 2030) would make the climate of Wangaratta more like the current climate of Cowra in NSW.

Source: CSIRO

Such changes would have substantial economic, environmental and social impacts within the region and beyond. As the region is the source of much of the water in the Murray Darling system, lower rainfall will be felt as reduced water availability across the Basin. Drier, hotter conditions will exacerbate the bushfire threat. Higher temperatures will also adversely affect much current horticulture and tourism, as well as the cool climate and alpine ecosystems and their distinctive plants and animals. Adverse effects on human

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health could also ensue. The region's communities are likely to suffer adverse economic and social consequences from all of these effects, however action should be undertaken to ameliorate these impacts.

The assessment methodology

The study employed several techniques to identify and evaluate the issues involved in climate change adaptation in the North East:

- A focus group with key community leaders and stakeholders;
- An on-line survey with organisational and stakeholder representatives; and
- A regional workshop with organisational and stakeholder representatives.

These methods were used to assess individual, sectoral and wider community awareness, vulnerability and capacity to adapt to climate change impacts. The workshop also provided an opportunity to undertake a qualitative assessment and prioritisation of impacts and adaptation actions.

Key findings

Impacts of climate change

Climate change is likely to pose significant challenges to the North East Region. Drawing together the results of the focus group, online survey and workshop, community leaders rated as the highest concerns:

- Drought and water stress, related to both water access and water quality;
- Increased bushfires / mega fires;
- Increases in extreme weather events (flooding and storms); and
- Flow-on social and economic impacts.

The region is already under a great deal of stress due to the impacts of the current drought and recent bushfires. Exacerbation of these impacts through climate change is likely to pose major challenges to the region. This is likely have long term impacts on population growth, the ability to retain young people and the viability of small towns. Many small towns are dependent on agricultural production and are already declining in regional Victoria, while the larger towns are growing. Climate change is likely to increase the pressure on smaller towns as agricultural production faces increased frequency of highly damaging events like drought and floods.

Adaptation responses to these impacts provide opportunities for the region to take advantage of new circumstances, to optimise adjustments to future conditions and to minimise impacts.

Adaptive capacity

Availability and accessibility to adjustment opportunities serve as the foundation for understanding and defining a system's adaptive capacity. In this and the next sub-section, adaptive capacity and adjustment opportunities (or adaptation actions) are addressed.

The qualitative assessment of adaptive capacity in the region identified a number of issues. The most outstanding feature to emerge is the consensus that financial capacities are perceived as low across individuals, organisations and the community generally, with a shortage of financial resources to call upon in the region.

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However, participants were consistently confident that the region has the skills to meet adaptation challenges. The sectors rating skills as high include agriculture, health and education, emergency services, and environment, public lands and natural resource management.

Participants were not as confident about the region's capacity in respect of knowledge, leadership, connectedness and motivation, although ratings varied among sectors. The business and tourism sector for example rated the factor of knowledge as high within the community.

Overall the assessments for community level capacities are generally rated lower than they are for the same capacities at the level of individuals and organisations. These assessments may reflect participants' greater confidence in their knowledge about individuals and organisations in their own sector. They also, however, highlight concerns about the capacities existing in the broader community.

Adaptation actions

The process of identifying adaptation actions that might be implemented to address climate change has begun during the course of this project. These actions present a number of opportunities for the region to adapt to climate change. Participants in the focus group, on-line survey and regional workshop made a large number of action recommendations which, along with the consultants' recommendations, can form the basis for further planning (both sectoral and multi-sectoral). The actions can be broadly grouped under the following headings:

- Mainstreaming climate change
- Land Use Planning
- Settlements and infrastructure
- Emergency Planning
- Coping with Water Stress
- Coordination of Effort
- Building capacity to adapt to climate change

Financial resources presents a major barrier to adaptation. Actions that encourage stakeholders to consider climate change in the course of normal decision making processes (mainstreaming, land use planning, settlements and infrastructure) are likely to provide opportunities for low cost adaptation. The literature also indicates that there opportunities to prepare for emergencies that are low cost.

Communication

This "Understanding Climate Change Impacts" project is to be followed up with a "Communicating Climate Change Impacts" project, making communication a key action. This report includes high level information on climate change impacts, adaptive capacity, adaptation actions and highly vulnerable stakeholders that can be communicated to a wider audience. Further information and communication needs have been identified and preferred communication channels have also been identified.

Language and terminology has been identified in the national and international literature as a barrier to understanding and communication about climate change adaptation. Similar observations have been made during the course of this project as participants have struggled with the meanings of key terms and the concepts they describe, including adaptation methods, actions and best practice. A glossary is

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included at the start of the report that clearly describes terms routinely used in communication about climate change and adaptation.

Vulnerability

The community of the North East is already under stress due to the 1997-2007 drought, superimposed on a warming trend. Projected climate change is likely to exacerbate these impacts. Sectors such as agriculture, tourism and food processing are vulnerable and their contribution to the local economy is at risk.

The sectors most vulnerable to climate change include:

- Water resources;
- Tourism – especially alpine tourism;
- Public lands – particularly forested areas;
- Agriculture and aquaculture – particularly activities relying on irrigation;
- Forestry;
- Biodiversity – particularly in alpine areas;
- Manufacturing – particularly that related to agricultural and forest products;
- Health – especially mental health and heat stress;
- Geographic – tornado allies, flood prone areas; and
- Existing buildings and infrastructure liable to damage from extreme weather events

From a social point of view, participants nominated the following impacts and vulnerabilities as particular concerns:

- New homes/ developments;
- Outlying communities/ small towns;
- Demographic: aging population, those less well off, those with a lack of capacity;
- Geographic: tornado alleys, flood prone areas;
- Mental health, including increased stress and uncertainty; and
- Low levels of community based leadership

Actions and responsibilities

A number of key organisations and actions will determine the implementation of adaptation responses in North East Victoria. DSE continues to implement the Victorian Greenhouse Strategy which provides guidance, resources and expertise. The Alliance and DSE should incorporate detailed assessments of climate change risks and vulnerabilities into these future activities. The Alliance has identified development of a regional adaptation strategy as a key long term response to climate change in the region. The next steps of adaptation include the projects “Communicating Climate Change Impacts” and

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"Adapting to Climate Change". Adaptation actions identified to date and the next steps of the project are outlined in greater detail in the full report.