

# Research to action: A multi-institutional synthesis of the Victorian Centre for Climate Change Adaptation Research

VCCCAR Visiting Fellow Report – 2014

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Image Credit: Tom Fairman (University of Melbourne)

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11 June 2014

**ISBN:** 978 0 7340 5001 4

**Acknowledgements:** Jon Barnett, Sarah Boulter, Phoebe Bond, Hartmut Fünfgeld, John Houlihan, Roger Jones, Svenja Keele, Rod Keenan, Johanna Christensen, Kirsty Lee, Judith Mair, Eve Merton, Jean Palutikof, Lauren Rickards, David Rissik, Doug Scobie, Helen Scott, Liam Smith, Tamara Sysak, Alexei Trundle, Geoff Withycombe, Kate Wood, Celeste Young

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# Executive summary

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Despite growing interest in Victoria regarding the pursuit of adaptation policy and practice to manage the risks posed by climate change, there has been, and continues to be, a highly persistent perception that more knowledge is needed in order to enhance adaptation literacy and to inform decision-making on the planning and implementation of specific adaptation options. This need can be attributed to a deficit of knowledge about adaptation as well as the poor alignment of existing knowledge to the context in which those working on policy and practice find themselves. To address these constraints, the Victorian Centre for Climate Change Adaptation Research (VCCCAR) was established in 2009 to manage a portfolio of research projects and associated activities to inform and build capacity of the Victorian government and other stakeholders regarding adaptation. Given adaptation is a long-term process that Victorians will undoubtedly continue to pursue well into the future, VCCCAR represents a useful model for exploring mechanisms for undertaking credible adaptation research that is also relevant to the objectives of stakeholders.

This report pursues this exploration through an institutional analysis approach that captures the context in which VCCCAR has operated as an organisation, the key ‘action arenas’ in which it has been active, the outcomes those actions have generated, and the criteria that can be applied in evaluating outcomes. Given VCCCAR represents a partnership between Victoria’s universities and the Victorian government, a key focus of this analysis is on the manner in which these two institutions have interacted as VCCCAR has worked toward achieving its objectives.

Key findings emerging from this analysis include the following:

- 1) Boundary organisations such as VCCCAR possess a number of advantages with respect to generating credible knowledge that is simultaneously relevant to policy and practice.** In addition to research, boundary organisations take on additional roles such as convening, collaborating, translating, and mediating. These roles are ultimately essential if research is to be relevant to stakeholders, particularly for complex issues associated with high uncertainty and where stakeholders have different perspectives and values. Boundary organisations also contribute to building relationships and social learning that enhances capacity, which enables such organisations to have greater societal impact and return on investment than they would if they were limited to research alone.
- 2) Despite the potential benefits associated with the boundary organisation model, the formation of an organisation in itself is not sufficient to build capacity or inform policy and practice.** The rules, cultural norms, and incentives associated with traditional academic research are quite different from those of policy and practice. Hence, to be effective, boundary organisations must enable researchers and practitioners to achieve their individual as well as shared objectives. This includes the execution of rigorous research that meets international standards, the generation of policy relevant analyses and communications that are relevant to stakeholders, and broad engagement and knowledge sharing to secure organisational legitimacy.
- 3) The pursuit of research to build stakeholder capacity and inform decision-making requires significant time commitments on behalf of researchers and practitioners alike.** The VCCCAR experience has demonstrated the value as well as the challenges associated with the co-production of adaptation knowledge. Co-production may require researchers to spend more time in discussions with stakeholders than would normally be anticipated in the

scoping of a research project. Similarly, those working in policy and practice often have to invest time sharing their knowledge with researchers, despite having other work commitments and obligations. Organisations must therefore anticipate and plan for these commitments to ensure efforts are appropriately resourced.

- 4) **The patterns of interactions among researchers and stakeholders catalysed by boundary organisations such as VCCCAR can be classified as active collaboration, passive collaboration, competition, or conflict.** *Active collaboration* occurs when both researchers and stakeholders cooperate toward the fulfilment of common as well as differential goals. In contrast, *passive collaboration* arises when one institution dominates the various action arenas, but with the consent of other institutions. *Competition* can occur when actors and/or their respective institutions seek to advance their own objectives over those of others. If severe, this type of interaction can ultimately lead to *conflict*, where actors actively seek to undermine the objectives of others.
- 5) **A successful boundary organisation will learn and adjust over time in order to address reoccurring problems and capitalise on opportunities.** Despite challenges in measuring the success of VCCCAR, its staff, in conjunction with the Advisory and Implementation Committees, have continually solicited feedback from stakeholders on mechanisms for improving the utility of VCCCAR's activities to end users. This has been aided by the mid-term evaluation, the production of annual reports, and the relationships that have been cultivated between staff in VCCCAR and the Victorian government.
- 6) **The existence of adaptation policy frameworks helps to align adaptation research with the needs of policy and practice.** Building the capacity of stakeholders to frame adaptation in productive ways and ask questions that can advance policy discussions is an important benefit of adaptation research. However, there are inherent difficulties associated with the pursuit of adaptation research that is relevant to the needs of stakeholders when those needs are not well articulated and/or when there is uncertainty regarding future policy pathways. The Victorian Adaptation Plan therefore provides important policy context that can guide future investments in research.
- 7) **VCCCAR has been one element of a growing adaptation knowledge network in Victoria and Australia more broadly.** While this network has grown organically in an ad hoc manner, it represents a holistic approach to building societal capacity to adapt to a changing climate. This distinctive 'Victorian Model' for adaptation illustrates how actions taken by multiple actors at multiple scales can contribute to a collective societal response. More formal recognition of this knowledge network and the identification of mechanisms for providing it with stability, focus, and direction would contribute to a more robust adaptation response within Victoria.

# 1 Introduction

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## 1.1 Report objectives

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The principal objective of this report is to explore VCCCAR as a model organisation for the generation of knowledge that is useful in supporting adaptation policy and practice within Victoria. This report synthesises the VCCCAR experience from the perspective of organisational design – what are effective ways of building and operating knowledge organisations to inform climate adaptation? This is achieved through pooling experience with VCCCAR from those individuals who have contributed to its development, leadership, research execution, and, ultimately benefitted from that research. In addition, this report reflects upon similar such efforts in Australia and elsewhere in search of common challenges and opportunities. As organisations specifically focused on adaptation decision-making (rather than climate change or climate science more broadly) are few in number and generally rather young, there are few benchmarks or best practices for organisational design to compare VCCCAR against. Hence, this synthesis focuses on aggregating collective learning about structuring adaptation research for policy and practice.

## 1.2 History of the Victorian Centre for Climate Change Adaptation Research

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The Victorian Centre for Climate Change Adaptation Research (VCCCAR) was established in 2009 to assist the Victorian Government and other relevant agencies and enterprises in planning and implementing adaptation responses to climate change. The centre represents a research partnership comprised of Deakin University, LaTrobe University, Monash University, RMIT University, and the University of Melbourne. However, its activities are not limited to its partner universities. It aims to provide funding and collaborative opportunities for researchers from all Victorian universities and seeks to work with organisations in the government, non-profit and for-profit sectors.

The Victorian Government committed \$5 million over five years for the initial phase of VCCCAR operations. Hence, a key function of VCCCAR is to address adaptation research priorities in the state of Victoria as identified by the Victorian Government. In this regard, VCCCAR represents a formal partnership between two societal institutions: academia and government. However, the research agenda and the execution of that research are enabled through collaborative partnerships among universities, different levels of government, as well as the private and community sectors. Therefore, much of the research projects sponsored by VCCCAR can be labelled ‘action research’ in that the research processes are structured to facilitate change.

The launch of VCCCAR coincided with a number of new programs, projects, and organisations across Australia focused on adaptation. Much of this new interest in adaptation was stimulated by the Council of Australian Governments, which noted a lack of investment and coordination in Australia’s research regarding climate change impacts, adaptation, and vulnerability. Meanwhile, the *Fourth Assessment Report* of the Intergovernmental Panel on Climate Change, released in 2007, emphasised the global commitment to future climate change and the importance of adaptation in reducing or avoiding impacts. In 2007, the CSIRO launched a new Climate Adaptation Flagship with an initial

Commonwealth investment of \$43.6 million over four years, which helped to elevate the issue of climate adaptation to the status of a national priority.<sup>1</sup> A year later, the National Climate Change Adaptation Research Facility was established as a partnership between the Australian Government Department of Climate Change and Energy Efficiency and Griffith University to generate the knowledge needed by decision-makers to adapt to climate change. The facility was established with \$50 million for its initial operating phase of five years (2008-2013).<sup>2</sup> A range of other adaptation initiatives are also apparent around Australia including the New South Wales Adaptation Research Hub,<sup>3</sup> South Australia's Science to Solutions Project,<sup>4</sup> and the Southeast Queensland Adaptation Research Initiative.<sup>5</sup>

Hence, VCCCAR is part of a wave of new adaptation research organisations that broke over Australia in a relatively short period of time. In this regard, Australia is somewhat unique in using such problem-focused organisations as vehicles for structuring and coordinating its research on adaptation and in having launched multiple model organisations, each of which approaches the problem from a different perspective. In addition, adaptation has become a key interest of a broad range of other organisations. In Victoria, for example, the Victorian Regional Greenhouse Alliances became a hub for climate change assessment and adaptation work within Local Government.<sup>6</sup> More recently, the Victorian Local Sustainability Accord was rebranded as the Victorian Adaptation and Sustainability (VAS) Partnership after adaptation was identified in 2012 as a key focus area for the State's Local Governments.<sup>7</sup> The VAS Partnership helps to build collaboration between Victoria's state and Local Governments in addressing adaptation and sustainability challenges.

Given the rapid surge in activity across both adaptation research and practice, it is worth reflecting upon how the investments made in new organisations and adaptation research have contributed to enabling adaptation.

### 1.3 The role of adaptation research in policy and practice

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Understanding how individuals adapt to their environment has been an arena of scientific inquiry for centuries. Such research has largely been led by the evolutionary biology community in its attempt to understand how organisms adapt and evolve in response to environmental opportunities and constraints. Climate has long been just one opportunity or constraint influencing human and natural systems. However, what is currently regarded as climate adaptation research is now quite specific to understanding how human and natural systems adjust to climate variability and change. In so doing, adaptation research has become focused on a particular type of constraint (i.e., climate) and adjustments made in anticipation of future changes in that constraint.

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<sup>1</sup> CSIRO (2007) Three New National Flagships Join the Fleet. Available at <http://www.csiro.au/Portals/Media/2007/FundingForExpansionForFlagships.aspx>

<sup>2</sup> NCCARF (undated) A Short History of NCCARF. Available at <http://www.nccarf.edu.au/content/short-history-nccarf>

<sup>3</sup> NSW (2014) NSW Adaptation Research Hub. Available at <http://www.environment.nsw.gov.au/climateChange/adaptreshub.htm>

<sup>4</sup> LGSA (2014) LGA Science to Solutions Project. Available at <https://www.lga.sa.gov.au/climatechange>

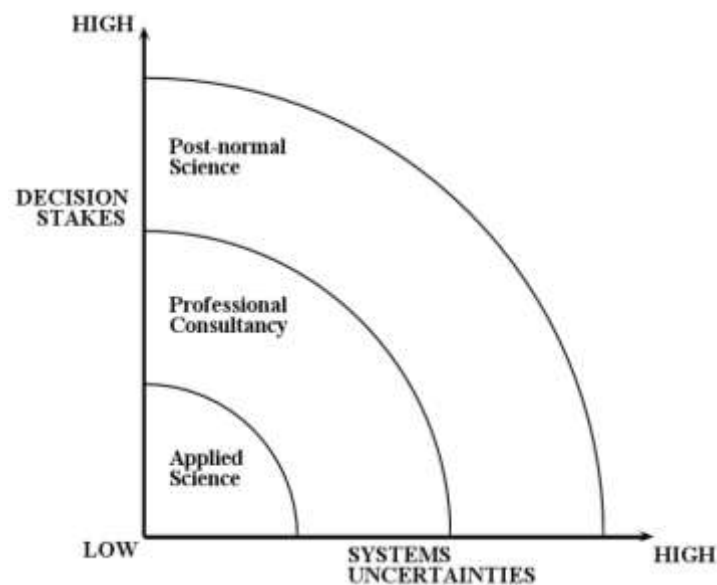
<sup>5</sup> CSIRO (2011) South East Queensland Climate Adaptation Research Initiative. Available at <http://www.csiro.au/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/seqcari.aspx>

<sup>6</sup> NAGA (2010) Victorian Regional Greenhouse Alliances. Available at <http://www.naga.org.au/regional-alliances.html>

<sup>7</sup> DEPI (2014) Victorian Adaptation and Sustainability Partnership. Available at <http://www.sustainability.mav.asn.au/vasp>



While individuals and organisations routinely make decisions regarding risk management, some aspects of climate change pose particular challenges. Various researchers have noted that climate risk management falls within the realm of ‘wicked problems’ due to the complex ways in which climate interacts with human and natural systems, the various scales associated with both consequences and responses, and the inherent uncertainty about the future (Figure 1). Knowledge regarding the future consequences of climate change and the determination of appropriate responses may be ambiguous. Meanwhile, decisions and investments in climate adaptation may have high stakes (Figure 1). The combination of high uncertainty in decision-making that carries high stakes poses significant challenges to the resolution of policy dilemmas through the generation and provision of scientific or technical knowledge. Under such conditions, traditional, applied science approaches to decision-making may be inadequate. The implications of that knowledge and its legitimacy may be contested, and different perspectives may lead to alternative perception of risk, problem framing, and solutions.



**Figure 1.** Comparison of different approaches to policy-relevant science with respect to uncertainty and the implications of the decision.<sup>8</sup>

The challenge to adaptation policy and practice has grown over time as the issue has evolved and the questions posed by stakeholders and end users to the research community have shifted. At one point, the discourse regarding climate change largely focused on determining whether or not it was in fact a problem and for whom. This largely triggered research regarding projections of future climate change and its impacts. Eventually, however, focus shifted to trying to identify solutions – strategies and options for climate risk management. This caused adaptation to be viewed in a policy context where issues of feasibility, cost, and effectiveness of different options became important. This more value-laden environment led to changes in how both researchers and stakeholders engaged in the research processes. For example, Preston et al. note that *“Researchers are taking on engagement activities that link to science, but on their own are not scientific. Meanwhile, stakeholders are becoming active participants in guiding and informing the research process.”*<sup>9</sup>

<sup>8</sup> Based on Funtowicz, S., and Raventz, J. (1993) Science for the most-normal age. *Futures* 25:735-755.

<sup>9</sup> Preston, B.L., Rickards, L., Dessai, S., Meyer, R. (2013) Water, seas, and wine. Science for successful adaptation. In Moser, S.C. and Boykoff, M.T. (eds.) *Successful Adaptation to Climate Change: Linking Science and Policy in a Rapidly Changing World*. Routledge, New York, NY.



In this context, adaptation research can be viewed as achieving two fundamental goals:<sup>9,10</sup>

- **Research for adaptation** – Investigations that seek to generate knowledge to support the planning and implementation of adaptation actions.
- **Research on adaptation** – Investigations that seek to generate knowledge regarding actors' understanding of risk and adaptation, adaptation processes and pathways, as well as adaptation opportunities, constraints, and limits.

Research for adaptation tends to have the explicit objective of decision support of adaptation policies and measures, and thus much of adaptation research has traditionally been focused on this type. Much of this research has evolved over time from the climate science community and its work on understanding climate change impacts. Such work, often exemplified by the Intergovernmental Panel on Climate Change's (IPCC) *Technical Guidelines for Assessing Climate Change Impacts and Adaptation* frames adaptation as a suite of processes that are implemented to address impacts identified from climate change.<sup>11</sup> Twenty years later, significant work on adaptation continues to be framed in this way. For example, Patwardhan et al. identified four key adaptation research questions where progress is needed:<sup>12</sup>

- Who and what are at risk?
- How will this risk change in the future?
- How do we manage risk?
- How do we put adaptation into practice?

Such questions largely assume that adaptation is constrained by a lack of knowledge about climate risk and adaptation responses. However, knowledge alone is not the only constraint, and thus addressing those deficits may not lead to adaptation. As a result, research on adaptation has emerged quite rapidly in recent years as another aspect of knowledge generation. In its more applied forms, such research is often designated 'action research' in that researchers often work directly with organisations and stakeholders to understand, shape, and implement adaptation responses with learning being captured throughout the process. That said, research on adaptation can be quite fundamental and thus more difficult to directly integrate into decision-making. Hence, the extent to which adaptation research involves participatory, action research focused on applied outcomes versus more fundamental research that does not involve stakeholders is a question for research design (Box 1). As discussed in subsequent sections of this report, VCCCAR has established its own pathway for navigating these complexities.

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<sup>10</sup> Rickards L., Hayman P. and Eckard R. (2011) Agricultural adaptation to climate change: acknowledging different frames, paper presented at the 5th World Congress of Conservation Agriculture, Incorporating 3rd Farming Systems Design Conference, September 2011, Brisbane, Australia. Online. Available at [http://aci-ar.gov.au/files/node/13992/agricultural\\_adaptation\\_to\\_climate\\_change\\_acknowl\\_15448.pdf](http://aci-ar.gov.au/files/node/13992/agricultural_adaptation_to_climate_change_acknowl_15448.pdf)

<sup>11</sup> IPCC (1994) *Technical Guidelines for Climate Change Impact Assessment*. Department of Geography, University College London and the Center for Global Environmental Research, National Institute for Environmental Studies, London and Tsukuba. Available at <http://www.ipcc-wg3.de/special-reports/.files-images/ipcc-technical-guidelines-1994n.pdf> .

<sup>12</sup> Patwardhan, A., Downing, T., Leary, N., & Wilbanks, T. (2009) Towards an integrated agenda for adaptation research: theory, practice and policy: strategy paper. *Current Opinion in Environmental Sustainability*, 1(2), 219-225.

## 1.4 Organisations for adaptation knowledge

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The generation of new knowledge regarding adaptation as well as the integration of that knowledge into decision-making poses some challenges to the traditional ways in which society structures its institutions. Research organisations, such as universities, are indispensable for innovation and the development of new knowledge in society. However, their existence is not necessarily predicated on the application of that knowledge within a policy environment. Thus, researchers often lack appropriate understanding of decision-making processes within government organisations, including the difficulties associated with prioritising actions and reconciling trade-offs among different responsibilities and policy objectives. Furthermore, researchers often measure success in ways that are quite distinct from that of government. Meanwhile, while government organisations often contain their own experts, those experts may not necessarily have a mandate to engage in exploratory research, particularly regarding emerging issues of concern. Success in policy environments may have little to do with research outcomes per se.

This divide between science and policy can be viewed as a social dilemma or collective choice problem. Society faces a common problem in the form of climate change and its associated risks. Existing institutions are perceived as being poorly equipped to deal with the problem, due to its novelty, complexity, and uncertainty. Enhanced knowledge regarding the nature of the risk, risk management options, and their costs and benefits is considered one component of developing appropriate societal responses by government and civil society more broadly. Yet, there are a broad range of mechanisms by which knowledge can be generated and engage the arenas of policy and practice. A key consideration is the extent to which knowledge is pushed into society by researchers, without a clear demand versus the extent to which knowledge is pulled from researchers by potential users of information.<sup>13</sup> Here we discuss different models of this push and pull dynamic as a means of introducing various costs, benefits, and trade-offs and to place VCCCAR in context.

Perhaps the most traditional model by which research engages the arenas of policy and practice is the so called Linear Model. The Linear Model treats both research and policy as pure and distinct societal institutions. In its purest form, research organisations adopting the Linear Model may function in what Pielke describes as a Pure Science Model,<sup>14</sup> whereby research is conducted by researchers on topics that are considered by the research community to be intellectually interesting. This information is then pushed into society through traditional research communications (e.g., peer-reviewed journal articles). One key failure of a Pure Science approach is the assumption of some process of natural diffusion or ‘trickle down’ learning that enables research to enter the realm of policy and practice (Figure 2). In reality, few individuals working in policy environments read research journals. While there is in fact value associated with fundamental research that does not seek to immediately inform a particular policy outcome, if one’s objective is to enable policy relevant research, the Pure Science approach is not an effective pathway. Yet many unfamiliar with the interactions between research and policy and/or the way in which knowledge is used in policy and practice continue to implicitly adhere to Pure Science as an ideal.

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<sup>13</sup> Dilling, L., & Lemos, M. C. (2011). Creating usable science: opportunities and constraints for climate knowledge use and their implications for science policy. *Global Environmental Change*, 21(2), 680-689.

<sup>14</sup> Pielke J.R., R.A. (2007). *The Honest Broker: Making Sense of Science in Policy and Politics*. Cambridge University Press, New York.

An alternative manifestation of the Linear Model is what Pielke labels a Science Arbiter Model.<sup>14</sup> Science arbiters conduct targeted research that seeks to address specific questions identified by decision makers as being particularly important to their policy deliberations. For example, the New South Wales (NSW) Adaptation Research Hub is a collaboration between leading NSW universities and experts in climate change impacts and adaptation science. The hub sponsors research to address key adaptation knowledge gaps around biodiversity, adaptive communities, and coastal processes and responses.<sup>3</sup> As such, the hub effectively represents the tasking of researchers to generate knowledge about key questions of interest to practitioners. At the international level, the IPCC could be considered to act as a science arbiter in that it provides assessments of the state of knowledge regarding topics identified by national governments as being important to international policy negotiations regarding climate change.<sup>15</sup> While a Science Arbiter approach appears to be a useful vehicle for generating evidence-based policy, it implies that researchers limit their advice to the specific questions of stakeholders. This precludes more collaborative engagement whereby researchers help to shape the questions being asked and stakeholders help shape the answers that result from the research.



**Figure 2.** Illustration of ‘trickle down’ delivery of research into policy and practice suggested by the Linear Model. Investments in research support the research community, but the benefits for other actors throughout society is less certain.

Given these limitations, sincere efforts to use research to inform policy and practice largely discard the Linear Model that assumes strict separation between researchers and stakeholders in favour of a Boundary Organisation Model. Boundary organisations operate at the ‘boundary’ between science and policy, drawing on scientific expertise and knowledge to address questions of a technical nature, such as uncertainty regarding future climate change or the costs can benefits of different adaptation options, and drawing on policy expertise and political deliberation to address value-laden questions such as where and when certain types of adaptation options should be implemented. Hence, the knowledge generated by such organisations is often considered to be co-produced – not entirely

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<sup>15</sup> However, the IPCC is an interesting lesson in this regard in that its position in the science to policy space is contested. For example, see Pielke, R., Wigley, T., & Green, C. (2008). Dangerous assumptions. *Nature*, 452(7187), 531-532.

pushed by researchers, nor entirely pulled by end users (Figure 3). Boundary organisations can take on multiple functions, which have been categorised as convening, collaborating, translating and mediating.<sup>16</sup> They act as conveners by bringing various stakeholders together to deliberate over issues of common interest. They act as collaborators by providing a forum for researchers to engage with end users toward knowledge co-production. They act as translators by packing complex technical information into products more useful and relevant to a particular stakeholder group while also enhancing understanding of researchers about decision environments. The mediation function arises in the case of potential conflicts regarding the appropriate generation and application of knowledge. Boundary organisations can also advocate (implicitly or explicitly) for particular social, economic, and/or policy outcomes. However, depending on the nature of the advocacy, this can have implications for the ability of the organisation to be seen as an honest broker of information.<sup>14</sup>



**Figure 3.** Co-production of solutions to societal problems.

In their purest form, boundary organisations operate independently from the organisations and institutions with which they interact and therefore may have different objectives and may conform to different rules and patterns of behaviour. For example, researchers working within boundary organisations may not have the same expectations in terms of research and publication as those working in more traditional research environments. Similarly, while serving end user constituencies and stakeholders, boundary organisations are not directly linked to those stakeholders and thus seek to inform decision-making without necessarily prescribing decision outcomes. However, more recent examinations of boundary organisations has led some researchers to observe that the Boundary Organisation Model is somewhat of an idealised organisational structure, which is often more complex in practice. For example, Miller noted that, rather than being independent, boundary organisations are often entangled with the institutions with which they interact and therefore it may be misleading to think of them as independent organisations passively conveying knowledge.<sup>17</sup> Furthermore, boundary organisations may ultimately engage a large number of other organisations and practitioners in varying capacities, and thus the boundary at which an organisation is operating may be quite fuzzy.

<sup>16</sup> Cash, D. W., Adger, W. N., Berkes, F., Garden, P., Lebel, L., Olsson, P., ... & Young, O. (2006). Scale and cross-scale dynamics: governance and information in a multilevel world. *Ecology & Society*, 11(2).

<sup>17</sup> Miller, C. (2001) Hybrid management: boundary organisations, science policy, and environmental governance in the climate regime. *Science, Technology & Human Values*, 26(4), 478-500.

### **Box 1. Conditions where collaborative knowledge production is needed**

Science and technical knowledge has long been valued as a means of enabling or improving decision-making or optimising processes. In many instances, the generation of such information and its availability to an end user is sufficient to add value in decision-making. Yet often, and some would argue increasingly, for decisions in public policy regarding environmental stewardship and risk management, information alone is inadequate to generate useful solutions. Key considerations are:

- **Complexity** – Problems and their solutions involve multiple driving forces, actors, and stakeholders, the relationships among which may not be well-defined.
- **Uncertainty** – Consequences that are being managed have uncertain outcomes as do various management alternatives sought to avoid or mitigate those consequences.
- **Values** – Values, and therefore the willingness, to pursue different decision pathways vary among different actors and stakeholders.

Climate change and adaptation to its impacts often meets most if not all of these criteria, which is one of the key reasons why identifying and implementing policy pathways for both mitigation and adaptation has proven so challenging. Several different research communities seek to enhance understanding regarding how to best resolve complex socio-ecological problems involving common pool resources such as the climate, water, or public lands. For example, research in Adaptive Governance, Risk Governance, and the Policy Sciences all offer frameworks for decision-making that combine scientific investigation with stakeholder deliberation in order to arrive at solutions that meet multiple objectives. A key benefit of such deliberation is enhanced understanding problems and incentives associated with different solutions from multiple perspectives and thereby developing a collective understanding of the problem.

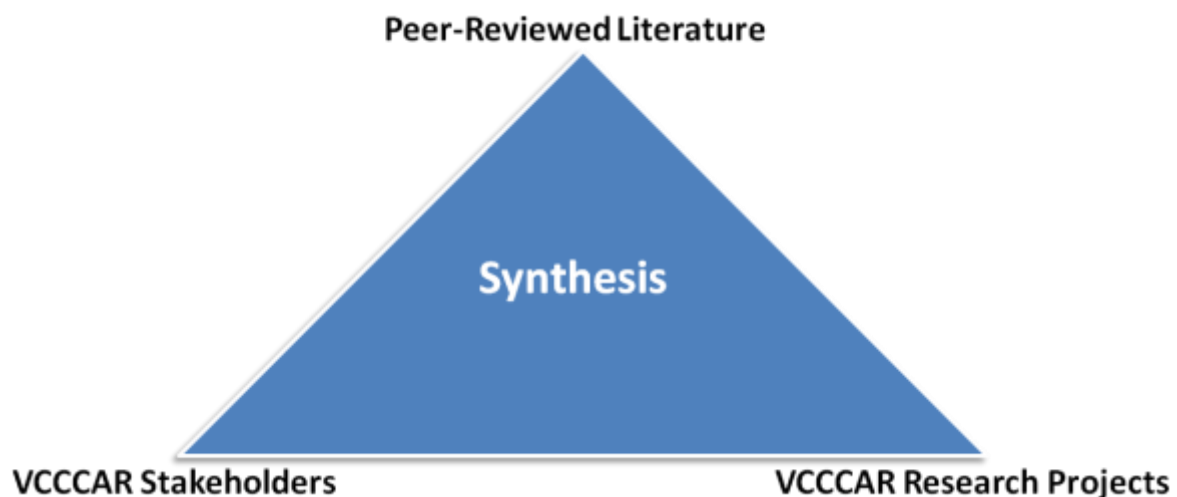
Similarly, adaptation research that is intended to have policy relevance and utility often may necessitate the integration of knowledge from policymakers and practitioners who understand the decision context (including how it is influenced by complexity, uncertainty, and values) and the desired outcomes for policy and practice. Researchers and practitioners need to be able to identify and understand how the research engages the policy arena. As researchers often do not work in such environments themselves nor have training in how best to communicate in such environments, the collaborative generation of knowledge is a useful vehicle for addressing such gaps.

That said, not all researchers and/or stakeholders may see the value in participating in research endeavours, and thus careful consideration must be given to the negotiation of coproduction if it is to be effective. One of the VCCCAR projects [\*Cogenerating Knowledge in Research and Policy\*](#) is exploring this specific question by analysing the process of co-production used in specific projects.

As a consequence, Miller proposed what he referred to as Hybrid Management Model as a more nuanced and relevant way of thinking about such organisations and the complexity of their relationships with other actors.<sup>17</sup> Feldman and Ingram extend this concept by noting that these complex relationships are often incorporated into knowledge networks where different actors are “*linked together in an effort to provide close, ongoing, and nearly continuous communication and*

*information dissemination among multiple sectors of society involved in technological and policy innovations for managing climate impacts.*"<sup>18</sup> Such networks may have formal structures (such as the establishment of formal bridging organisations such as VCCCAR) as well as informal structures that are more ad hoc, such as informal working groups or peer to peer learning. To this end, VCCCAR as well as other organisations such as NCCCARF or Australia's Cooperative Research Centres can be viewed as hybrids. They pursue many of the same activities as boundary organisations, but structurally, they are more direct partnerships among institutions rather than independent go-betweens.

These different models raise the question of what is the most effective way of conceptualising the pathway by which adaptation research can lead to adaptation policy and practice and, in particular, how to structure organisations such as VCCCAR to achieve this end. The establishment of an organisation alone is not necessarily sufficient to achieve success. Achieving a successful design necessitates some degree of learning-by-doing, because actors and institutions have to learn the most effective ways in which to engage. Furthermore, the appropriate design may change over time as new knowledge is generated and new needs are identified. Given the growing demand for knowledge that can facilitate adaptation, and the growing trend in research to recognise a diversity of expertise lies outside of formal academic institutions, VCCCAR represents a timely model organisation for exploring how social institutions generate knowledge.



**Figure 4.** Sources of information used in undertaking the institutional synthesis. Peer-reviewed literature includes previously published studies on approaches to institutional analysis, different approaches to pursuing policy-relevant research, and the experiences of researchers and organisations in addressing the science/policy interface. VCCCAR Research Projects includes the portfolio of research products and outcomes emerging from projects funded through VCCCAR. VCCCAR Stakeholders includes those investigators who have been involved in VCCCAR research projects as well as those in federal, state, and Local Government, the private sector, NGOs, or other organisations that have participated in (and/or have a vested interest in) VCCCAR activities.

<sup>18</sup> Feldman, D. L., and Ingram, H. M. (2009) Making Science Useful to Decision Makers: Climate Forecasts, Water Management, and Knowledge Networks. *Weather, Climate & Society*, 1(1).



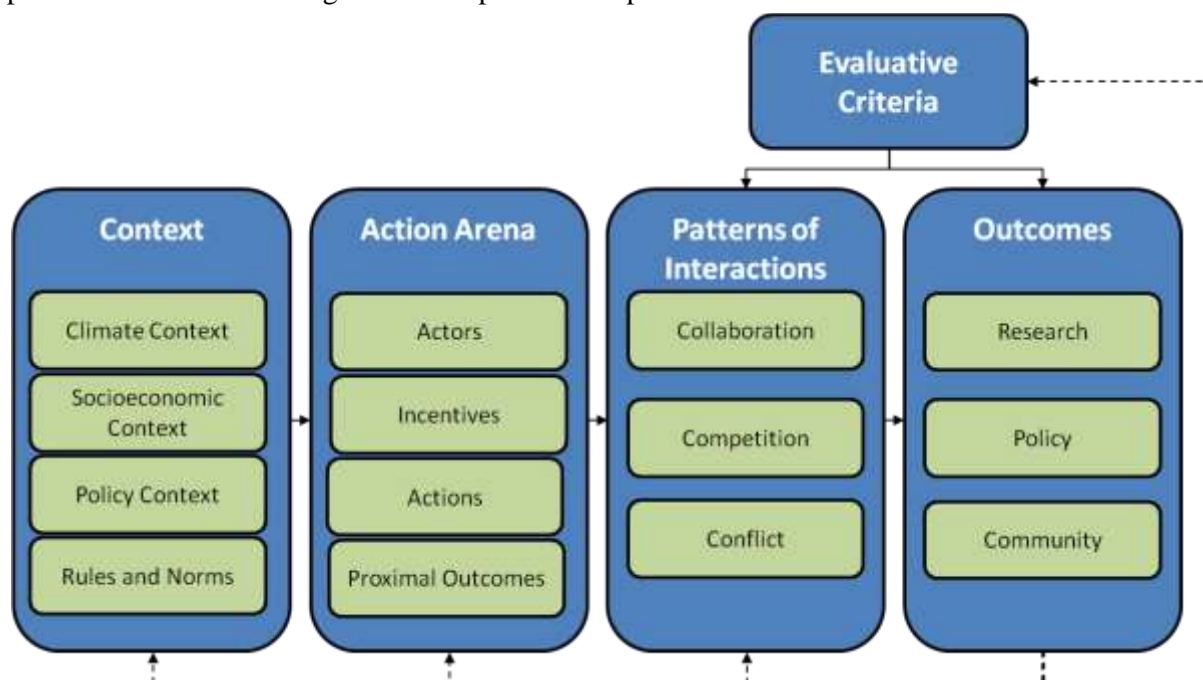
## 2 Institutional synthesis

To further explore the VCCCAR model, this report pursues an institutional analysis framework that helps to identify key components and processes contributing to VCCCAR's approach to policy-relevant adaptation research. This framework is adapted from previously published studies in the arena of institutional analysis and development (IAD) theory,<sup>19</sup> which has been used in both research and policy analysis to understand institutional behaviour in addressing collective choice problems, such as managing common pool resources. As applied here, the use of IAD seeks to specify the processes by which institutional arrangements and interactions affect adaptation research conducted under the auspices of VCCCAR as well as the outcomes of that research. Insights regarding each of these topics are gleaned from multiple sources including the academic literature on institutional analysis and science/policy interactions as well as more local sources familiar with VCCCAR and its context (

Figure 4). The following section elaborates on the framework, which is subsequently applied to the VCCCAR context.

### 2.1 Framework for synthesis

Fundamentally, VCCCAR represent an organisation that brings together two social institutions. One is academia, represented by the universities that contribute to the VCCCAR consortium as well as other partners. The other is government in the form of Victoria government agencies. The IAD framework is a systematic method for organising policy analysis by deconstructing complex social processes into a set of recognizable components and processes:



<sup>19</sup> Specifically, the framework used here is based on the IAD framework developed by Elinor Ostrom (e.g., Ostrom, Elinor, Roy Gardner, and James Walker (1994) *Rules, Games, and Common Pool Resources*, Ann Arbor: University of Michigan Press) with subsequent modifications by Andersson (e.g., Andersson, K. (2006). Understanding decentralized forest governance: an application of the institutional analysis and development framework. *Sustainability: Science Practice and Policy*, 2(1), 25-35) for applications in forest governance.



**Figure 5.** Institutional analysis and development framework applied in this synthesis.<sup>19</sup>

- **Context** – Factors that influence the behaviour of institutions and actors regarding adaptation such as projected climate change, trends in demography and economic or political conditions, and the rules and norms that govern actors' behaviour.
- **Action arenas** – Activities, such as adaptation research, through which actors from different institutions interact and the proximal outcomes they generate.
- **Patterns of interactions** – Ways in which interactions are structured, observed trends in behaviours and driving forces.
- **Outcomes** – The ultimate consequences (positive and negative) of VCCCAR actions and interactions for different institutions and society at-large.
- **Evaluative criteria** – Tools for evaluating patterns of interactions and outcomes vis-a-vis the original problem and objectives.

Ultimately, institutional processes and outcomes influence the context for VCCCAR, arrangements among its institutions, or the structure of the organisation itself. For example, outcomes can alter the context in which research is conducted; the way in which adaptation is framed; how actors participate in research; or the ways in which information is exchanged or conflicts are resolved. Outcomes might even lead to new ideas about how to evaluate VCCCAR and its processes as expectations regarding the organisation shift over time.

The following sections explore each of these five components of the framework within the context of VCCCAR, the institutions it represents, and the organisations expressed objectives.

## 2.2 Context for institutional analysis

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Climate change represents a societal problem for the State of Victoria and the various sectors, communities, actors, and ecosystems of which it is comprised. The problem arises from three different sources:

- Victoria *contributes* to regional and global climate change through its economic activity, energy consumption, greenhouse gas emissions, and land use change.
- Victoria is *vulnerable to climate change* and, in particular, changes in the frequency, intensity, and/or duration of extreme weather events, due to the exposure and sensitivity of its people, physical assets, and natural ecosystems.
- Victoria will be affected, positively and negatively, by *policies and measures* implemented to address climate change.

From the perspective of institutional analysis, it is therefore useful to further explore the context in which the problem of climate change arises in Victoria. This includes consideration for the climate changes that are anticipated to occur over the next century, as well as other social, economic, and political factors that influence vulnerability, resilience, and the responses of Victoria's institutions.

### 2.2.1 Climate context

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Climate change and its consequences has been an issue for policy and practice in Victoria for over two decades. For example, research exploring the effects of sea-level rise on the Victoria coastline dates to at least the early 1990s.<sup>20,21,22</sup> Since that time, awareness of climate change and its potential consequences have expanded markedly through international assessment efforts such as those conducted under the auspices of the IPCC. Scientific investigations at the national, state, and local level have also increased over time.

Victoria has experienced significant warming over the past century, and this warming is consistent with what has been observed at the global level. This long-term trend toward higher temperatures has been accompanied by a variety of extreme weather events in recent years including severe bushfire events (e.g., Black Saturday in 2009), record high temperatures and heat waves, flooding, and coastal storms. While all of these events cannot be attributed to anthropogenic climate change, they have increased awareness of societal vulnerability to extreme weather, the potential risks of future climate change, and the benefits of increasing resilience to future events. The State Government has indicated that AUS\$4 billion has been spent in the past decade on extreme events. Estimates from other sources put the total economic impacts of extreme weather in the state over that time period at AUS\$20 billion.<sup>23</sup> Hence, while historically framed as an environmental issue, extreme weather events and climate change clearly have financial and economic implications for the state of Victoria.

Models of the climate system project significant changes in the state's climate including continuation of the observed warming trend, declines in average annual rainfall, increases in extreme heat events, and increases in rainfall extremes. Overall, Victorians are anticipated to experience an increase in the frequency, intensity, and duration of climate-related hazards relative to what is already a highly variable climatic environment. Nevertheless, considerable uncertainty remains regarding the rate and magnitude of future climate change and how it will manifest in the Victorian context.

### 2.2.2 Socioeconomic context

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Victoria, like much of Australia, has a relatively low population density, yet its population is highly urbanised. In 2012, Victoria had a population of 5.6 million of which 4.2 million (75%) resided in the metropolitan area of Melbourne.<sup>24</sup> By 2061, the state is projected to add between 3.5 and 6.5 million residents, with the majority of this growth also concentrated in Melbourne.<sup>24</sup> Such growth will create significant new demands for infrastructure and services including energy, water, transportation, housing, food, and health care. Hence, while much of the concern regarding the potential impacts of

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<sup>20</sup> Black, K.P., Hatton, D.N. and Colman, R. (1990) Prediction of extreme sea levels in northern Port Phillip Bay and the possible effect of a rise in mean sea level, Report to the Board of Works Melbourne by the Victorian Institute of Marine Sciences, Melbourne, 141 pp.

<sup>21</sup> Coastal Investigations Unit (1992) Victorian Coastal Vulnerability Study. Port of Melbourne Authority and Office of the Environment, Melbourne Australia 60 pp

<sup>22</sup> McInnes, K.L. and Hubbert, G.D. (1996) Extreme Events and the Impact of Climate Change on the Victoria Coastline. Report to EPA and Melbourne Water, Melbourne, Victoria. Available at [http://www.climatechange.vic.gov.au/\\_data/assets/pdf\\_file/0003/73218/Extremeeventsandcoasts1996.pdf](http://www.climatechange.vic.gov.au/_data/assets/pdf_file/0003/73218/Extremeeventsandcoasts1996.pdf)

<sup>23</sup> Friends of the Earth (2014) Natural Disasters and a Warming Climate; Understanding the Cumulative Financial Impacts on Victoria. Available at [http://www.melbourne.foe.org.au/files/imce/costs\\_of\\_disaster\\_report.pdf](http://www.melbourne.foe.org.au/files/imce/costs_of_disaster_report.pdf)

<sup>24</sup> Australian Bureau of Statistics (2008) Population Projections, Australia, 2006 to 2101. Available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/3222.0Main+Features+2006%20to%202101?OpenDocument> .

climate change has focused on primary industries (e.g., agriculture, fisheries, forestry) with a high degree of exposure and sensitivity to climate, the rapid concentration of population around urban centres indicates that climate change will increasingly be an urban problem.

Although the population is growing, Victoria is also aging. In 2009, an estimated 13.6% of the population was 65 years of age or older. This proportion is projected to be 23.1% by 2056, and even higher outside of the Melbourne metropolitan region.<sup>25</sup> This has implications for vulnerability in terms of increased exposure of potentially sensitive individuals to climate extremes. In addition, Victoria is losing valuable experience from its labour force, which has contributed to a skills shortage, particularly for the sciences and engineering, health care professionals, education, information technology, and various trades.<sup>26</sup> Tertiary education efforts are therefore attempting to incentivise students in these areas.<sup>27</sup> This trend has also impacted participation in volunteer services including emergency management.<sup>28</sup>

Victoria's population growth has been accompanied by a rise in per capita consumption attributed to several key sectors: telecommunications, insurance services, transportation, recreation, and personal assets.<sup>29</sup> Consumption has been driven by an increase in incomes in Victoria which has averaged 4.5% per year over the past decade.<sup>30</sup> Average incomes and the rate of income growth have been higher in urban areas, such as the Melbourne suburbs. At the same time, upward pressure on housing prices has contributed to steady growth in home values, which has exceeded income growth contributing to declining affordability. This requires homeowners to invest significant income in housing and incentivises urban fringe development.<sup>31</sup>

Rapid population growth and economic development create a need for ongoing long-term investments in infrastructure (including public transportation, water resources management, telecommunications, and energy), education, and community services. Rising household incomes, consumption and GDP will provide revenue with which to help fund those investments. However, consideration for climate change, adaptation, and societal resilience will increasingly be a feature of decision-making regarding Victoria's future development pathway. Balancing the opportunities and challenges of growth with the increasing imperative to plan for climate resilience will create new demands for knowledge, information, and tools that can assist decision-making in the public and private sectors.

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<sup>25</sup> Australian Bureau of Statistics (2010) State and Regional Indicators, Victoria, Jun 2010. Available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1367.2Chapter3Jun+2010>.

<sup>26</sup> Australian Government (2014) Skill Shortage List, Victoria. Available at [http://docs.employment.gov.au/system/files/doc/other/skillshortagelistvic\\_0.pdf](http://docs.employment.gov.au/system/files/doc/other/skillshortagelistvic_0.pdf)

<sup>27</sup> OECD (undated) OECD Review of Higher Education in Regional and City Development. State of Australia, Victoria. Available at <http://www.oecd.org/edu/imhe/46648363.pdf>

<sup>28</sup> Parkin, D. (2008) Future challenges for volunteer based emergency services. *The Australian Journal of Emergency Management*, 23(2), 61-67. Available at <http://www.em.gov.au/Documents/AJEM%20Challenges%20for%20Volunteer%20Emergency%20Services%20Vol123,%202%20May08.pdf>

<sup>29</sup> Australian Bureau of Statistics (2007) Trends in Household Consumption. Available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/0485BB5550FE5799CA25732C00207C77?opendocument#THE%20LONG-TERM%20TREND>.

<sup>30</sup> Australian Bureau of Statistics (2013) Estimates of Personal Income for Small Areas, Time Series, 2005-06 to 2010-11. Available at <http://www.abs.gov.au/ausstats/abs@.nsf/mf/6524.0.55.002#Anchor6>.

<sup>31</sup> Kulish, M., Richards, A., and Gillitzer, C. (2011) Urban Structure and Housing Prices: Some Evidence from Australian Cities. RDP 2011-03, Reserve Bank of Australia, Sydney, NSW. Available at <http://www.rba.gov.au/publications/rdp/2011/pdf/rdp2011-03.pdf>

### 2.2.3 Policy context

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The landscape for adaptation has changed significantly throughout Australia over the past decade. While impacts and adaptation research has been pursued in the state for a number of years (including projections of future climate change, modelling of sea-level rise and storm surge along the Victorian coast, and assessment of vulnerability and risk at the state and local level), the policy agenda for adaptation has formed more recently. Coordinated action on adaptation across scales was triggered by the National Climate Change Adaptation Framework (NCCAF) that was produced by the Council of Australian Governments in 2006.<sup>32</sup> The NCCAF emphasised the need for research coordination, but also emphasised that much of the action will be at the state and local level. This latter point has been reiterated in subsequent years. For example, the Australian government produced a “position paper” in 2010 that argued that climate adaptation should largely be led by State and Local Government.<sup>33</sup> The identification of the need for adaptation research led to sizeable shifts in adaptation science policy including the launch of various adaptation research initiatives such as the CSIRO Climate Adaptation Flagship and NCCARF.

In addition to these national efforts on adaptation, Victoria pursued state-based initiatives. The significant costs that have been incurred by both the public and private sectors in Victoria over the past decade in managing climate-related extreme events and covering the losses (e.g., Section 2.2.1) have led to a persistent discourse around climate change and what policies and practices are appropriate. Nevertheless, there is a persistent perception that there are significant adaptation needs in Victoria that include resources, cultural and behavioural change, and improved information (see Box 2). The 2009 Climate Change Green Paper identified adaptation as “*one of the strongest roles for the Victorian Government in climate change policy.*”<sup>34</sup> The establishment of VCCCAR that same year provided a research capability responsive to the needs of the Victorian government. Meanwhile, the Climate Change Act 2010 required, in addition to a range of other matters, the development of a state adaptation plan.

The end of 2010 saw a change in government in Victoria to a Liberal-National Coalition Government, and with that change some uncertainty persisted in the adaptation policy area until the release of the Climate Change Adaptation Plan in March 2013 when the government’s commitment to the development of an adaptation incentivised whole-of-government thinking about adaptation, priority issues, and the coordination of efforts. Such coordination is particularly important given a number of local governments in Victoria have also undertaken adaptation planning. Hence, adaptation planning and implementation must extend beyond the state government to involve stakeholders throughout Victoria. The Victorian Adaptation and Sustainability (VAS) Partnership program, focused on local government, is just one recent initiative that attempts to address this need.<sup>35</sup>

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<sup>32</sup> The *National Climate Change Adaptation Framework* is available at [http://www.climatechange.gov.au/sites/climatechange/files/documents/03\\_2013/nccaf.pdf](http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/nccaf.pdf)

<sup>33</sup> *Adapting to Climate Change in Australia – An Australian Government Position Paper* is available at [http://www.climatechange.gov.au/sites/climatechange/files/documents/03\\_2013/adapt-climate-change-position-paper.pdf](http://www.climatechange.gov.au/sites/climatechange/files/documents/03_2013/adapt-climate-change-position-paper.pdf)

<sup>34</sup> The Climate Change Green Paper is available at [http://www.climatechange.vic.gov.au/data/assets/pdf\\_file/0016/125422/Victorian-Climate-Change-Green-Paper-July-2009.pdf](http://www.climatechange.vic.gov.au/data/assets/pdf_file/0016/125422/Victorian-Climate-Change-Green-Paper-July-2009.pdf).

<sup>35</sup> For details on the VASP program, see [https://www.google.com/search?q=victorian+adaptation+and+sustainability+partnership&oq=Victorian+Adaptation+and+Sustainab&aqs=chrome..69j57j0.7360j0j4&sourceid=chrome&es\\_sm=122&ie=UTF-8](https://www.google.com/search?q=victorian+adaptation+and+sustainability+partnership&oq=Victorian+Adaptation+and+Sustainab&aqs=chrome..69j57j0.7360j0j4&sourceid=chrome&es_sm=122&ie=UTF-8)

Despite these initiatives, shifting policy priorities and tight budgets are affecting adaptation science policy and adaptation efforts across different scales in Australia. The Federal Government has scaled back adaptation research activities within federal departments, and although NCCARF has been funded for a second phase of operations, its scope and resources have contracted significantly relative to its first phase. While the VASP program in Victoria will move forward as a key State initiative on adaptation, VCCCAR itself will not be renewed, which therefore raises questions regarding how to meet future knowledge needs and build upon the adaptation community.

#### **2.2.4 Rules and norms**

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The context for VCCCAR has also been shaped by the rules and norms that influence the participating institutions. Researchers in academic environments work within boundaries established by formal and informal rules and community norms. For example, universities often have formal rules governing the behaviour of research staff. As a case-in-point, the University of Melbourne has a range of statutes and regulations that guide the governance of the university and its faculty and staff. These include policies regarding titles and appointments, the collection of fees, requirements for the degrees, and intellectual property.<sup>36</sup> In addition, there is a specific ‘Code of Conduct for Research’ that emphasises integrity and professionalism, fairness and equity, intellectual honesty, conflict resolution, safety, and openness of research to scrutiny. These formal policies are reinforced by informal norms among researchers, who place a high value upon research integrity. Surveys of researchers indicate a strong aversion to dishonest or unethical behaviour and a general belief that such behaviour should be punished.<sup>37</sup> Such rules and norms are instrumental in conveying credibility to research organisations and researchers themselves, which ultimately is an important characteristic for research to have impact in policy and practice. At the same time, the emphasis on establishing credibility is often argued to be a potential barrier to undertaking policy relevant research through, for example, its implications for how research is communicated. However, it has also been argued that academic institutions are increasingly being encouraged to be more entrepreneurial,<sup>38,39</sup> which creates a more recent expectation that researchers should be savvy in terms of seeking research funding and creating new business opportunities. This trend ultimately enhances pressure on academic institutions to engage those working in policy and practice and respond to their needs.

The Victorian government, its various departments, and the staff within are also governed by rules that influence behaviour. Formally, these rules are encoded within the Australian Constitution that establishes the legal framework for Australia’s state and territory governments, their roles and responsibilities, and their relationship with the Federal Government. Effectively, the legal framework for the Victorian government conveys powers and responsibilities, but the behaviour of individuals within government organisations is also influenced by informal rules and norms that may differ from those working within academia. For example, while researchers communicate their findings through peer-reviewed journal articles, government organisations may prefer briefs that concisely communicate policy-relevant information. Furthermore, the hierarchical nature of government can

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<sup>36</sup> University Secretary’s Department Statutes and Regulations. Available at <https://www.unimelb.edu.au/Statutes/r171r8.html>

<sup>37</sup> Korenman, S. G., Berk, R., Wenger, N. S., & Lew, V. (1998). Evaluation of the research norms of scientists and administrators responsible for academic research integrity. *Jama*, 279(1), 41-47. Available at <http://jama.jamanetwork.com/article.aspx?articleid=185891>

<sup>38</sup> Etzkowitz, H. (1989). Entrepreneurial science in the academy: A case of the transformation of norms. *Social Problems*, 14-29.

<sup>39</sup> Etzkowitz, H. (1998). The norms of entrepreneurial science: cognitive effects of the new university–industry linkages. *Research Policy*, 27(8), 823-833.

tend to emphasise vertical, rather than horizontal, communication and the prior approval of information released to the public or other audiences.<sup>40</sup> This is somewhat different from academic institutions that emphasise more collaborative and transparent communication.

Academic and government institutions therefore are accustomed to operating under different formal and informal rules and norms, which translate into differences in institutional cultures. This ultimately influences the way in which these institutions interact through organisations such as VCCCAR. However, it is also important to note that within Victoria, the institution of academia is not entirely independent of government. For example, Victorian universities are governed through acts of State Parliament,<sup>41</sup> which therefore creates some level of government oversight of academia. This extends to other actors important in Victoria's adaptation response. For example, Victoria's Local Governments were established under state legislation, specifically the Victorian Constitution Act 1975 and the Local Government Act 1989.<sup>42</sup> Therefore, while academia and government bring their own institutional and cultural perspectives into the VCCCAR partnership, at a higher level, there are well-established legal definitions regarding the governance relationships. While these may not reflect the day-to-day operations of an organisations such as VCCCAR, they do influence the relative position of academia vis-a-vis government.

### 2.3 VCCCAR action arenas

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The action arenas include the various action situations that generate VCCCAR's adaptation research and its outcomes. The specific actions situations relevant to VCCCAR's action arena include the following:

- the processes by which research is prioritised
- the processes by which research is executed
- the processes by which research is communicated
- the processes by which research is applied in practice

Each of these processes involves different actors.

#### 2.3.1 Action arena 1: Research prioritisation

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For VCCCAR the prioritization of adaptation research involved multiple actors and multiple decision points, and evolved over time through learning and changes in the institutional context. The process for development of research priorities for VCCCAR was led by the Victorian Government through the Adaptation Research Centre Investment Panel (ARCIP). Different activities were used to generate priorities, including facilitated workshops, surveys and discussion at meetings. Hence, the research investments and the resulting outputs and outcomes in terms of policy relevant adaptation research were strongly influenced by a priori decisions regarding what research themes and questions were within the scope of VCCCAR.

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<sup>40</sup> Parker, R., & Bradley, L. (2000). Organisational culture in the public sector: evidence from six organisations. *International Journal of Public Sector Management*, 13(2), 125-141.

<sup>41</sup> [http://www.legislation.vic.gov.au/Domino/Web\\_Notes/LDMS/LTObject\\_Store/LTObjSt7.nsf/DDE300B846EE D9C7CA257616000A3571/E7BF815A8CBC04F1CA257AE1007D3CC6/\\$FILE/09-78aa005%20authorised.pdf](http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/LTObject_Store/LTObjSt7.nsf/DDE300B846EE D9C7CA257616000A3571/E7BF815A8CBC04F1CA257AE1007D3CC6/$FILE/09-78aa005%20authorised.pdf)

<sup>42</sup> <http://www.dpcd.vic.gov.au/localgovernment/guide-to-local-government/how-councils-work/the-legal-basis>

With the inception of VCCCAR, the then Department of Sustainability and Environment developed an Investment Priorities discussion paper which was circulated to members of the Adaptation IDC, Adaptation IDC Working Group, Ministerial Reference Council and other interested government stakeholders. A facilitated workshop was held on 17 September 2009 to determine the criteria for research investment and areas of priority research activity. This resulted in the following priorities.

- 1) ***Opportunities for long term adaptation in the short term*** - As well as increasing the variability of our climate and the frequency and intensity of extreme events, climate change will also require the consideration of responses to more longer term, gradual changes to our 'average' climate. Identifying and integrating these considerations in the short term and being prepared to incorporate these changes as opportunities arise may reduce the overall cost of adaptation responses while also delivering win-win benefits. This work would also seek to articulate the learning from the last 12 years of climate change (including issues such as drought, heatwaves and other extreme events).
- 2) ***Future scenarios*** - Identifying common goals that are robust under a number of future scenarios, and then identifying primary research needs will allow the Government to assume a leadership role in the face of complexity and uncertainty. This project would seek to build on regional climate change projections to create a range of climate change scenarios as well as socio-economic and environmental scenarios to assist government and other decision makers (i.e., communities groups, businesses, etc.) plan for the future.
- 3) ***Future landscapes under climate change*** - A holistic approach to understanding the implications of climate change at the landscape level to look at the potential benefits and trade-offs between adaptation responses as well as other policy objectives. Potential work under this theme might include integrated vulnerability assessments at a regional scale or along regional transects to explore the 'migration' of activities and ecosystems along climate gradients and developing measures of community and ecosystem resilience to climate change impacts.

In the second half of 2010, the VCCCAR Director was asked to submit a discussion paper to outline a view on the Year 2 research priorities for consideration of the joint meeting of VCCCAR and ARCIP. It was considered that VCCCAR partners were in the best position to provide this advice, based on the outcome of the initial priorities provided in the first year, as well as its collective exposure to the research currently underway at the State, national and even international levels.

The themes indicated above were still relevant but were presented under revised headings:

- Institutions for climate change
- Urban systems, societies, health and infrastructure
- Scenarios, risk management and communication of climate change
- Natural systems, landscapes and regional planning and development

Following the change of government in 2010, there was an absence of an explicit policy framework from the State Government regarding adaptation policy and practice. In mid-2011 the Advisory Board and ARCIP met to consider the results of a survey of government participants and university researchers on priority research. The following five themes were identified as high priority:

- 1) Making decisions under future climate uncertainty
- 2) Climate risk assessment and management for industry and infrastructure investment
- 3) Managing climate change impacts in aging communities



- 4) Governance structures and coordination models to support the flexibility and authority required for effective climate adaptation
- 5) A framework for assessing potential climate impacts and adaptation pathways in Victoria

These were further reviewed and in September 2011 the following priorities were agreed

- 1) Legal risks of climate and governance adaptation options in Victoria
- 2) Climate risk assessment and management for essential services and infrastructure
- 3) Assessment and management of climate change impacts in vulnerable communities

Research proposals were developed to align with these priorities and 4 projects were selected and initiated.

Following the Liberal-National Party review of the Climate Change Act in mid-2012 (triggered by the passage of Federal legislation for a Carbon Pricing Mechanism and associated measures under the Clean Energy Future package), the policy environment became clearer. Most requirements in the Act relating to reducing GHG emissions were removed but there was recognition and renewed commitment by the State Government to adaptation, including the development of a Climate Change Adaptation Plan.

In March of 2013, the Victorian Adaptation Plan established clear objectives and priorities for the state, which could subsequently be used to inform the adaptation research agenda. However, at this point, only just over a year was left in VCCCAR's funding agreement. Similarly, although a number of Local Governments in Victoria had already engaged in some form of adaptation planning through various initiatives, this was not a universal phenomenon, and thus there remains a rather incomplete picture of knowledge needs for Local Government. Similarly, the business community and community services in Victoria are key players in adaptation, yet insights into their knowledge needs are only now starting to emerge.

The incentives underlying these decisions on VCCCAR boundaries varied among different actors (Table 1). For those in State Government, the boundaries provided a means of demonstrating the relevance of the research through its alignment to the interests of Victorians. This satisfied the desire to see useful knowledge generated that can improve evidence-based decision-making, demonstrate a return on the state's VCCCAR investment, and provide evidence that the VCCCAR model works. For investigators, those boundaries provide significant breadth and flexibility to support a broad range of research questions, which also happen to be strengths of researchers among the VCCCAR consortium.

However, this also constrained those eligible for pursuing VCCCAR funding to members of the research community. As an organisation that was developed to support research, this was justified. However, this was not necessarily be the most optimal pathway for meeting particular knowledge needs of Victorian stakeholders. State government departments, Local Governments, regional organisations, and/or NGOs representing civil society in Victoria may all benefit from adaptation research and may have important roles to play in contributing to a climate-resilient Victoria. However, they may lack the capacity to develop and execute research. As such, building bridges between researchers and a variety of end users is an important element of maximising the relevance of research for end users. As a case-in-point, the VCCCAR project [\*Implementing Tools to Increase Adaptive Capacity in the Community and Natural Resource Management Sectors\*](#), engaged with different groups providing community services to facilitate adaptation planning.

**Table 1.** Actors, roles and incentives associated with the *Research Prioritisation* action situation.

Actor	Role	Possible Incentives
<b>VCCCAR Staff</b>	<ul style="list-style-type: none"> <li>Coordinate and participate in think tanks, forums and other events</li> <li>Issue calls for proposals</li> <li>Communicate research priorities, outputs, and outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Increase visibility of VCCCAR</li> <li>Enable long-term success of VCCCAR as an organisation</li> <li>Advocate for collaborative approaches to adaptation research</li> <li>Maintain alignment between research projects and VCCCAR's strategic themes</li> </ul>
<b>VCCCAR Advisory Board</b>	<ul style="list-style-type: none"> <li>Provide guidance and strategic direction on research agenda</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda</li> <li>Enable long-term success of VCCCAR model</li> </ul>
<b>VCCCAR Implementation Committee</b>	<ul style="list-style-type: none"> <li>Establish processes for proposal submission</li> <li>Coordinate think tanks, forums and other events</li> <li>Track progress of research projects</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda</li> <li>Enable long-term success of VCCCAR model</li> <li>Maintain alignment between research projects and VCCCAR's strategic themes</li> </ul>
<b>Researchers</b>	<ul style="list-style-type: none"> <li>Coordinate and participate in workshops identifying research needs</li> <li>Development of research and think tank proposals</li> <li>Development and submission of VCCCAR research proposals</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda</li> <li>Enhance funding opportunities for researchers</li> <li>Expand record of research performance</li> <li>Enhance opportunities for early career research experience</li> </ul>
<b>Victoria Government Staff</b>	<ul style="list-style-type: none"> <li>Participate in workshops identifying research needs</li> <li>Approve prioritised research projects for funding</li> <li>Communicate research priorities, outputs, and outcomes</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda</li> <li>Increase access of government staff to researchers and research insights</li> <li>Maximise perceived return on VCCCAR investment</li> <li>Marginalise research pathways that are of low priority or poorly aligned to needs for policy and practice</li> <li>Increase access to information for evidence-based decision-making</li> <li>Build networks among staff in government departments</li> </ul>
<b>Local Government Staff</b>	<ul style="list-style-type: none"> <li>Participate in workshops identifying research needs</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda that benefits Local Government</li> <li>Increase access of government staff to researchers and research insights</li> <li>Build networks among staff within and among state and Local Government departments</li> </ul>
<b>Community Services</b>	<ul style="list-style-type: none"> <li>Participate in workshops identifying research needs</li> <li>Participate in research projects</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda that benefits Local Government</li> <li>Increase access of community service staff to researchers and research insights</li> <li>Build networks among staff within and among community service organisations</li> </ul>
<b>Private Businesses</b>	<ul style="list-style-type: none"> <li>Participate in workshops identifying research needs</li> <li>Participate in think tanks</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda that benefits the business community</li> <li>Increase access to information</li> <li>Build networks</li> </ul>
<b>Civil Society</b>	<ul style="list-style-type: none"> <li>Participate in workshops identifying research needs</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda that benefits civil society</li> <li>Increase access to information</li> <li>Build networks</li> </ul>

Requests for proposals (RFPs) for research that address particular research themes were issued by VCCCAR through 3 rounds. Specific details included in the RFPs were established through the Implementation Committee. The proposal proforma was relatively streamlined so as not to exceed 4 pages. Proposals consisted of descriptions of project participants, a project summary and 1 to 2 pages

of project details, and an indicative budget. Although not externally peer reviewed, the proposals were assessed and ranked by the VCCCAR Advisory Board and by the Adaptation Centre Research Investment Panel (ARCIP), comprised of representatives of multiple Victorian Government departments, for prioritization and were approved by the Victorian government for funding. Criteria for proposal ranking were well-defined. Ultimately, the decision on the proposals going forward for approval by the Victorian government rested with ARCIP.

The streamlined proposal process served researchers, VCCCAR, and the Victorian government by focusing proposal descriptions on key topics and deliverables and avoiding detailed technical or theoretical background that may not be widely digestible. These high level project descriptions also allowed some flexibility to modify the research as the projects developed, as the entire project was not prescribed in minute detail at the outset. That said, the lack of detailed description also limited the capacity for those making funding decisions to evaluate the substantive rigour of the proposal and any associated methodologies and, therefore, how well proposals were aligned to the evaluation criteria. However, the VCCCAR Advisory Board and the Implementation did provide their assessment on the value of the proposal as it moves through to the decision on commissioning.

There has also been an ongoing dialogue regarding research priorities through the VCCCAR Think Tanks as well as the annual Adaptation Forums, which have generated multiple discussions among researchers and practitioners (see also Section 2.3.4). In addition, the presence of the International Visiting Fellows has injected independent ideas into VCCCAR and created other collaborative discussions. Collectively, these interactions have stimulated discussions that have led to the identification of new adaptation policy opportunities as well as knowledge needs to support pathways toward policy implementation. They have also enabled continual evaluation of policy and research priorities to pick up emerging issues and build legitimacy by allowing ongoing input from multiple stakeholders. Meanwhile, by building connections between research in VCCCAR and adaptation work in other parts of the world and hosting visiting fellows, VCCCAR enhances its visibility and credibility.

### *Research prioritisation: Proximal outcomes*

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Over the course of its funding, VCCCAR initiated 13 research projects, yet the articulation of research needs and priorities was an ongoing process. A general description of how these projects align with the priorities identified in the Victorian Adaptation Plan appears on the VCCCAR website,<sup>43</sup> although again it should be noted that most projects were launched prior to the release of the plan. As a consequence, there is not a direct correspondence between policy themes in the plan and research themes within VCCCAR.

This gradient of fundamental to highly applied research is apparent within VCCCAR's portfolio of research projects. For example, the project [\*Responding to the Urban Heat Island\*](#) deployed thermal imaging technologies to characterise the thermal properties of urban landscapes in Melbourne and evaluate the benefits of green infrastructure and vegetation in reducing thermal loading. The project also developed a set of design principles for employing such technology. While the project also explored barriers and opportunities associated with using such technologies to evaluate and implement green infrastructure options, as a whole, it was highly applied and provides multiple

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<sup>43</sup> VCCCAR (2013) Adaptation Resources for Decision-Makers. Available at <http://www.vcccar.org.au/adaptation-resources-for-decision-makers>.

pathways for entry into State, and particularly Local, Government adaptation planning and decision-making.

In contrast, the majority of the VCCCAR projects contain elements of both applied and fundamental research. As a case in point, the project [\*Framing Multi-Level and Multi-Actor Adaptation Responses in the Victorian Context\*](#) explored the conceptualisation of adaptation among different actors and organisations as well as the research traditions from whence those conceptualisations have arisen. While there are practical benefits associated with stakeholders being more aware of different framings, concepts, and definitions in the adaptation discourse that awareness alone does not necessarily translate into adaptation policies and measures. However, the project also supported the development of the [\*Adaptation Navigator\*](#) – a planning tool to assist stakeholders with working through the adaptation process.

Because of its ability to straddle basic and applied research or, perhaps more appropriately, to generate different types of knowledge and outputs (e.g., journal articles, project reports, and policy briefs; see Section 2.3.3), VCCCAR has positioned itself to undertake research both for and on adaptation. Hence, it has distanced itself from other research institutions that pursue knowledge for its own sake. In addition to those projects that have been funded, VCCCAR has presided over an ongoing dialogue among researchers, policy makers, and practitioners in Victoria regarding priority knowledge needs for adaptation. This process is necessarily an iterative one, and thus there is no single ‘right’ way of defining priorities. Rather, those priorities will continually evolve in response to changing stakeholder needs as well as emerging opportunities and risks that draw attention to particular issues.

### *Research prioritisation: Comparison with other models*

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It is quite apparent that the research priorities espoused by VCCCAR would not have emerged under more traditional models for delivering research into policy and practice. Assuming researchers act as pure scientists, for example, there would likely have been no institutional structure to establish adaptation research priorities and fewer incentives for researchers to develop research ideas relevant to adaptation policy. Such an approach would not preclude adaptation research from emerging that is relevant to the Victorian context (through, for example, Australian Research Council funding), but such research would likely have been ad hoc, and thus poorly aligned to end user needs. A Science Arbiter Model could have generated a series of research priorities designed to address key knowledge gaps among decision-makers as well as a research program sponsored directly by the Victorian government. Such a purchaser/provider approach, however, would not necessarily have led to the broader deliberation that has evolved through VCCCAR regarding adaptation research needs. That said, as an organisation sponsored by the Victorian government, there appear to be fewer opportunities for those in Victoria outside of State Government and/or the research community to influence the adaptation research agenda. Hence, one could imagine a more inclusive approach involving a more extensive network of Victorian stakeholders (e.g., Local Government and businesses) directly in the development of research themes and project priorities.

### 2.3.2 Action arena 2: Research execution

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While the execution of research projects is a clear component of a research organisation, in the context of this report, a key consideration is how that process contributes to capacity building and informing decision making among stakeholders regarding adaptation. While research execution within VCCCAR may be assumed to largely be the domain of researchers, in practice that research has also engaged a broad variety of stakeholders that lie outside of academia. Furthermore, the research itself may have a range of stakeholders that may or may not have an active role in the research. However, as the extent to which VCCCAR's research engages stakeholders in its execution is a key design feature of the organisation, the question of the quality of that engagement and who is engaged is a particularly important one. Across the various VCCCAR projects, a range of different stakeholders are engaged through a variety of ways.

First, each project operated with assistance and guidance under a range of advisory groups from advisory committee to reference groups to steering committees, which often had members from State or Local Government. Such committees can play a number of important roles. They create opportunities for ongoing feedback regarding research execution and how to align that research to the needs of potential stakeholders. They enable stakeholders to contribute their own knowledge to the project, albeit in an informal way, that may complement the theoretical and methodological expertise of researchers. They also can help enhance the perceived legitimacy of the research in the eyes of other stakeholders as researchers are not operating completely independently of other actors. While the participation of stakeholders in the research process can enhance relevance and legitimacy, the normative views of stakeholders can also introduce a potential source of bias should stakeholders seek to lobby for particular research pathways or outcomes. Ultimately, this can act to reduce the credibility of the research as well as its legitimacy if it is perceived as being crafted to support a particular policy agenda. This also creates a potential source of conflict between researchers and stakeholders that can be distracting and ultimately reduce the impact of the research.

The idea of ongoing consideration for co-production emerged from one of the research projects, [Cogenerating Knowledge in Research and Practice](#). It was also a theme raised in the 2014 VCCCAR annual forum in a research workshop session ([Coproducting Knowledge in Research and Policy](#)) focused on this project. Continual reflection on, or even a reflexive examination of, how the researcher/practitioner relationship is evolving over the course of the project and whether or not it is achieving the original goals or if there are new opportunities that have been discovered was identified as a useful process in itself. In some ways, this process represents a form of 'boundary critique'<sup>44</sup> in

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<sup>44</sup> Boundary critique (BC) is a concept in critical systems thinking and operational research that argues that the validity of positions is dependent on judgments regarding what knowledge and values are relevant. Supporting references include the following: I) Midgley, G., Munlo, I., & Brown, M. (1998). The theory and practice of boundary critique: developing housing services for older people. *Journal of the Operational Research Society*, 467-478.; II) Cordoba, J. R., & Midgley, G. (2008). Beyond organisational agendas: using boundary critique to facilitate the inclusion of societal concerns in information systems planning. *European Journal of Information Systems*, 17(2), 125-142. III) Midgley, G., & Pinzón, L. A. (2011). Boundary critique and its implications for conflict prevention. *Journal of the Operational research Society*, 62(8), 1543-1554.

which all participants are monitoring a project to determine whether it is progressing appropriately with respect to scope and objectives.

Second, a number of projects have been comprised of multiple subtasks, some of which have been undertaken solely by researchers, while others have involved greater participation with stakeholders. As a case-in-point, the VCCCAR project, [\*Implementing Tools to Increase Adaptive Capacity in the Community and Natural Resource Management Sectors\*](#) completed two research reports that synthesised research regarding adaptation in the primary health, community welfare, and natural resources management sectors in Victoria. These reports were authored exclusively by university researchers, although stakeholders in other organisations were able to review drafts and provide feedback. In addition, however, the project included a number of case studies where insights, concepts, and tools emerging from the research reports as well as other VCCCAR funded projects were used to enhance the capacity of community service and NRM organisations to adapt to climate change. These case studies were jointly written by researchers and practitioners in these organisations and largely represent efforts to apply knowledge to generate useful learning processes and products for stakeholders. These case studies, however, do not necessarily represent traditional research endeavours in themselves, but rather represent applications of research (or perhaps ‘action research’). Nevertheless, they represent new forms of knowledge that arise from collaboration between researchers and practitioners.

**Table 2.** Actors, roles and incentives associated with the *Research Execution* action situation.

Actor	Role	Possible Incentives
<b>VCCCAR Staff</b>	<ul style="list-style-type: none"> <li>Facilitate distribution of funds</li> <li>Compile research outputs</li> <li>Track research progress</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model through production of quality research</li> <li>Deliver policy-relevant adaptation research to government and other stakeholders</li> <li>Enable long-term success of VCCCAR model</li> </ul>
<b>VCCCAR Advisory Board</b>	<ul style="list-style-type: none"> <li>Monitor overall research progress</li> <li>Advise on potential problems in research execution</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model through production of quality research</li> <li>Deliver policy-relevant adaptation research to government and other stakeholders</li> <li>Enable long-term success of VCCCAR model</li> </ul>
<b>VCCCAR Implementation Committee</b>	<ul style="list-style-type: none"> <li>Track research progress</li> <li>Advise on potential problems in research execution</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model through production of quality research</li> <li>Deliver policy-relevant adaptation research to government and other stakeholders</li> <li>Enable long-term success of VCCCAR model</li> </ul>
<b>Researchers</b>	<ul style="list-style-type: none"> <li>Execute proposed research</li> <li>Report on research progress to VCCCAR staff and Implementation Committee</li> <li>Establish and liaise with project advisory committees</li> </ul>	<ul style="list-style-type: none"> <li>Deliver policy-relevant adaptation research to government and other stakeholders</li> <li>Enhance future funding opportunities through research success</li> <li>Enhance opportunities for early career research experience</li> </ul>
<b>Victoria Government Staff</b>	<ul style="list-style-type: none"> <li>Advise on potential problems in research execution</li> <li>Support and/or participate in elements of research where Victoria government knowledge, insights, or concerns are relevant</li> </ul>	<ul style="list-style-type: none"> <li>Increase access to information for evidence-based decision-making</li> <li>Maximise perceived return on VCCCAR investment</li> <li>Build networks among staff within and among State Government departments</li> </ul>
<b>Local Government Staff</b>	<ul style="list-style-type: none"> <li>Support and/or participate in elements of research where Local government knowledge, insights, or concerns are relevant</li> </ul>	<ul style="list-style-type: none"> <li>Increase access to information for evidence-based decision-making</li> <li>Build networks among staff within and among Local Government departments</li> </ul>
<b>Community Services</b>	<ul style="list-style-type: none"> <li>Support and/or participate in elements of research where Community Service knowledge, insights, or concerns are relevant</li> </ul>	<ul style="list-style-type: none"> <li>Increase access to information for evidence-based decision-making</li> <li>Build networks among staff within and among community service organisations</li> </ul>
<b>Private Businesses</b>	<ul style="list-style-type: none"> <li>Support and/or participate in elements of research where Private Business knowledge, insights, or concerns are relevant</li> </ul>	<ul style="list-style-type: none"> <li>Increase access to information for evidence-based decision-making</li> <li>Build networks among staff within and among businesses</li> </ul>
<b>Civil Society</b>	<ul style="list-style-type: none"> <li>Support and/or participate in elements of research where Civil Society knowledge, insights, or concerns are relevant</li> </ul>	<ul style="list-style-type: none"> <li>Increase access to information for evidence-based decision-making</li> <li>Build networks among staff within and among civil society and associated organisations</li> </ul>

Third, the outputs of research projects and how those outputs are shaped by researchers and stakeholders is an important aspect of informing policy and practice. However, as this largely occurs at the end of the research process and is part of the broader issue of communication and engagement, this topic is addressed specifically in Section 2.3.3.

Although co-production of knowledge creates opportunities to add value and impact to adaptation research projects, it is clear from both researchers and practitioners that the transaction costs associated with co-production are non-trivial. In its more marginal forms, such as serving on a project advisory committee or reviewing draft documents, participation by practitioners in research projects may be small time commitment that can be readily absorbed, particularly if the organisation in which the practitioners sits is supportive of his or her role. In its more inclusive forms, however, co-production may necessitate significant time commitments by practitioners in meetings, data analysis, document generation, etc. These are costs that may not be easily borne by the individual or his or her organisation. Meanwhile, co-production in research execution places additional burdens on researchers as well. It may require additional thinking about research design to enable the effective



use of stakeholder knowledge, and it may require extensive ongoing deliberation to secure stakeholder participation and engagement in the project. To the extent that stakeholders have opportunities to comment specifically on the credibility, relevance, and legitimacy of the research, this may necessitate additional revisions to methods and project deliverables that may not be adequately costed in the project design and timeline.

### *Research execution: Proximal outcomes*

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Over the course of its five years, VCCCAR successfully completed a range of projects within its portfolio and outputs of that research have been made publicly available. Completion of projects is one outcome, but consideration must also be given to whether projects have been successful in enhancing the capacity of decision-makers in Victoria to adapt to climate change as well as the mechanism by which this has occurred. For example, the research projects provide evidence of co-production during the research process. However, the manner in which that co-production has manifested and its extent varies significantly among projects. This reflects a number of phenomena. First, understanding of the value of co-production as well as best practices for co-production have evolved over the five years VCCCAR operated. Second, different projects will have different opportunities and needs for stakeholder participation, and therefore the interactions between researchers and practitioners and the extent to which practitioners are involved in shaping the research will naturally vary among different projects. Therefore, a lack of evidence of co-production is not necessarily equivalent to a lack of research quality or even relevance. The value of co-production has to be evaluated on its own merits on a project-by-project basis.

Those projects which are regarded by both researchers and practitioners as being exemplars with respect to co-production are not necessarily projects where the research per se was extensively co-produced, but rather where research and applications by stakeholders were incorporated into the same project. In other words, rather than the research elements of the project themselves being considered useful to stakeholders, in some instances it was the ability to apply research frameworks, insights, and tools to the context of stakeholders. This process and its outcomes, however, are somewhat novel compared to a more traditional research paradigm which separates the production of knowledge from its subsequent application by end users. In fact, some research sponsors would perhaps not recognise research applications as being a valuable project component.

### *Research execution: Comparison with other models*

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Research execution within VCCCAR contains elements that are consistent with Pure Science. Each project has endeavoured to first understand the current state of knowledge on its topic, and methodologies for research have been developed and articulated. However, other aspects of the VCCCAR research process distinguish VCCCAR from the Pure Science Model. The monitoring of projects by committees comprised of stakeholders provides a vehicle for ongoing reflection on the research and its relevance to stakeholders. Furthermore, the emphasis on co-production in the research process is a clear indication that the research lies outside of the pure science paradigm.

To some extent, VCCCAR research could be viewed as evolving under a Science Arbiter Model, with researchers being tasked to undertake and deliver research on topics specified by stakeholders. However, the active participation of researchers in the scoping of research projects acts to expand the bounds of research beyond what might be in scope for a Science Arbiter. Meanwhile, the active participation of stakeholders in the monitoring of projects and, in some cases, the application of

research outputs to new problems and contexts, is indicative of a much greater role for stakeholders than would be expected under a Linear Model approach to informing decision-making.

Hence, it seems that VCCCAR's hybrid structure lends itself to the organisation being an 'honest broker' of knowledge regarding adaptation.<sup>14</sup> However, the concept of 'honest' implies that the research that is being shaped by researchers and stakeholders alike is free from bias in terms of the research process and the articulation of its implications for public policy. Otherwise, the research may be viewed as issue advocacy in that research findings are being applied to support a specific policy agenda. Researchers involved in VCCCAR projects commented that maintaining the integrity of research findings at times required active negotiation with stakeholders. However, given the incentives placed on different actors associated with the research process, as well as their objectives, are at times different, such negotiation is an inherent aspect of the interactions between researchers and practitioners (see Section 2.4). Furthermore, emphasising co-production of research provides a space for such negotiation to occur, thus reducing the likelihood of conflicts regarding the characterisation and interpretation of research for policy and practice.

### ***2.3.3 Action arena 3: Stakeholder engagement and communication***

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Although established as an adaptation research organisation, VCCCAR is recognised by both researchers and practitioners as having additional roles. These roles are complementary to, but distinct from, the research process. Specifically, VCCCAR undertakes functions that are similar to those of traditional boundary organisations – convening, collaborating, translating and mediating (see Section 1.4.2). Hence, VCCCAR acts as an intermediary between the research community, represented by VCCCAR-affiliated universities, and the practitioner community, represented by the Victorian Government and other stakeholders. For example, the 'Think Tanks' that VCCCAR has sponsored over the past five years are a good example of its *convening* functions. Those events bring multiple stakeholders together, which, in addition to enabling broad discussion around specific topics, helps to build relationships and networks for shared learning. Other activities such as the VCCCAR annual forums and seminar series also fulfil a convening function. VCCCAR supports *collaboration* through its research projects, particularly those that encourage and incentivise co-production of research and research outputs. As a *translator*, VCCCAR staff and project investigators have worked to develop different ways of communicating research and think tank outputs and outcomes to different audiences. This is perhaps best illustrated by the various policy briefs that have been generated that distil extensive research reports into concise documents focused on that information relevant for a policy context. While the demand for *mediation* services may not be particularly high, VCCCAR does represent an organisation that could mediate between the research and policy communities. This could transpire on a small scale in terms of potential disputes regarding the characterisation of research findings for a specific project for policy and practice (see Section 2.4). Alternatively, on a broader scale, VCCCAR could mediate (in part through its convening function) in reconciling broader strategic objectives for adaptation research among different stakeholders within Victoria.

Despite its role as a boundary organisation, VCCCAR's research mission has generated a range of traditional research outputs as evidenced by the broad range of project reports that have been generated by different research teams. Such reports are to some extent a necessary element of a research organisation. They comprehensively communicate the research problem, methods of investigation, results, and significance. Some stakeholders may find such publications of value. However, other stakeholders find them too technical and too lengthy to be effective for practitioners. Meanwhile, as project reports they may not have as much impact within the research community as a

peer-reviewed journal article. While a number of journal articles have been produced from VCCCAR research, they remain relatively limited at present, although a number of projects are still in the final stages of completion. Hence, the communication of VCCCAR research findings has also relied upon non-traditional outputs such as policy briefs or reporting on projects through workshops and the VCCCAR annual forums.

In fact, the non-research roles undertaken by VCCCAR are a key element that distinguishes it from a traditional research institution and which enhances its capacity to fulfil its objective in terms of enhancing the capacity of decision-makers. Although discrete research projects can provide knowledge on specific questions of interest to stakeholders, that research needs to be communicated to stakeholders during and after the research processes. Furthermore, the adaptation process and capacity building of stakeholders requires ongoing engagement regarding adaptation more broadly including the continual reiteration of the climate change problem, adaptation options that can provide solutions, as well as the processes and interactions necessary to build a robust response through policy and practice.

As with the other action arenas, different actors have different incentives with respect to stakeholder engagement and communication. As a boundary organisation, such engagement is a fundamental role of VCCCAR that is essential for the organisation to meet its objectives. In the absence of that role, VCCCAR would simply be a conduit for adaptation research funds, which could be administered through a broad range of other channels. More importantly, the stakeholder engagement and communication activities of VCCCAR often involve the development of relationships among the research community and policy communities. These relationships are important vehicles for enhancing the relevance of adaptation research to stakeholders. Stakeholder engagement and communication clearly present opportunities for enhancing the visibility of VCCCAR and its activities, with subsequent benefits for VCCCAR, researchers who execute projects, the Victorian government that ultimately sponsors those projects, and other stakeholders that engage in or benefit from the research. Lastly, stakeholder engagement and communication is the action arena in which messages regarding adaptation generally, and the implications of specific research projects, are formed and delivered. Hence, competition may arise among different actors regarding that messaging. For example, researchers may attempt to communicate about their work in a manner that best reflects upon their expertise. Meanwhile, those working in policy and practice may opt to develop messages that best support existing agendas. However, the collaborative nature of VCCCAR helps to impose checks and balances on different actors and institutions to enable consistent and accurate messaging.

**Table 3.** Actors, roles and incentives associated with the *Stakeholder Engagement and Research Communication* action situation.

Actor	Role	Possible Incentives
<b>VCCCAR Staff</b>	<ul style="list-style-type: none"> <li>• Convene thinktanks, forums and other events for VCCCAR stakeholders to facilitate deliberation</li> <li>• Communicate research priorities, projects, outputs, and outcomes</li> <li>• Liase with Victorian and national stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Enable long-term success of VCCCAR model</li> <li>• Establish VCCCAR as a thought leader in Victoria regarding adaptation</li> <li>• Build capacity of stakeholders in Victoria to adapt to a changing climate</li> <li>• Influence messaging of a adaptation to stakeholders</li> <li>• Build networks</li> </ul>
<b>VCCCAR Advisory Board</b>	<ul style="list-style-type: none"> <li>• Provide guidance and strategic direction regarding stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>• Enable long-term success of VCCCAR model</li> <li>• Establish VCCCAR as a though leader in Victoria regarding adaptation</li> <li>• Build capacity of stakeholders in Victoria to adapt to a changing climate</li> </ul>
<b>VCCCAR Implementation Committee</b>	<ul style="list-style-type: none"> <li>• Assist in the planning of workshops and forums</li> </ul>	<ul style="list-style-type: none"> <li>• Enable long-term success of VCCCAR model</li> <li>• Establish VCCCAR as a though leader in Victoria regarding adaptation</li> <li>• Build capacity of stakeholders in Victoria to adapt to a changing climate</li> </ul>
<b>Researchers</b>	<ul style="list-style-type: none"> <li>• Production of research publications</li> <li>• Communication of research results, outputs, and outcomes to different audiences</li> </ul>	<ul style="list-style-type: none"> <li>• Enable long-term success of VCCCAR model</li> <li>• Build capacity of stakeholders in Victoria to adapt to a changing climate</li> <li>• Enhance the relevance of research outputs for stakeholders</li> <li>• Increase the visibility and perceived expertise of researchers to enhance future funding opportunities</li> </ul>
<b>Victoria Government Staff</b>	<ul style="list-style-type: none"> <li>• Access research outputs and disseminate information to relevant government departments</li> <li>• Provide input to VCCCAR staff regarding information needs and communication opportunities</li> <li>• Participate in workshops and forums</li> <li>• Share knowledge with other stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Build capacity of stakeholders in Victoria to adapt to a changing climate</li> <li>• Maximise perceived return on VCCCAR investment</li> <li>• Increase access to information</li> <li>• Enhance the relevance of research outputs for State Government and other stakeholders</li> <li>• Influence messaging of a adaptation to stakeholders</li> <li>• Build networks</li> </ul>
<b>Local Government Staff</b>	<ul style="list-style-type: none"> <li>• Access research outputs and disseminate information to relevant government departments</li> <li>• Provide input to VCCCAR staff regarding information needs and communication opportunities</li> <li>• Participate in workshops and forums</li> <li>• Share knowledge with other stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Increase access to information</li> <li>• Build networks</li> <li>• Enhance the relevance of research outputs for Local Government</li> </ul>
<b>Community Services</b>	<ul style="list-style-type: none"> <li>• Access research outputs and disseminate information within and among service organisations and associated stakeholders</li> <li>• Provide input to VCCCAR staff regarding information needs and communication</li> <li>• Participate in workshops and forums</li> <li>• Share knowledge with other stakeholders opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• Increase access to information</li> <li>• Build networks</li> <li>• Enhance the relevance of research outputs for community services</li> </ul>
<b>Private Businesses</b>	<ul style="list-style-type: none"> <li>• Access research outputs and disseminate information within and among businesses and associated stakeholders</li> <li>• Participate in workshops and forums</li> <li>• Share knowledge with other stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Increase access to information</li> <li>• Build networks</li> <li>• Enhance the relevance of research outputs for private businesses</li> </ul>
<b>Civil Society</b>	<ul style="list-style-type: none"> <li>• Access research outputs and disseminate information within and among stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>• Increase access to information</li> </ul>

As was apparent from conversations with VCCCAR staff and associated stakeholders, stakeholder engagement and communication is considered a key aspect of VCCCAR activities, yet one that is difficult to sustain given available resources. For example, none of the staff positions within VCCCAR are full time positions. Managing projects, organising events, and serving on various

committees alone occupies significant time. But reaching out to existing and new stakeholders, identifying opportunities for the use of research outputs, and generally championing the cause of adaptation necessitates sustained commitment. During two years (2012 and 13), VCCCAR employed a staff member part-time to facilitate such engagement. However, this position was discontinued due to lack of resources. Overall, the level of investment in stakeholder engagement and communication suggests a prioritisation of research over research communication. While this is quite natural, given VCCCAR was established a research organisation, stakeholders associated with VCCCAR place a high value on the other roles that VCCCAR plays. This reflects a sentiment expressed elsewhere by those working at the interface between research and policy/practice that research for adaptation must involve more than just research if it is to have an impact on policy and practice (see Box 2).<sup>9</sup>

### *Stakeholder engagement and communication: Proximal outcomes*

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Since its inception, VCCCAR has grown to become an important organisation acting as a catalyst for deliberation within Victoria among researchers, policy makers, and practitioners regarding adaptation. This outcome emerged over time with the changing policy and political context in Victoria and as relationships among VCCCAR and different stakeholders developed. While initially established with a strong focus on research that can help build the capacity of practitioners, VCCCAR and its stakeholders increasingly recognised that research in the absence of a receptive system of governance can do little to build capacity or inform decision-making.

The dynamics of the Victorian policy context, which have included multiple changes in government, leadership of government departments and policy priorities over the past five years, posed some challenges to building consensus and capacity regarding adaptation. However, the passage of the Climate Change Act in 2010 by the Victorian parliament, which required the development of an adaptation plan, established a need for a coherent approach to adaptation within the state. As evidenced by the plan, a robust adaptation response is a shared responsibility among multiple stakeholders and therefore requires the development of relationships among those stakeholders – State Government departments, Local Government, private business, community services, and civil society. To this end, VCCCAR has used research not only to investigate questions of relevance to stakeholders (and the adaptation plan specifically) but also as a vehicle for building relationships among stakeholders. This has included engaging with stakeholders so that they can be entrained in research projects, but also convening think tanks, workshops, and forums that have enabled discussions among Victorian stakeholders regarding adaptation needs and practice that would not have otherwise occurred.

### *Stakeholder engagement and communication: Comparison with other models*

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The stakeholder engagement and communication action arena clearly distinguishes VCCCAR from other approaches to adaptation knowledge generation. Researchers or research organisations tasked simply to operate in a Pure Science or Science Arbiter mode lack the mandate or incentives to pursue significant stakeholder engagement or at least that engagement is limited to that which is needed to achieve a particular research objective. In contrast, because it was established to take on convening as well as traditional research functions, VCCCAR has occupied an important space within the Victorian adaptation community. In particular, VCCCAR has acted as a bridge between different institutions, organisations, and actors. This has positioned VCCCAR as an important knowledge broker while also contributing to the development of a broad network of adaptation researchers and practitioners. In addition, however, VCCCAR can be seen as an advocate for the issue of adaptation and its potential

benefits in terms of enhancing Victoria's resilience. For example, VCCCAR staff have made public statements arguing that investments in adaptation can be highly cost-effective in terms of reducing the consequences of extreme weather events.<sup>45</sup> Such commentary also sets VCCCAR apart from the conventional research role where those working in policy and practice are left to interpret the benefits of adaptation or adaptation research for themselves.

### ***2.3.4 Action arena 4: Research application***

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The fourth VCCCAR action arena as defined in this report is the application of research outputs and findings. Here, the concept of application is considered quite broadly. It is not limited to the direct use of a particular research product or conclusion in the development of a particular policy or practice. Rather it includes the manner in which the knowledge created under the auspices of VCCCAR (inclusive of research projects, think tanks, and engagement efforts) is taken up and used to build capacity of stakeholders. This broader consideration of research applications is consistent with the underlying VCCCAR program logic.

Invariably, linking individual research projects to successful outcomes poses an array of challenges. Research can provide some essential foundational knowledge that allows institutions to build effective policy and practice, but that process invariably takes time and other forms of knowledge. In addition, stakeholders involved in developing adaptation policy and practice must be receptive to the knowledge emerging from research efforts, which is influenced by values, economic conditions, perceptions of climate risk, the options available to adapt, and other political considerations. Hence, part of the capacity building process involves introducing uninitiated stakeholders to the concept of climate change, the development of a common language and framing of the issue, and the generation of a culture where consideration for climate change adaptation can become routine. Again, such processes may not be considered applications of research in the conventional sense. Yet these are processes that have been enabled by VCCCAR's research agenda as well as its actions in stakeholder engagement and communication that facilitate the sharing of knowledge (see Section 2.3.3).

As in the other action arenas, the roles played by different actors and their incentives vary with respect to the application of adaptation research. For VCCCAR staff, its Advisory Board, and associated committees, the uptake and use of the research activities it sponsors is a core expectation for the organisation. In the absence of evidence that VCCCAR has in fact building capacity and contributing to adaptation policy and practice, it would simply be an organisation managing adaptation research for the sake of supporting research. Similarly, as the key sponsor and funding source for VCCCAR, and the key beneficiary of the emergent knowledge, the Victorian Government also has strong incentives to be able to document evidence of applications of VCCCAR research. Such evidence helps to justify the investment of public funds, but also can be considered indicative of the tangible benefits of adaptation research in terms of increasing Victoria's resilience to climate change. Undoubtedly, stakeholders in Local Government, community service organisations, and the private sector also see themselves as potentially benefitting from VCCCAR research efforts by becoming more informed or by gaining insights regarding potentially useful courses of action. While many researchers will have a personal interest in contributing to enhancing the capacity of Victoria to adapt to a changing climate, in the context of VCCCAR, their role is often largely one of executing research rather than seeing that research applied in useful and effective ways. That said,

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<sup>45</sup> Keenan, R., and Preston, B.L. (2014). Spending wisely now will make heatwaves less costly later. The Conversation, 28 January, 2014. Available at <http://theconversation.com/spending-wisely-now-will-make-heatwaves-less-costly-later-22402> .

demonstrating that research has practical value to stakeholders can be beneficial to a researcher's reputation and thereby enhance his or her influence as well as future funding opportunities.

Failure to demonstrate practical utility from investments in adaptation research can present two key pitfalls. First, it would suggest an overall weakness in the original assumptions under which VCCCAR was formed (i.e., that research is an appropriate vehicle for capacity building) or weakness in the manner in which it was operated. Either would limit the return on investment and suggest the resources allocated to VCCCAR could have been better invested elsewhere. Second, it would invite opportunities for criticism that adaptation *research* is being pursued rather than adaptation *action*. As a case-in-point, U.S. climate policy during the second Bush Administration strongly emphasised evidence-based policy and therefore the need for more research to inform decision-making. Yet political interference in research and its communication helped to marginalise science and thereby limit opportunities for research to engage effectively with policy. This phenomenon ultimately leads to a 'research trap' where research is supported to address uncertainties that hinder decision-making, yet the key factors hindering decision-making are not due to knowledge deficits, and thus are not resolved by additional research. Hence, VCCCAR's action arena of stakeholder engagement and communication is a key element enabling the action arena of research applications. The active attempt by VCCCAR to generate utility for Victorian stakeholders evidences the organisation's efforts to do more than just research and it greatly enhances opportunities for knowledge uptake and use.

The evidence of VCCCAR's research being applied comes in three different varieties. First, there are research projects that may have had limited direct engagement or knowledge coproduction with stakeholders but that nevertheless generate knowledge with clear potential in adaptation policy and practice. For example, the project [\*Governance arrangements for climate change adaptation and natural disaster risk management in Victoria\*](#) addressed key policy questions regarding the development and implementation of adaptation policy in Victoria. The identification of adaptation opportunities and constraints associated with legislation and legal instruments is a necessary step if stakeholders are to design policy interventions that enable adaptation. However, such projects in themselves do not necessarily change legislation, policy or practice directly or immediately.

Second, there are projects that can be considered action research, and thus, there is no clear distinction between research and application. For example, the VCCCAR project [\*Responding to the urban heat island\*](#), included technical reports on thermal imaging and surface mapping, but also explored the institutional barriers and opportunities for the implementation of green infrastructure. This subsequently led to an implementation guide on the deployment of green infrastructure on urban landscapes. Similarly, the project [\*Framing multi-level and multi-actor adaptation responses in the Victorian context\*](#) led to the development of the [\*Adaptation Navigator\*](#), which was used in later the [\*Implementing tools to increase adaptive capacity in the community and natural resource management sectors\*](#) project by community service organisations to undertake adaptation planning. Also, the [\*Cogenerating knowledge in research and policy project\*](#) seeks to understand the process of cogeneration and its enabling factors while simultaneously exploring options to better facilitate cogeneration within the project itself. Hence, the investigation of research questions in partnership with stakeholders leads to knowledge that provides tangible guidance and tools for policy and practice.



**Table 4.** Actors, roles and incentives associated with the *Research Application* action situation.

Actor	Role	Possible Incentives
<b>VCCCAR Staff</b>	<ul style="list-style-type: none"> <li>Establishment and participation in workshops identifying research needs</li> <li>Coordinate think tanks, forums and other events</li> <li>Issue calls for proposals</li> <li>Communicate research priorities</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model</li> <li>Maximise perceived return on VCCCAR investment</li> <li>Demonstrate new approaches to bridging research to policy divides</li> </ul>
<b>VCCCAR Advisory Board</b>	<ul style="list-style-type: none"> <li>Provide guidance and strategic direction on research agenda</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model</li> <li>Maximise perceived return on VCCCAR investment</li> <li>Demonstrate new approaches to bridging research to policy divides</li> </ul>
<b>VCCCAR Implementation Committee</b>	<ul style="list-style-type: none"> <li>Establish processes for proposal submission</li> <li>Coordinate think tanks, forums and other events</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model</li> <li>Maximise perceived return on VCCCAR investment</li> <li>Demonstrate new approaches to bridging research to policy divides</li> </ul>
<b>Researchers</b>	<ul style="list-style-type: none"> <li>Participation in workshops identifying research needs</li> <li>Development of research and think tank proposals</li> </ul>	<ul style="list-style-type: none"> <li>Enhance the capacity of Victorian stakeholders to adapt to a changing climate</li> <li>Enhance perceived impact and utility of research</li> <li>Enhance future funding opportunities</li> <li>Build networks</li> </ul>
<b>Victoria Government Staff</b>	<ul style="list-style-type: none"> <li>Participation in workshops identifying research needs</li> <li>Approval of prioritised research projects for funding</li> </ul>	<ul style="list-style-type: none"> <li>Enable long-term success of VCCCAR model</li> <li>Maximise perceived return on VCCCAR investment</li> <li>Demonstrate new approaches to bridging research to policy divides</li> <li>Enhance human capital within Victorian government on the issue of adaptation</li> <li>Improve the development of Victorian government policy and practice regarding a adaptation</li> <li>Enhance the capacity of other Victorian stakeholders to act effectively on a adaptation</li> <li>Demonstrate a activity on a adaptation by the State Government</li> <li>Increase access to information</li> <li>Build networks</li> </ul>
<b>Local Government Staff</b>	<ul style="list-style-type: none"> <li>Participation in workshops identifying research needs</li> </ul>	<ul style="list-style-type: none"> <li>Enhance human capital within Local Government on the issue of a adaptation</li> <li>Improve the development of Local Government policy and practice regarding a adaptation</li> <li>Increase access to information</li> <li>Build networks</li> </ul>
<b>Community Services</b>	<ul style="list-style-type: none"> <li>Participation in workshops identifying research needs</li> </ul>	<ul style="list-style-type: none"> <li>Enhance human capital within community service organisations on the issue of a adaptation</li> <li>Improve the development of community service policy and practice regarding a adaptation</li> <li>Increase access to information</li> <li>Build networks</li> </ul>
<b>Private Businesses</b>	<ul style="list-style-type: none"> <li>Participation in workshops identifying research needs</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda that benefits Local Government</li> <li>Increase access to information</li> <li>Build networks</li> </ul>
<b>Civil Society</b>	<ul style="list-style-type: none"> <li>Participation in workshops identifying research needs</li> </ul>	<ul style="list-style-type: none"> <li>Contribute to the development of a policy-relevant adaptation research agenda that benefits Local Government</li> <li>Increase access to information</li> <li>Build networks</li> </ul>

Third, there are various activities conducted under the auspices of VCCCAR that are not research per se, but rather activities that foster the sharing of knowledge, where stakeholders develop an understanding of adaptation in different contexts and the opportunities and constraints associated with adaptation planning and implementation. Effectively, such activities enable knowledge to be applied in helping stakeholders with problem orientation for adaptation policy and practice. There may be little specific knowledge regarding adaptation policies and practices or their costs and benefits for specific sectors. Yet, for stakeholders to determine which questions are the relevant ones and what specific knowledge is needed to support their individual adaptation challenges, some basic foundational knowledge is required. As discussed in the action arena of stakeholder engagement and communication (Section 2.3.4), research projects as well as think tanks, VCCCAR forums, and other activities supported by VCCCAR have all contributed to developing this foundational knowledge among stakeholders and researchers alike. In essence, this process represents the application of knowledge for adaptation capacity building.

Once research organisations actively pursue the application of research findings in policy and practice as an explicit objective of the research, this necessitates the ability to document research applications and their effectiveness. Much attention has recently been given to mechanisms for the monitoring and evaluation of adaptation.<sup>46</sup> However, it has also been suggested that such critical reflection should also be pursued by adaptation researchers. Despite significant investments in adaptation research in both Australia and other nations, few insights are available regarding what types of, or approaches to, research are most beneficial in terms of building capacity or supporting adaptation decision-making.<sup>9</sup> Therefore, frameworks and action are needed on behalf of researchers, research organisations, and research funders to encourage or require more formal consideration regarding the extent to which research investments are indeed delivering on stated objectives regarding the facilitation of adaptation. Fortunately, VCCCAR has pursued such actions, and thus some information is available in this regard, at least at the organisational level. For example, a consultant was engaged in 2012 to conduct a mid-term evaluation of VCCCAR “to determine progress towards expected outcomes, and provide an opportunity to refine the initiative to ensure it meets its objectives” (see Section 2.3.4.1).<sup>47</sup> In addition, VCCCAR’s collaborative structure creates opportunities for ongoing informal feedback from the Victorian government as well as other stakeholders regarding the effectiveness of VCCCAR in terms of meeting objectives (see also Box 2).

### *Research application: Proximal outcomes*

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In examining what outcomes VCCCAR has generated in terms of research applications, a number of lines of evidence exist. The formal mid-term evaluation that was conducted in 2012 generally indicated that VCCCAR has been successful in terms of “*building an adaptation community*” in Victoria, noting in particular VCCCAR’s engagement and communication efforts.<sup>47</sup> That same report also discussed the difficulties in terms of evaluating the extent to which research and stakeholder engagement translate into decision-making, due to the manner in which research is published, the time

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<sup>46</sup> Preston, B.L. (2012). Climate Change Vulnerability Assessment: From Conceptual Frameworks to Practical Heuristics. Working Paper #16, Climate Adaptation Flagship, CSIRO, Aspendale, Vic. Available at: <http://www.csiro.au/en/Organisation-Structure/Flagships/Climate-Adaptation-Flagship/CAF-working-papers/CAF-working-paper-16.aspx> .

<sup>47</sup> Clear Horizon (2012). Final Evaluation Report. 2nd Monitoring Assessment (mid-term evaluation) of the Victorian Centre for Climate Change Adaptation Research Project. Report prepared for the Department of Sustainability and Environment. Cremorne, Victoria.

lag from research to practice, the challenge of measuring the utility of research and engagement efforts, and the dynamics of policy environments. This is an arena where VCCCAR was encouraged to seek improvements in terms of articulating how its research activities contribute to policy and practice and creating processes that facilitate that translation. At the same time, however, researchers have noted that there are inherent difficulties in providing objective evidence of success in science translation.

While demonstrating research translation remains challenging, VCCCAR has established relationships that create an enabling environment for translating research into policy and practice, largely through its goodwill and transparent desire to work with diverse stakeholders. In fact, the relationships that VCCCAR has developed or helped others to develop is seen by many within VCCCAR as well as among its stakeholders as being one of the key outcomes of VCCCAR. Hence, VCCCAR is somewhat of a paradox in that it is perceived by many as being an important thought leader of adaptation in Victoria, yet is challenged to provide the kind of clear indicators of return on investment that could be readily incorporated into an organisational cost/benefit analysis. In some ways, this reflects long-standing tensions among different perspectives on how research influences policy. If one assumes that adaptation policy and practice will advance through the provision of specific knowledge regarding policy design and implementation, then it may be difficult to identify where and how VCCCAR has been effective. However, if one assumes that policy and practice advance through the development of adaptation literacy across Victoria, the development of relationships and trust among stakeholders, and the insertion of new ideas and opportunities into organisations, then VCCCAR appears to have been quite successful in terms of applying the knowledge it has generated. Clearly, both of these perspectives exist among VCCCAR's stakeholders.

It should be noted, however, that for some individual stakeholders, VCCCAR's research efforts have had a very tangible impact on capacity and have facilitated the development of policies toward more resilient organisations. For example, the [Adaptation Navigator](#) generated from the [Framing multi-level and multi-actor adaptation responses in the Victorian context](#) project is a practical tool that can be readily used by stakeholders in the adaptation process. In addition, the action research conducted in the project, [Implementing tools to increase adaptive capacity in the community and natural resource management sectors](#), contributed to adaptation planning within organisations. Such projects illustrate how research can lead directly to application. Yet, VCCCAR's stakeholders (including both researchers and practitioners) want to see more of these practical outcomes – tools, policy guidance – emerging from the investments in VCCCAR. This adds validity to the mid-term evaluation's recommendation that greater attention be devoted to thinking about the pathway by which research becomes useful. Yet, this critical thought must be undertaken at multiple levels including the fundamental strategic direction of VCCCAR, the design of individual projects, and the mechanisms by which stakeholders are engaged. If one waits until a project has been completed to think about how the research can be used to engage policy and practice, often the opportunities have already been missed.

### *Research application: Comparison with other models*

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There is no question that research in general can have important societal impacts including implications for policy and practice. This is true regardless of whether that research is basic and exploratory or applied. However, when application is explicitly stated as an anticipated objective of the research, the question ceases to be whether research can have an impact and becomes will the research have impact. It is this expectation that investments in research will be translated into

awareness and action that distinguishes VCCCAR from other types of research or research organisations. Organisations working in Pure Science Model, for example, would not identify application as an objective and some pure scientists might even reject this objective as being anti-intellectual. At the same time, the expectation that VCCCAR investments will result in actionable information and practical tools does place a burden on VCCCAR that would not exist for other research efforts. For example, it necessitates a significant investment in stakeholder engagement and communication activities. It also influences the research process and the design of research projects, and organisations and researchers may need time to reorient themselves to a new mode of operation.

## 2.4 Patterns of institutional interactions

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The interactions observed among different actors associated with VCCCAR as they engage the organisation's different action arenas conform to a small set of recurring patterns. These patterns capture particular types of behaviour and also indicate what types of outcomes may result. In particular, this report focuses on patterns of interaction relevant to understanding the relationship between researchers and practitioners as they work toward the development of knowledge to facilitate adaptation policy and practice. In this context, the interactions can be framed in the terms of different modes of collaboration, although it must be noted that the meaning of collaboration varies among different actors and situations.<sup>48</sup>

### 2.4.1 Active collaboration

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One pattern of interaction is *active collaboration* in which both researchers and VCCCAR stakeholders (whether in Victoria government or other practitioner organisations) cooperate within different action arenas toward the fulfilment of common as well as differential goals. This pattern is perhaps most evident and consistent among those action arenas where there are well-structured procedures involving both researchers and practitioners. For example, in the prioritisation of research, the various committees that exist to facilitate deliberation on strategic priorities and the prioritisation of individual research and think tank proposals contain representatives from both academia and State Government. Those committees exist such that those different actors can negotiate pathways forward that are mutually agreeable. In addition, in the prioritisation of research, it may be easier to reconcile the goals of different actors. Government seeks to prioritise research that is relevant to its agenda, while academia's priorities are on maintaining that those priority topics are pursued in a credible way by knowledgeable researchers.

Active collaboration is also observed in the execution of research. Such collaboration could occur among different researchers within the same or across different universities that pool expertise in executing a research project. However, active collaboration can also cut across institutions. For example, research projects that are perceived as successfully employing some model or mechanism for knowledge co-production are by definition displaying active collaboration. Hence, those VCCCAR projects that have pursued an action research approach by working with stakeholders to simultaneously generate and apply knowledge epitomise this pattern of interaction. Even in the absence of such an action research or coproduction, active collaboration may still be evidence among researchers and practitioners, provided the latter are consistently engaged in influencing the behaviour of the former. For example, VCCCAR projects are routinely executed with guidance from

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<sup>48</sup> Katz, J.S. and Martin, B.R. (1997) What is research collaboration? *Research Policy* 26, 1-18. Available at [http://www.sussex.ac.uk/Users/sylvank/pubs/Res\\_col9.pdf](http://www.sussex.ac.uk/Users/sylvank/pubs/Res_col9.pdf)

an advisory committee, comprised of both researchers and practitioners, that provides ongoing feedback regarding the manner in which research is being executed.

Active collaboration is also observed in the arena of research engagement and communication. For example, multiple VCCCAR projects have produced policy briefs that summarise emergent policy relevant insights. While these briefs have been produced in different ways, depending on the project and its participants, the content of those briefs has routinely been developed through a collaborative process. For example, researchers may take the lead in developing content for a brief, but that content is subsequently revised in an iterative process with practitioner feedback.

To some extent, active collaboration is also observed in the application of research findings. However, this may be limited to projects that emphasise action research and/or knowledge coproduction. Such projects tend to blur the lines between research and its application. In the absence of the adoption of such research paradigms, boundaries may remain between research and practice that hinder active collaboration. Under such circumstances, the observed patterns of interaction may be quite different (see subsequent sections).

#### **2.4.2 *Passive collaboration***

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In contrast with active collaboration, institutions may engage in *passive collaboration* in which one institution dominates the various action arenas with the consent of other institutions. For example, researchers may execute a particular research project while largely maintaining independence or autonomy from other stakeholders such as the Victorian government. As the research itself was funded, and at some level approved for funding, by the Victorian government, the government itself is a stakeholder. However, it can remain a passive stakeholder if researchers are largely left to their own devices. Such passive collaboration is most likely to arise in the research execution action arena, particularly when the research involves highly technical work with limited relevance to policy or where there is a clear 'line of sight' to a policy need, but the knowledge itself is relatively non-controversial. In fact, passive collaboration is the *de facto* model for adaptation research in that the organisation sponsoring the research is often not directly involved in the research itself. Under such circumstances, there may be little need for government or other stakeholders to be actively involved in the research. Therefore, the existence of passive collaboration, however, should not necessarily be interpreted as a negative quality of a research project.

In contrast with research execution, the action arenas of engagement and communication as well as application of research by necessity should involve more active participation of stakeholders outside of academia. Researchers alone may struggle to communicate the significance of their own work to practitioners without having practitioners assisting in that process. Meanwhile, the application of research findings in policy and practice largely lies outside the academic sphere, and thus engagement between researchers and practitioners may be needed for the effective application of research outputs. Alternatively, passive collaboration may emerge in the engagement and communication as well as in the application action arenas if researchers largely leave the communication and application of research findings to practitioners.

### **2.4.3 Competition**

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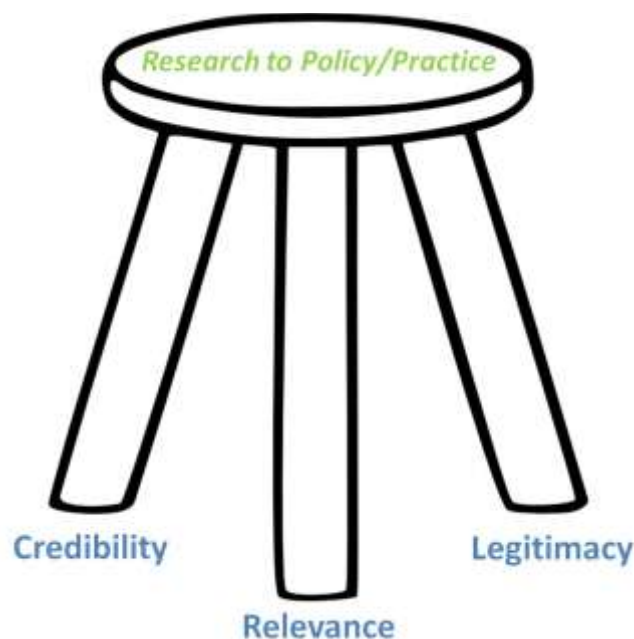
A third, and potentially detrimental, pattern of interaction observed among VCCCAR's action arenas is that of competition in which actors and/or their respective institutions seek to advance their own objectives over those of others. In some limited contexts, competition can be beneficial. For example, competition in the prioritisation of research is desirable. Much of research funding is based on a competitive model where research proposals are submitted and evaluated based on their relative merits. This process clearly helps to increase the likelihood that higher quality research will be funded, which benefits researchers, research funders, and those who seek to apply the knowledge in policy and practice.

Competitive interactions during research execution, however, can have a negative impact. For example, when researchers and/or stakeholders compete to pursue particular research pathways and/or questions rather than collaborate, this may be indicative of a lack of trust and lack of confidence in whether a particular course of action is appropriate. Similarly, if competition arises in the arenas of engagement and communication as different actors and/or institutions seek to control the messaging of a particular research project, this can ultimately reduce rather than enhance opportunities for effective communication. For example, researchers and stakeholders described instances where researchers resisted engaging with stakeholders in order to pursue their individual agenda(s) or where stakeholders sought to influence the communication of research findings so that they aligned with an a priori agenda. Though seemingly rare occurrences, they are indicative of competitive, rather than collaborative, interactions. Such competition can be managed such that actors and/or institutions have opportunities to deliberate, and among VCCCAR staff, the Implementation Committee and the Advisory Board, there have been multiple mechanisms for intervening to facilitate that deliberation. However, if poorly managed, such competition can result in conflict, where actors actively seek to undermine the objectives of others.

## 2.5 VCCCAR outcomes and evaluative criteria

Based on the preceding analysis, VCCCAR can be identified as a boundary organisation that is largely consistent with the concept of hybrid management in that its governance and its approach to research are based on a direct partnership between academia and government. This creates a number of advantages, not the least of which is it eliminates the middle man, by having direct engagement between both academia and practitioners in government. However, challenges can also arise, as both institutions have different objectives and may measure success differently. Researchers within universities, for example, may evaluate their performance based on the success of grant proposals, the magnitude of research dollars, or the number of peer reviewed journal articles and/or the impact factor of the journal in which those articles are published. Although staff within government organisations may also contribute to the academic literature, often success is judged differently including, for example, the successful execution of programs and projects, meeting budget targets, or generating positive media stories about government actions. Achieving all of these objectives may be quite difficult for a single organisation. Yet, failing to achieve these objectives suggests a lack of balance in organisational structure or function that may ultimately reduce its effectiveness.

Developing criteria with which to evaluate VCCCAR's success as an organisation is a task best left to VCCCAR staff and stakeholders. For example, the mid-term evaluation of VCCCAR conducted in 2012 was a formal exercise based on specific criteria identified by the Victorian Government which were evaluated by a neutral third-party (i.e., a consultant). However, some general evaluative insights regarding VCCCAR can be made using the well-established criteria of credibility, relevance, and legitimacy ( ). Each of these three criteria can be thought of as a leg of a 3-legged stool (Figure 6). Deficiencies in any one criterion enhance the likelihood that the stool will collapse and efforts to use research to guide policy and practice will fail. This also suggests that there are strong interactions among these criteria in that they are mutually reinforcing. Here, these three criteria are used as a lens for synthesising the macro-level outcomes of VCCCAR.



**Figure 6.** Criteria needed for research to be used effectively to support adaptation policy and practice.



### **2.5.1 Credibility**

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One element of VCCCAR's success to date has been its ability to establish itself as a trusted source of information on adaptation to climate change in the Victorian context. It has managed an adaptation research program that has delivered a broad range of research projects and outputs, not to mention the think tanks and other forums for the presentation of adaptation research and knowledge. The centre's credibility has been aided by the presence of senior, accomplished researchers within its advisory board, implementation committee, and in the position of Director. Similarly, many of the research projects themselves have been executed by accomplished researchers within Victorian institutions – aided by promising early career talent. The fact that VCCCAR is hosted by Victoria's university system (rather than by a government department) has helped the centre to maintain its credibility despite various changes in Victorian State Government since 2009.

Nevertheless, researchers that have participated in VCCCAR research projects or other activities have noted opportunities to enhance the rigour of the centre's research processes. For example, because the research proposals themselves have tended to be quite brief, it is not clear that they provide sufficient information for an evaluator to assess their merits, particularly regarding research methods and outcomes. In addition, neither the proposals themselves, nor publications such as project reports, undergo an external peer review process as is often the norm in research settings. For example, the research reports funded through NCCARF, which by many measures is comparable to VCCCAR, are all reviewed by at least two reviewers before being finalised. Also, the fact that few peer-reviewed journal articles have been produced to date from VCCCAR research projects (although there is often a lag from research completion to paper publication) suggests opportunities are being missed to further establish the centre as a source for high quality research. Such matters can be readily addressed by bolstering procedures in the actions arenas of research prioritisation and research execution. For example, more extensive proposal requirements, procedures for peer review, and expectations in terms of delivery of peer reviewed publications can all be articulated in funding agreements and contracts.

## **Box 2. Adaptation research for policy and practice: Insights from the 2014 VCCCAR Adaptation Forum**

The VCCCAR annual forums represent a key opportunity to convene a broad range of Victorian researchers and stakeholders to discuss knowledge needs for adaptation and how to meet them. The [2014 forum](#) coincided with the end of the 5-year funding period for VCCCAR and therefore was useful for reflecting upon VCCCAR, its accomplishments and the additional needs to further progress adaptation in the state. The forum was framed around four strategic questions, and comments from participants on these questions were recorded during each of the forum sessions. These comments are synthesised below.

### **How have research endeavours to date been used in capacity building and/or adaptation policy development and practice?**

While both researchers and Victorian government staff working with VCCCAR have a strong interest in generating and documenting the benefits of VCCCAR's research for capacity building and decision-making, forum participants noted this is an inherently difficult task. Certainly, research generally has had a profound role in advancing the discourse of adaptation through climate change projections, hazard mapping, and understanding adaptation options and constraints. Participants did specifically identify the [Adaptation Navigator](#) as an example of a practical tool emerging from VCCCAR research that is being used. More commonly, however, participants noted that many of the VCCCAR benefits were intangible, but still important. For example, researchers and practitioners noted that they were gaining skills in framing research questions, gaining appreciation for the complexity of adaptation. Some participants commented that the adaptation agenda was revealing weakness in business management in Victorian sectors with respect to enterprise resilience. The most common comment was that VCCCAR had catalysed relationships and activity on adaptation across the state and demonstrated an approach for collaboratively enhancing capacity.

### **What are the key challenges to using adaptation research for policy development and practice?**

Forum participants discussed a wide variety of challenges in using research as a vehicle for building adaptive capacity. One of the more common challenges related to the dynamics of the environments in which stakeholders and practitioners work. Adaptation has to compete with other priorities, and those priorities are constantly changing. This dynamism means that the timing of research is a critical aspect of it being useful for policy and practice. Multiple participants noted that research projects often take an extended period of time to complete, and those time scales are often inconsistent with the rapidly opening and closing windows of opportunity encountered by stakeholders. Meanwhile, researchers noted that engaging stakeholders in participatory research in order to enhance its utility is also a time consuming process. Forum participants also pointed to the challenges posed by organisational cultures that pose barriers to changing practices and ways of doing business and may limit entry points for new knowledge and tools. Cultural differences between researchers and practitioners also manifest in language and communication channels. Getting different individuals and organisations to speak a common language is an ongoing challenge. Finally, many other adaptation barriers that appear in the literature also surface during the forum including financial constraints, concerns about uncertainty, legacy issues, and lack of clear adaptation objectives. That said, some participants noted that the tendency to focus on problems rather than solutions was a problem in itself.

### When is co-production needed to generate research outcomes relevant to policy and practice?

Forum participants had two different perspectives on approaches to co-production of adaptation knowledge. On one hand, some indicated that co-production is needed at all times and at all stages of research prioritization, design, execution, and communication. This holistic approach to research is a response to the aforementioned dynamics of policy environments as well as a perception that researchers do not often appreciate the implications of their research (both positive and negative) for stakeholders. Hence, greater engagement is needed across the research enterprise. On the other hand, the transaction costs of co-produced research suggest that its value varies with context. Hence, co-production is best-suited to situations where stakeholders have a clear decision point that can be informed by a specific research agenda. These two different perspectives can be reconciled by focusing on the objectives a particular research effort is designed to achieve and the role that co-production can play in that regard.

### What additional steps are needed to translate research into action?

Forum participants identified some common needs in order to incentivise the use of research in evidenced-based development of adaptation policy and practice. First, and foremost, researchers and practitioners need to be able to develop a story or vision of adaptation that reflects a diversity of voices. This requires building relationships and trust and linking those relationships through networks. Some participants noted that this holistic approach was beginning to emerge in Victoria. However, it is unrealistic to expect a research finding to change ways of doing business. Rather, change comes from within, and hence substantive adaptation may require structural reforms in key systems (e.g., water resources management) greater efforts in preserving institutional knowledge, and behavioural change. That said, VCCCAR has played a role in building the capacity of organisations and empowering them to find adaptive pathways for themselves.



**Figure 7.** Word cloud based on notes taken during sessions at the 2014 VCCCAR Annual Forum. Notes from sessions were compiled and edited to remove session identification information as well as the words/phrases "adaptation" and "climate change". Credit: [www.wordle.net](http://www.wordle.net).

That said, for boundary organisations such as VCCCAR, the credibility of research is a minimum standard. The mission of VCCCAR is not simply to undertake research, but to build the capacity of stakeholders across Victoria. Hence, a strong emphasis on research credibility using the conventions and processes generally associated with a Pure Science research organisation can be counterproductive. The hybrid nature of VCCCAR means that its processes and substance must be accessible not only to researchers but also to practitioners and stakeholders. Hence, extensive proposals that are rich on methods and theory or require multiple rounds of peer review may simply slow the research process or reduce its accessibility. In other words, the efforts made to ensure the credibility of research must be balanced with the need to maintain relevance.

**Table 5.** General criteria used in the evaluation of research for policy and practice.<sup>49</sup>

Criteria	Description	Evidence
<b>Credibility</b>	Degree to which information is perceived as authoritative, believable, and trustworthy	<ul style="list-style-type: none"> <li>• Rigorous peer review process for the evaluation of research proposals and deliverables</li> <li>• Positive feedback from peers within the research community</li> <li>• Success publishing research outputs in peer reviewed literature</li> <li>• Citations to VCCCAR research in other adaptation research publications</li> </ul>
<b>Relevance</b>	How relevant is information to decision-making bodies or practitioners	<ul style="list-style-type: none"> <li>• Positive feedback from stakeholders working in policy or practice on research outputs</li> <li>• Direct contributions of stakeholders working in policy or practice to research projects</li> <li>• Uptake and use of guidance and tools emerging from research projects</li> <li>• Synthesis of research outputs into policy-friendly products</li> <li>• Development of, or changes to, adaptation policy and/or practice</li> </ul>
<b>Legitimacy</b>	Extent to which the process of knowledge production considers appropriate values, concerns, and perspectives of different actors	<ul style="list-style-type: none"> <li>• Participation of stakeholders from different governmental and non-governmental organisations in VCCCAR research projects, think tanks, and forums</li> <li>• Perceived value of VCCCAR research and activities by stakeholders outside of Victorian government</li> <li>• Transparency in processes by which research projects and prioritised, evaluated, and funded</li> </ul>

## 2.5.2 Relevance

If the goals of adaptation research are to directly enhance the capacity of stakeholders to develop and implement policy and practice, the knowledge generated must be relevant to the decision context of those stakeholders. This concept of relevant knowledge and information is often captured with the adjectives ‘actionable’, ‘decision-ready’, or ‘useful’. While conceptually straightforward, this criterion is one that has traditionally been challenging to achieve in practice, particularly for complex issues that cannot be readily resolved simply by overcoming a specific technical hurdle or analysing a specific body of data. Past attempts to use science and assessment to inform decision-making have

<sup>49</sup> Cash, D., Clark, W., Alcock, F., Dickson, N., Eckley, N., and Jäger, J. (2002) Salience, Credibility, Legitimacy and Boundaries: Linking Research, Assessment and Decision Making. RWP02-046, John F. Kennedy School of Government, Harvard University Faculty Research Working Papers Series, Cambridge, MA. Available at <https://research.hks.harvard.edu/publications/getFile.aspx?Id=60> .

met with mixed results.<sup>50,51,52</sup> Hence, the success of VCCCAR in this regard is contingent upon avoiding a number of common pitfalls<sup>50</sup>:

- Failing to appreciate the policy context for research and assessment;
- Failing to address the needs of potential users of research; and
- Failing to treat research and assessment as a communication process.

Understanding the policy context for VCCCAR has been an ongoing work-in-progress, largely due to the dynamic nature of the Victorian Government and its policy agenda over the past five years. Changes in government leadership as well as the structure of government departments caused some uncertainty in the policy context until early 2013 (Release of Climate Change Adaptation Plan March 2013). While researchers may lament this phenomenon, it is an inherent aspect of government, and therefore research organisations and their strategies should strive to be robust to such uncertainties. Despite changes in government, Victoria's Climate Change Act 2010 and its requirement for the state to generate an adaptation plan provided a consistent foundation for VCCCAR. For example, the release of the Victorian Adaptation Plan in 2013 established priorities for adaptation as well as key needs for knowledge and information that provide important context for aligning VCCCAR research to government needs. For local governments in Victoria, the VAS Partnership initiative coincided with the launch of the adaptation plan, and therefore the VAS Partnership projects can benefit from that strategic guidance. However, by 2013, the majority of VCCCAR's research projects were already completed or under contract. Continuing to use the adaptation plan and subsequent updates as a basis for prioritising research would assist in enhancing the link between adaptation research in Victoria and the priorities of government. Yet, even in the absence of that tight linkage, research efforts can help stakeholders understand issues and opportunities and therefore what questions need to be asked and answered.

While ensuring adaptation research meets whole-of-government needs in Victoria is likely to be a long-term process of continual adjustment and improvement, VCCCAR recognised early that its role as a communicator on adaptation was a key component of the organisation's mission. It is quite clear that VCCCAR actively strives to position itself as a knowledge broker that can build bridges and partnerships among stakeholders in the research community, government, and civil society. It has helped to convene a broad network of individuals and organisations engaged in adaptation and use the relationships among actors within that network to promote adaptation. Having such a broad network, however, does create potential tensions regarding whose needs should VCCCAR strive to meet. For example a series of think tanks were conducted in late 2013 to identify research needs associated with the various strategic priorities within the Victorian Adaptation Plan. Those needs are likely more extensive than can be met over the near-term by an organisation such as VCCCAR. Hence, additional deliberation will likely be needed to determine which needs are of the greatest priority to different stakeholders and perhaps identify future research pathways that can address common challenges that cut across different stakeholder groups and thereby provide greater benefit to Victoria as a whole.

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<sup>50</sup> Cash, D., and Clark, W. (2001) From Science to Policy, Assessing the Assessment Process. RWP01-045, John F. Kennedy School of Government Harvard University Faculty Research Working Papers Series. Available at <file:///C:/Users/b5p/Downloads/SSRN-id295570.pdf>

<sup>51</sup> Sarewitz, D. (2004) How science makes environmental controversies worse. *Environmental Science & Policy*, 7(5), 385-403.

<sup>52</sup> Watson, R.T. (2005) Turning science into policy: challenges and experiences from the science-policy interface. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 360(1454), 471-477.

It is therefore timely for stakeholders of adaptation research in Australia to contemplate how future research efforts can continue to meet user needs and which mechanisms are most effective in generating that research. As illustrated by the New South Wales Adaptation Research Hub,<sup>3</sup> South Australia's Science to Solutions Project,<sup>4</sup> and the Southeast Queensland Adaptation Research Initiative<sup>5</sup>, there are a range of pathways for generating knowledge that is useful for adaptation. That said, VCCCAR's structure as a boundary organisation rather than simply a provider of expert knowledge on questions deemed relevant, appears to enhance expectations of, and opportunities for, the application of knowledge in policy and practice. Hence, continuation of the VCCCAR model in some form, while addressing identified opportunities for process improvement, may be an efficient mechanism for meeting future research needs in a way that builds upon the social capital and knowledge foundation that VCCCAR has developed to date.

### ***2.5.3 Legitimacy***

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The activities VCCCAR has pursued to enhance its credibility and relevance to policy and practice have simultaneously helped to position VCCCAR as an organisation with significant legitimacy. For an organisation like VCCCAR, there are two key challenges for building legitimacy. First, it must avoid the perception that the research it produces is designed to support the a priori policy positions of government. By forming VCCCAR within the university system, the credibility associated with academic institutions helps to inoculate emerging research against the perception of political influence on research findings. In contrast, if the VCCCAR research portfolio were executed exclusively by consultancies, the emerging knowledge might be perceived more as a product of the government rather than research process.

The second challenge associated with building legitimacy is to demonstrate openness and willingness to engage with diverse stakeholders and, subsequently, to allow those stakeholders to influence research strategy and execution. In this regard, VCCCAR has worked quite actively to pursue that engagement. Its research projects have included various State Government departments, Local Government, community services, and the private sector. Hence, VCCCAR appears to have been successful in creating the perception that it is a resource for Victoria rather than just the Victorian government. Potential criticisms regarding VCCCAR's outreach efforts seem to relate to the level of resources available for VCCCAR to maximise its value in this role. This manifests at both the project level in that the commitment of time and resources to engage stakeholders in the research process is often not well reflected in the funding and time frames under which projects are completed. At the organisational level, this manifests in terms of the part-time nature of VCCCAR staff, which again constrains the opportunities for research communication, engagement of new stakeholders, and the identification of future pathways.



## 3 Emergent lessons and the ‘Victorian model’

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The rapid institutionalisation of adaptation research within Australia exemplifies the perception among those working in policy and practice that decision-making on adaptation is not well-served by the available evidence base. Hence, a wide variety of projects, programs and organisations have emerged to try and address this knowledge gap. Effectively, governments at the state, territory, and federal level are using adaptation science policy as a mechanism for advancing adaptation policy and practice. This treatment of the policy challenge as a ‘knowledge deficit’ problem is seemingly rational, and there are many examples of similar strategies being applied around the world to address a range of public policy challenges. Yet there are also many examples where this strategy, when applied using a Pure Science Model, has failed to generate satisfactory policy guidance.

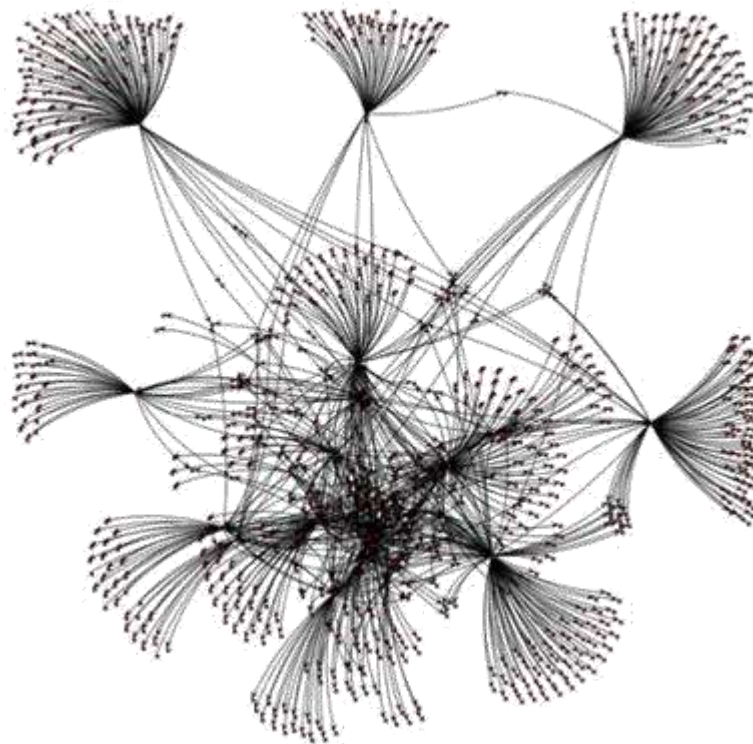
Hence, while various initiatives in Australia and elsewhere continue to adopt a Pure Science or Science Arbiter Models to the adaptation challenge, much of the more productive work in this regard is emerging from boundary organisations that work at the interface of academic and government institutions and that are more active in entraining stakeholders in the research process. For example, increasingly, U.S. federal agencies are funding the creation of boundary organisations based at universities in order to enhance the societal impacts of federal investments in research regarding climate change, its consequences, and risk management options. The U.S. National Atmospheric and Oceanic Administration’s [Regional Integrated Sciences and Assessment \(RISA\) Program](#) has supported regional teams for a number of years to enhance researcher engagement with end users. More recently, the U.S. Department of the Interior established a number of regional [Climate Science Centres](#) to help facilitate the effective use of climate science by natural resource managers. In February of 2014, the U.S. Department of Agriculture followed suit by launching several [Regional Climate Hubs](#) to provide like services for the agricultural sector. Such activities illustrate that science policy around the world is recognising the limitations of traditional Pure Science Models for meeting the needs of end users and decision makers in adaptation policy and practice.

For Australia, VCCCAR and NCCARF are similar to the various aforementioned U.S. organisations. However, some important distinctions exist. First, the U.S. organisations are largely (but by no means exclusively) focused on enhancing the usefulness of climate information for end users. While this may be an important aspect of supporting adaptation efforts, both VCCCAR and NCCARF place a significant emphasis on a broader array of research and decision support activities. Second, the U.S. organisations tend to be more conventional boundary organisations. Although they receive federal grants to operate, they are not tasked with supporting federal decision-making, but rather to support various end users in their region. In contrast, VCCCAR and NCCARF are hybrid organisations in that they both are research organisations set up by government for government, with both academia and government having a stake in the organisation.

The hybrid nature of VCCCAR forces the institutions of academia and government to interact in the production of adaptation knowledge and drive research toward outcomes that are mutually beneficial. Researchers receive access to funding and the opportunity to pursue research that can have important societal impact. Meanwhile, government receives access to a credible source of information that, ideally, is aligned to its own context and needs. That said, as illustrated by their different roles and



incentives in the action arenas, achieving those mutually beneficial outcomes is not without its challenges. The challenge of enhancing useful knowledge for stakeholders is not necessarily aided simply by the creation of a new organisation that is intended to fulfil that objective. Rather, the opportunity created by a hybrid management structure is contingent upon cooperation and collaboration among institutional actors (i.e., researchers, policymakers, and practitioners), which, in turn, is dependent upon the establishment of trust and the perception of the pursuit of common goals. In other words, relationships matter. The success that VCCCAR has enjoyed largely can be attributed to the effectiveness with which its staff, in collaboration with the Victorian government, have cultivated and managed relationships among a wide variety of stakeholders. Although VCCCAR clearly has an active role in management adaptation research and overseeing the development and delivery of knowledge, it also creates spaces in which knowledge can be shared.



**Figure 8.** Illustration of a knowledge network comprised of many actors that are linked through key nodes. Image credit: [www.activoinc.com](http://www.activoinc.com).

In light of this, there are ultimately two ways of viewing VCCCAR and its function with respect to adaptation in Victoria. On one hand, VCCCAR can be viewed in and of itself as it appears on paper – a research organisation that manages research projects that can help the Victorian government and other stakeholders understand and effectively respond to the adaptation challenge. In this capacity, VCCCAR actively promotes the research that it sponsors through communication and stakeholder engagement, and it works collaboratively with government to identify strategic research pathways and enhance the relevance of research projects and outputs.

On the other hand, it is perhaps useful to view VCCCAR as one element of a larger model for facilitating adaptation. Although originally established to build the capacity of the Victorian government, VCCCAR's influence has clearly expanded over time to influence, and be influenced by, a broader range of stakeholders. In this context, VCCCAR can be viewed as an important node in a large adaptation knowledge network that extends throughout Victoria and beyond (Figure 8). For

example, other research organisations, including NCCARF and CSIRO, have supported adaptation research in Australia, yet VCCCAR has relationships with those organisations that give Victoria a pathway to a larger pool of researchers and knowledge. Other initiatives of the Victorian government such as the VASP program are facilitating adaptation among the state's Local Governments. Many such Local Governments already have connections to VCCCAR and VCCCAR's activities can have benefits for Local Government as well. Private consultancies have emerged rapidly over the past decade as important providers of adaptation services, and greater collaboration between research organisations and consultancies may help to enhance the policy relevance of university-based research. Meanwhile, many other private firms will themselves have to adapt to a changing climate and can share ideas and practice with other Victorian stakeholders.

Victoria has therefore developed its own collaborative model for the generation and sharing of adaptation knowledge, policy, and practice. However, the 'Victorian Model' has emerged organically, rather than by design, as different actors across the state have pursued adaptation and capacity building. Furthermore, the state's adaptation knowledge network remains fairly young, and its stability and longevity are unclear. A number of adaptation initiatives around Australia have recently experienced strong headwinds due to shifting policy priorities at the national, state/territory, and local level. Nevertheless, there are opportunities for the more deliberate cultivation of the Victorian Model. First, there will continue to be a need for credible, relevant, and legitimate adaptation research to address knowledge gaps. However, there are a range of mechanisms for generating and managing that research, and the VCCCAR experience has helped to inform which mechanisms are more effective and useful. Second, organisations that have a formal role in convening researchers and practitioners to facilitate communication and knowledge sharing are important for building capacity and increasing the opportunities for the uptake and use of research. Third, investing in relationships among researchers and practitioners across the whole of government as well as among other stakeholders helps to translate research and convening functions into strong networks. Hence, recognising the value of Victoria's adaptation network, and identifying pathways for strengthening that network deliberately, rather than relying upon ad hoc efforts, can help to create a stable and long-term foundation for building adaptation responses.