Victorian Centre for Climate Change Adaptation Research

Submission on the Productivity Commission Issues Paper: Barriers to Effective Climate Change Adaptation

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Summary and recommendations

Adapting to climate change presents new challenges for policy makers and the community. Responding to the risks of climate change involves assessment of the hazards and the vulnerability, exposure and adaptive capacity in communities, industries and ecosystems. Building resilience and responding effectively to climate related impacts require foresight and leadership, strategic thinking, resourcefulness, creativity, collaboration and effective communication. This submission presents some key messages from Centre research and from broader experience in local government and makes the case for continuing investment in, and improved coordination of, research to support climate risk management.

Recommendations:

1. Responding effectively to climate change requires a clear understanding of risks and the sensitivities of decisions to different climate variables, an understanding of the different adaptation options and their costs and benefits.
2. This requires continued investment in research on climate science, analysis of impacts and adaptation options and improved coordination of research at local, state and national levels.
3. The potential impacts of climate change vary across the country and across industries. Information needs to be targeted specifically for different state and local governments and for different industry sectors.
4. The science and understanding of climate change and its impacts will continually evolve. A strategic, flexible, state or national approach is needed to provide the basis for local government to incorporate the latest science to into hazard overlays and other planning processes.
5. There is a need to ensure appropriate support and planning that recognises cultural diversity and varying socio-economic status in different types of communities.
6. There is a need to invest in institutions to support local government decision making on climate related issues, including improved strategic thinking and planning frameworks. The Federal Government should consider funding for analysis of potential impacts and response options and in increasing capacity in local government to utilise technical inputs and undertake local assessments aimed at meeting local planning needs.
7. There is a need to invest in analysis to determine ways to incorporate potential future climate change impacts into asset management, maintenance and replacement and the development of financial and accounting tools to support this.
8. Policies and institutional arrangements should aim to build collaborative networks at state and regional levels that develop resilience through maintaining redundancy, organisational flexibility and the availability of resources to respond to climate risks and to facilitate information sharing between different levels of government and with industry and the community.
9. There is a need to define good adaptation reporting and the measures, indicators or benchmarks that can be used to assess adaptation success. This requires a systems framework for linking the different components of climate impacts and adaptation responses

Introduction

The Victorian Centre for Climate Change Adaptation Research is a partnership among Victorian universities. It was established with Victorian Government funding in 2009 to improve understanding in government and the community about the potential impacts of climate change and options for adapting to climate risks. This submission was developed in consultation with partner universities and two Victorian local government organisations: City of Melbourne and City of Port Phillip.

The Centre's research program involves multi-disciplinary and multi-institutional research teams to address priorities identified by the Victorian Government. It conducts regional think-tanks, stages an annual forum and supports a visiting fellowship program. Researchers work closely with all levels of government and the community to ensure that research results make a difference to policy and practice. The submission presents relevant learning from VCCCAR activities on key questions raised in the issues paper.

Adapting to climate change risks presents new challenges for policy makers and the community. It involves more than just consideration of climate-related hazards. Responding to the risks of climate change involves assessment of the vulnerability, exposure and adaptive capacity in communities, industries and ecosystems. Adaptation is essentially a social learning process. It requires an understanding of sense of place, a capacity for individuals and the broader society to identify potential future changes and what these mean for themselves as individuals, their families, their communities or their companies. Building resilience and responding effectively to climate related disasters require agreement on common goals. Developing these goals requires foresight and leadership, strategic thinking, resourcefulness, creativity, collaboration and effective communication. Government needs to foster meaningful conversations within the community about what we value and what we might be prepared to lose in a changing climate.

Adaptation action remains relatively new to the government policy arena in Australia. Therefore roles and responsibilities between levels of government and between government bodies are uncertain and often inconsistent. In order to effectively manage climate change risks, levels of government will need to understand and agree on their roles and responsibilities and effectively articulate this clarification externally to all stakeholders.

Climate change adaptation is also still often framed, in government policy and industry practice, as a 'environment' or 'sustainability' issue. The need to adapt to future climate risks is better regarded as a business risk, such as employee health and safety. Anticipating and managing these risks will be a lower long-term cost to the economy and the society.

For example, recent analysis of the implications sea level rise and coast and catchment flooding indicates a high cost for a 'wait and see' approach, particularly given rapid growth in coastal populations and a strong drive for further coastal development. Current infrastructure and planning policy is inadequate even without any further change in climate or sea level impacts but there appears to be limited desire in state or federal governments to invest in further research and capacity building to manage increasing risks.

The Centre's research program and other activities are producing outputs that can inform responses to issues raised in the Issues Paper. The aim of this submission is to briefly present some of the most important messages from this work and from broader experience in local government. These can be encapsulated in three areas: framing responses to climate risks, improved decision making under uncertainty through scenario planning, building leadership and networked capacity and preparing for and responding to extreme events. The submission also makes the case for continuing investment in, and improved coordination of, research and development in disaster and climate risk management.

Climate change adaptation in context: framing responses to climate risk

(this section is drawn from the VCCCAR working paper by Fünfgeld and McEvoy 2011 http://www.vcccar.org.au/files/vcccar/Framing_project_workingpaper1_240611_0.pdf)

Framing occurs when people with different knowledge, experiences and personal backgrounds consider an activity or a challenge. Framing is a way of making sense of a topic (like climate change) from an individual perspective but it can also be used to arrive at a shared meaning and sense of purpose in addressing the challenge.

Early research activity has focused on different climate change assessment methodologies and how these can potentially influence potential pathways. Through this activity, the study has identified the following ways of framing adaptation:

1. **A disaster response approach**. This natural disasters frame has been an important consideration in government policy discussion on climate change.
2. **A risk management approach**. This is the dominant, organisational practice for dealing with risks to assets or legal liabilities in local government and the private sector.
3. **A vulnerability approach**. This focuses on who or what will be affected and in what way.
4. **A resilience approach**. This is the ability of groups or communities to cope with external stresses and disturbances as a result of social, political, or environmental change. The concept originated in ecology but is now being translated and applied to human systems.

Understanding and managing risks depends to a large extent on what approach different people use to frame the response to climate change. The project also found that:

- Adaptation will often be context specific, not only influenced by different climate impacts but also the vulnerability and exposure of the 'system' in question;
- Further institutional complexity is introduced when considering the large number of organisations and people affected. Each bring different values, perceptions of risk, motivations, levels and types of knowledge, roles and responsibilities, and even cultural background;
- When assessing the problem to be addressed, even the choice of climate change assessment methodology can be considered a framing influence. Taking two examples; risk assessments can be characterised as top-down expert driven approaches whereas vulnerability assessments tend to be bottom-up processes which encourage the greater inclusion of multiple stakeholder voices;
- Being more explicit about these framings as part of local adaptation processes can benefit a shared understanding of the fundamentals of climate risks and adaptation options, lead to more flexible, adaptive management approaches to responding to climate change.

Planning

Victorian local Councils are working with Victorian Government Departments to identify the most appropriate way to incorporate the risks associated with sea level rise and increased rainfall inundation into planning schemes. The City of Melbourne and City of Port Phillip are assembling available climate change information. However a consistent statewide or national approach would be superior to planning decisions by individual Councils.

The science and understanding of climate change and its impacts will continually evolve. A strategic, flexible, state or national approach is needed to provide the basis for local government to incorporate the latest science to into hazard overlays and other planning processes.

Planning frameworks also need to consider equity and diversity in managing climate risks. For example, the Western region of Melbourne has one of the largest residential growth areas in the country is one of the most diverse cultural regions in the metropolitan region with over 90 different nationalities. It also has some of the most disadvantaged socio economic groups. These factors combined with the physical setting and the lack of vegetation cover and other forms of 'green infrastructure' can lead to very high exposure and vulnerability to specific risks. A spatial vulnerability analysis of urban populations to extreme heat events by Monash University showed that most areas of the Western region of Melbourne have high vulnerability to the increasing temperatures. Consequently, the long term effects of climate change on the Western Metropolitan communities are likely to be more severe and create greater hardship than other areas of Metropolitan Melbourne. To maintain liveability in many communities, there is a need to ensure appropriate support and planning that recognises cultural diversity and socio-economic status.

While many reforms to planning frameworks may involve little cost, there is a need for sound analysis to support planning decisions (see for example, http://www.buildingfutures.org.uk/assets/downloads/Facing_Up_To_Rising_Sea_Levels.pdf). Local governments need increased technical capacity to adequately assess potential impacts on coastal settings, existing infrastructure and advice and guidance on appropriate essential infrastructure for newly emerging coastal communities. Providing consistent support and advice will lead to better opportunities for coastal living in other areas along Victoria's coastline and put less pressure on existing growth regions.

There is a lack of institutions to support local government decision making. The private sector is not filling the requirement. There is potentially a role for the Federal Government in providing funding for this type of analysis and increased capacity to utilise technical inputs and undertake local assessments that is aimed at meeting local planning needs.

Assets and infrastructure

In many areas of Victoria there are aging assets that will become increasingly vulnerable in relation to extreme weather events. Exposed coastal assets (both private and public) have been identified as highly vulnerable to sea level rises. There is a need for analysis to determine the most appropriate way to incorporate potential future climate change impacts into asset management, maintenance and replacement and the development of financial and accounting tools to support this.

For example, analysis of current drainage capacity and coastal planning and protection measures in coastal councils indicates that current infrastructure is severely limited and is inadequate for dealing with a changing climate. Local government requires increased support and strategic guidance from the Federal and State government to engage in localised and strategic hazard and vulnerability analysis in order to make appropriate and sound investment decisions in this area.

There are already indications that the insurance industry is moving to reduce liability in this area and increase premiums. For example, there a levy of $50, 000 has been placed on local governments to cover the costs of recent flood events. There is anecdotal evidence to suggest that there has been a reduction in some areas of compensation.

Science, education and warning systems

Responding effectively to climate change requires a clear understanding of risks and the sensitivities of decisions to different climate variables, an understanding of the different adaptation options and their costs and benefits.

There is a clear need to generate improved climate information that is relevant to decision making on different types of risks is different parts of the country. This needs to driven by the information required to support investment and management decisions being taken by government and industry.

Most climate change adaptation will take place at the community level by individuals, households and businesses. A resilient community requires clear and credible information about risks, responsibilities and available services. Engagement and education of businesses and households will require targeted programs which identify the needs of stakeholder groups and how to effectively engage with them. For example businesses and households which exist in flood prone areas require support and information from various different government bodies, at various levels of government. This information will need to be provided in a clear, consistent and timely manner. A commitment by those government and non-government parties involved to support communities and to effectively coordinate programs is essential to ensuring businesses and households have the information they require to effectively adapt.

However, it is important to have the correct balance between complexity and simplicity in information. If the information is too complex, the user may not be willing or able to absorb and apply it or it may be misinterpreted or misused. If it is too simple, the lack of detail may mean that a user is not able to make decisions that are appropriate to their circumstances.

Decision makers must also be supported in applying complex information and decision tools. Personal attitudes and beliefs of people in senior positions can determine the motivation and willingness within an organisation to consider climate risks and provide resources to implement climate adaptation plans.

Information on future climate risks also needs to be targeted for different industry sectors. The effects of climate change will differ between sectors and at VCCCAR events we have found that the capacity to consider and respond to climate change varies considerably across industry sectors and between scales. Small and Medium scale enterprises are generally found to have limited capacity.

There is also a need for improved strategic thinking and planning frameworks to ensure industry productivity increases (see scenario planning section below).

These frameworks and tools also need to extend to local government. Training is needed on understanding risk and risk management approaches, such as scenario approaches, to ensure decisions about future development, particularly in areas highly exposed to the impacts of climate change do not increase risk through greater creating exposure to hazards.

Increases in extreme weather events, both in Australia and overseas, has the potential to cause severe disruption to supply chains that will have negative impacts on local industry. A strategic response framework is required to maintain logistics and local supply chains to limit disruption to local industry, ensure continuity and maintain productivity. Greater interaction between business and government to can identify and address critical vulnerabilities along industry supply chains

Increases in the number of days with excessive heat can impact directly upon productivity in areas such as construction and manufacturing. Working in hot conditions can result in a number of adverse health effects - ranging from discomfort to serious illness, which are generally grouped together as heat stress. In extreme circumstances this can be fatal. While there is some advice available to industry to address these issues, identifying the future financial impacts of changing climate for industry sectors will be important in ensuring the risk to industry sectors from climate change is able to be appropriately and effectively managed.

Maintaining investment in locally and regionally focused research and building local expert capacity will enable review and interpret lessons from climate-related events, build a culture of commitment to excellence and generation and testing of new ideas, and provide the evidence base for adoption of improved responses to climate risks. Well-resourced, local research communities such as the VCCCAR can also rigorously test interstate and international methods and best practices for adoption in the local context.

The need for adaptive and social learning processes

Building adaptable, resilient and responsive communities, institutions and organisations is a social learning process. It is a continuing process that evolves in response to new information and changing environmental, economic and social circumstances, as well as the availability of new technologies.

Monitoring and evaluating responses is critical. Effective adaptation includes incorporating an adaptation plan and continually reviewing and updating it.

Policies are required to build collaborative networks at state and regional levels that develop resilience through maintaining redundancy, organisational flexibility and the availability of resources to respond to climate risks. These should have wide membership, including agencies and organisations not necessarily regarded as part of ‘disaster response’ (for example VicRoads, Transport and community sector organisations and municipal councils). This will require commitment by agency leaders and strong incentives for participation and collaboration. These can be built through regular dialogue, social events, shared training, staff exchanges and clear branding. Experts (from universities, CSIRO, BOM and other organisations) also need to be involved in these networks.

Such networks can be used to establish agreed authoritative decision making and to identify and protect key infrastructure, built and natural assets, vulnerable sectors of the community and other things of value and to develop plans for their protection. This requires investment in communication processes up and down and across organisations and with different parts of the community to inform people of potential risks and their role in disaster preparation and response.

Local governments also need effective knowledge networks to ensure that they have access to the right information that enable good decision making. Small councils who have less resources are more likely to find it harder to be able achieve this and this has the potential to lead to long term inequity and limited capacity to build organisational resilience in relation to climate change.

Adaptation requires organisations that work at the boundary between science and policy or practice. Such organisations operate over longer time frames to build high levels of trust with partners and provide for sustained commitment and capacity in advising on climate impacts and adaptation options (international examples include the UK Climate Impacts Program or the CMAS program in the USA). The development of this type of organisation in different parts of Australia is highly desirable.

In the short time it has been in operation, VCCCAR has played an important role in some aspects of this network development across state government agencies, universities, local government, industry and various sectors of the community. Through various activities, the Centre is providing opportunities for creative discussion and engagement between these different groups on ways to better understand and respond to climate risks.

Decision making under uncertainty

(this section is drawn from the VCCCAR policy brief by Biggs et al 2011 http://www.vcccar.org.au/files/vcccar/Scenario%20policy%20brief%20web%20version%20120711.pdf)

Understanding and managing complexity and uncertainty is one of the greatest challenges facing policy makers and practitioners in emergency management. Traditional linear planning and 'pre-formed' decision making have developed from an approach that assumes expert knowledge and analysis can be used to anticipate or define future conditions. This approach is not so relevant in rapidly changing and uncertain conditions. Climate change will occur over a long time frame, with diverse potential impacts and a high complexity of interacting social, economic, political and environmental drivers, these traditional approaches are unlikely to be effective. Scenario-based approaches are therefore being used across a range of Victorian Government departments as a key tool for decision making under uncertainty in the emergency management context.

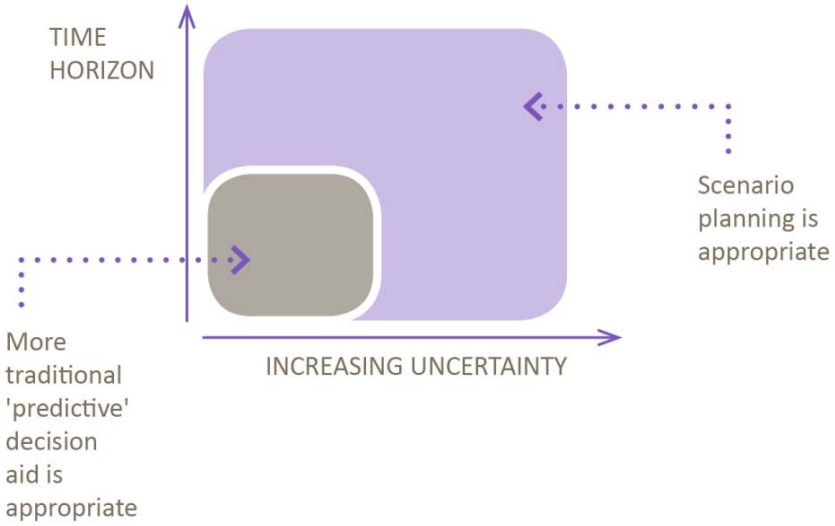

Figure 3: When is scenario planning appropriate?

Scenario planning has been a valuable tool for addressing climate change adaptation objectives in Victoria. However, there was substantial variation in the goals of the exercise, types of scenarios used and the approach to scenario planning. In general, scenario approaches have stimulated constructive dialogue and informed strategic planning or policy making processes.

The following key points emerged from the research:

1. **Scenario planning supports a shift from 'enhanced prediction' to 'robust decision making' under uncertainty.**
   Many scenario processes are driven by a desire to determine the 'most likely' future scenario consistent with a 'predict-then-act' model of problem solving. Yet, fundamental to scenario planning is the capacity to overcome 'predictive' mindsets and engage with potential futures beyond the 'status quo'. Scenarios are not predictions. The major strength of scenario planning is the exploration of possibilities and making 'robust' decisions that recognise future uncertainties. Emergency preparation could incorporate the use of scenarios into.

2. **Scenario planning can be a powerful platform for exploring and integrating diverse sources of knowledge and stimulating imaginative ideas and responses.**
   Knowledge and opinions from diverse groups of people can be integrated using scenario planning techniques. Scenario processes also help uncover and explore different 'world-views' and build shared understanding. Creative approaches can be particularly effective for capturing the imagination of different people about what the future might look and feel like. Exercises that integrate across different government departments can increase the range of world views and perspectives involved and results in more 'joined up' approaches to policy development or implementation.

3. **Maximising the benefit of scenario planning for climate adaptation decision making requires a clear linkage between scenario outcomes and specific decisions.**
   Scenario processes should be embedded within specific decision making situations and structured in a way that ensures the relevance of the outcomes is clear to decision makers.

Processes such as state adaptation planning and planning for regional development or implementation of policies such as Living Victoria may benefit from adopting a scenario-based approach.

4. **Effective adoption of scenario planning requires building and supporting organisational cultures and communities of practice.**
   There is significant potential benefit to be realised from establishing ongoing support and learning networks around scenario planning. The Victorian Government should consider the development of these cross-department networks that share knowledge and capacity in scenario approaches.

Costing climate change impacts and adaptation options

(this section is drawn from the VCCCAR working paper by Keating and Handmer 2011 http://www.vcccar.org.au/files/vcccar/Framing_project_workingpaper2_240511.pdf)

Estimating the costs of climate change impacts is the first step in the economic evaluation of adaptation options. Regardless of any future action on climate change mitigation, impacts of climate change in Victoria are already being felt and are likely to intensify in the future. Some effects of climate change could be positive, for example potential increases in agricultural production or reduced human deaths from extreme cold in some regions; but many impacts are likely to be negative, particularly with the projected increase in intensity and frequency of extreme events.

From a public policy perspective there is a demand for an economic analysis of the costs and benefits of climate change impacts that can then be compared with the potential costs of adaptation. These are important for assessing potential risks and making the case for government intervention. However assessing the economic impacts of climate change is challenging and resource intensive and there are a variety of potential approaches that can be used to make these assessments.

Key concerns and issues in assessing the costs of climate events and adaptation options include: (1) the valuation of impacts on intangibles (such as the environment or amenity values); (2) the selection of an appropriate discount rate; (3) incorporation of uncertainty, 4) the analysis of low probability though high impact events; and (5) the distributional impacts between different parts of the community. These challenges highlight the importance of transparency regarding assumptions in the way these issues are treated, the sensitivity of results to these assumptions, and the combining of quantitative and qualitative data.

In one example, the work of the current Coastal Adaptation Pathways project for Port Phillip Bay is showing clear indication that the cost to the City of Port Phillip and the City of Melbourne of coastal and catchment inundation has the potential to be very high even with when low sea level rise scenarios are applied. Further analysis is required but there is no indication, thus far, that the market is responding to these potential impacts.

Future research needs

Continued research is required to identify and analyse the type and extent of the impacts of future We require clear strategic actions from the Federal Government on the science on sea level rise and catchment inundation and its potential impacts for each region and clear indication of what this means for future planning policy and provision in this area. Our analysis at the LGA level indicates that it is now clear that the risk of impacts from a changing climate over even the short to medium is real, and the liability of no action lies with the Federal Government.

Research is required to determine appropriate indicators of adaptation and response to disaster events and testing these for incorporation into state reporting and planning. These may be based around loss of life, injuries, property or natural assets as a result of climate change and the extent of these in relation to the incidence and intensity of future events.

Some other key questions emerging from discussions with government and industry include:

- What risks and liabilities are governments currently exposed to as a result of current changes in climate and to what extent do these risks and liabilities arise from Victorian legislation and regulation?
- What legislative and planning changes are required to ensure that risks and potential liabilities arising from the impacts of climate change should reside with the entity best placed to manage those risks?
- Can alternative governance and institutional structures be used to more effectively manage these risks?
- What are the climate change related risks for government assets and essential services infrastructure, when and how are these risks likely to present themselves and what are the alternative options for managing risks to infrastructure or services (including legal contracts, insurance, building design or planning)?
- What is the nature of vulnerability and adaptive capacity in 'vulnerable' communities, how can it be measured or assessed and how are future social and economic changes likely to affect this vulnerability?
- What specific types of climate events are vulnerable sectors of the community most exposed to and when are these effects likely to be felt? Are there particular temperature, rainfall or other thresholds when community exposure and impacts will markedly increase and when are they likely to be felt?
- What options (including planning, behavioural, regulatory and structural changes) could be considered by government for reducing community vulnerability? How can these options be demonstrate both cost effectiveness and effectiveness against outcomes?
- How can/ should government engage with communities about future climate risks and to facilitate effective adaptive behaviour and how can responsibilities for adapting to climate related risks be shared between government and the community?
- What are the responsibilities of those who intend to support vulnerability reduction (primarily in the community and not-for-profit sector), what is their capacity to support adaptation and how can they be better equipped to do so?

In the process of addressing these questions there needs to be better coordination research activity in this field. There are a wide range of research funding and management arrangements around climate adaptation, including the National Climate Change Adaptation Research Facility, the CSIRO Climate Adaptation Flagship, the Bushfire Cooperative Research Centre and as well as various projects within state government agencies and partnership projects with universities. Improving

understanding, linkages and management of the breadth of research being undertaken across the country would build greater capacity to inform policy and practice.

Supporting information

See a range of VCCCAR publications at http://www.vcccar.org.au/.

A spatial vulnerability analysis of urban populations to extreme heat events. School of Geography and Environmental Science, Monash University. http://www.health.vic.gov.au/environment/downloads/heatwaves_hotspots_project.pdf

Climate Change Risks to Coastal Buildings and Infrastructure - A Supplement to the First Pass National Assessment http://www.climatechange.gov.au/publications/coastline/climate-change-risks-to-coastal/climate-change-risks.aspx

Supporting Victorian Local Governments Manage Climate Risks and Plan for Change, MAV. http://www.sustainability.mav.asn.au/counciloperations/Supporting_Victorian_Local_Government_Manage_Climate_Risks_and_Plan_for_Change-6287