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Contrasting perspectives on barriers to adaptation in Australian climate change policy

Elissa Waters · Jon Barnett · Aedan Puleston

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Abstract Barriers to adaptation have emerged as key concerns in climate change theory and practice, however there remains little consensus about which barriers are the most significant to different groups and how competing concerns may be addressed. We investigate the significance of different barriers to adaptation for governments, the private sector, and civil society in Australia through a systematic analysis of submissions to the Australian Productivity Commission's inquiry into barriers to adaptation. Our results show that respondents prioritise barriers differently according to their respective sectors, and that there are competing concerns about which barriers should be addressed first. Nevertheless, some barriers are more persistent in the submissions than others, with governance and policy seen by most groups as being the major impediments to adaptation. We explain the implications of our analysis for adaptation politics and policy.

1 Barriers to adaptation

As adaptation science and policy evolves it is becoming increasingly clear that there are a range of factors that impede adaptation to climate change (Adger et al. 2007). Barriers to adaptation are defined as “obstacles that can be overcome with concerted effort” (Moser and Ekstrom 2010). They are becoming increasingly prominent in empirical research on adaptation as they help to explain the difference between the widely recognised need for adaptation to happen and a general lack of action (Amundsen, Berglund and Westskog 2010; Nielsen and Reenberg 2010; Patt and Schroter 2008; Wolf et al. 2010).

Adaptation to the multiple risks of climate change is a complex process which involves managing the risks to a large range of values: from collective public goods shared by vast populations (such as world heritage areas, or peace), to things that are shared by small populations (such as beaches, or traditional practices), to things that are highly individualistic (such as households' gardens, or personal identity). Given this heterogeneity of adaptation concerns, there are likely to be multiple barriers to adaptation that range across scales, sectors

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and places. This suggests a seemingly endless lists of obstacles, which can make it difficult to strategically address barriers throughout the adaptation process. In response to this challenge a number of studies have made efforts to group and categorise barriers in a variety of ways, either depending on the nature of the barrier and how it manifests (Field et al. 2007; Jones and Boyd 2011; Adger et al. 2007) or the timing of when barriers occur in the adaptation process (Moser and Ekstrom 2010).

A large number of studies have also identified barriers as part of broader investigations into adaptation in different contexts. Across this literature, four barrier types emerge as the most important. First, significant attention is given to institutional barriers that emerge as part of the governance of adaptation in both developing and developed country contexts (Adger 2001; Agrawal 2008; Burch 2010; Dovers and Hezri 2010; Naess et al. 2005; Urwin and Jordan 2008). These concern the challenges of coordinating institutions across scales and sectors, the distribution of responsibility for adaptation, and the responsiveness of institutions to change (Adger, Lorenzoni and O'Brien 2009), as well as barriers that specifically relate to leadership (Burch 2010; Flugman, Mozumder and Randhir 2011; Moser 2005; Moser and Ekstrom 2010; Rosenzweig and Solecki 2010; Storbjörk 2010).

Second, the literature is increasingly emphasising barriers that relate to the social and cognitive aspects of adaptation, including emotions, knowledge, and risk perception—though as often as not these are identified as enablers as well as barriers to adaptation (Grothmann and Patt 2005; Lorenzoni, Nicholson-Cole and Whitmarsh 2007; Moser 2005; O'Neill and Hulme 2009; Swim et al. 2011; Wolf and Moser 2011; Kuruppu 2009). At a more collective level, a number of studies also highlight the role of 'culture' – that is the symbols that express meaning, and bring about collective outlooks and behaviors – in creating barriers to adaptation (Adger et al. 2013; Ford et al. 2006; Hovelsrud and Smit 2010; Kuruppu 2009; Mortreux and Barnett 2009; Nuttal 2009; Petheram et al. 2010; Rudiak-Gould 2012).

Third, there is considerable discussion on the extent to which uncertainty is a barrier to adaptation (Amundsen, Berglund and Westskog 2010; Bedsworth and Hanak 2010; Swart et al. 2009; Crabbé and Robin 2006; Few, Brown and Tompkins 2007; Moser 2005; Tol, Klein and Nicholls 2008). Uncertainty in the literature is largely characterised as a problem of imperfect knowledge about the timing and magnitude of climate change impacts, however there is increasing recognition that uncertainty is inevitable and ubiquitous across many policy problems, and that there are many approaches to making decisions that accommodate uncertainty (Dessai and Hulme 2004; Dovers and Hezri 2010; Sarewitz 2004; Wilby and Dessai 2010).

Finally, although not discussed as frequently or thoroughly as other types of barriers, the costs of adaptation are identified as impediments to action in a number of studies (N. Adger et al. 2007; Tol, Klein and Nicholls 2008; Farber 2007; Mendelsohn 2006; Tompkins and Eakin 2012). For example, cost and resource barriers are often raised in analyses of adaptation to sea-level rise (Few, Brown and Tompkins 2007; Flugman, Mozumder and Randhir 2011; Measham et al. 2011; Scally and Wescott 2011). The majority of these studies are seeking to estimate the costs of adaptation, and view the main barrier to be scarcity of resources relative to the potential costs of adaptation.

These studies give valuable insights into the barriers to climate change adaptation across developed and developing country contexts. Yet they are few, the studies are from disparate places and sectors, and for many, barriers are peripheral or secondary concerns. The majority of studies that theorise the role of barriers in adaptation are deductive in nature and are not well informed by examples. Significantly, those studies that explicitly create categorisations and typologies of barriers have, for the most part, not been informed by the experiences and opinions of those undertaking adaptation. For those studies that do focus on barriers in

practice, most are limited in their capacity to compare the relative importance of barriers across scales, places and sectors. Indeed the majority of research on individual barriers comes from small case studies (Biesbroek et al. 2013), from which it is difficult to generalise. The result of these limitations in the literature is that our knowledge of barriers, though improving in scope, is both disjointed and somewhat abstract.

We seek to address these limitations by using a unique and substantial body of evidence to analyse the types of barriers that matter most to key adaptation actors across different scales and sectors in Australia. This inductive approach is made possible through analysis of over 800 pages of submissions from companies, industries and professional associations, government agencies, non-governmental organisations and individuals to the Australian Productivity Commission's inquiry into *Barriers to Effective Climate Change Adaptation*. These submissions represent a significant body of evidence on how different actors understand and experience barriers to adaptation and the relative importance they place on various types of barriers in the context of a national level inquiry into these issues.

Having established what the literature identifies as the main barriers to adaptation, we now turn to explain what respondents to the Australian Productivity Commission's inquiry consider to be the main barriers. First, however, we explain our approach and methods of analysis. We then present the results of this analysis, through constructing a typology of the various barriers that are mentioned, and then an analysis of the comparative importance of different types of barriers to the different groups that made submissions to the inquiry. This is followed by a discussion on the implications of this analysis for adaptation research and policy.

2 The Australian productivity commission inquiry

The Australian Productivity Commission provides research and advice on public policy issues affecting the welfare of Australians, and aims to help governments make better policies by leading public inquiries on issues identified by the Australian government. In 2011 the Commission was instructed to undertake a public inquiry into the regulatory and policy barriers that may be preventing effective and efficient adaptation to climate change across all sectors of the Australian economy. The evidence that informs our analysis comes from the 79 submissions to the Australian Productivity Commission's inquiry into *Barriers to Effective Climate Change Adaptation*. The submissions were made by diverse actors in the Australian climate change adaptation policy community, from across both the public and private sectors. The individual submissions were, for the most part, considered and detailed; the average length of each submission was nine pages and overall the inquiry garnered over 800 pages of submissions. This makes for an unusually rich and detailed repository of information about the experiences and opinions of key players in adaptation in Australia.

The Commission's is an important national advisory body, which has two implications for our data set. First, the submissions demonstrate high-level engagement from those individuals, governments, civil society groups, and businesses that have already begun thinking and acting on climate change adaptation.¹ For example, the industry/professional groups were for the most part made up of those that had an interest or stake in federal adaptation policy development (such as building corporations or representatives of the insurance industry), and the local governments that provided submissions were mostly ones which had begun

¹ For a full list of respondents see Productivity Commission Final Report (Productivity Commission 2012) and for full text of the submissions see <http://www.pc.gov.au/projects/inquiry/climate-change-adaptation/submissions#initial>

adaptation planning due to their exposure to climate risks or potential adaptation policy changes. Similarly the academic submissions were dominated by those disciplines concerned with adaptation policy and governance issues such as political and social sciences. Most of the organisations that made submissions have commenced climate change adaptation planning, or have conducted surveys of their affiliate organisations on the topic for the purposes of reporting back to the Commission. While these perspectives provide valuable insights into adaptation in progress, the opinions of these groups do not necessarily represent those who are disengaged or marginalised from adaptation activities. However, given the diversity of organisations that made submissions (Fig. 1) it is likely that the barriers they identify do span a substantial range of experiences in adaptation.

Second, given that the Productivity Commission is seen to have some influence on Australian policy, the submissions should be viewed as artifacts of a strategic intention on behalf of the submitters to make their positions heard, and to influence policy decisions. A group, industry or level of government's stake in the outcomes of federal policy development on adaptation is likely to influence the types of barriers they identify and the way those barriers are framed, expressed and represented. Far from being a limitation for this type of analysis, these submissions point to the politics of adaptation policy in Australia, and ground this paper's analysis in this important and very real context.

3 Approach and method

The aim of our analysis of the submissions was to explore the types of barriers that were identified, and importantly to consider which barriers appeared to be important to different groups. Thus, the method of data analysis consisted of a systematic enumeration of barriers identified in the submissions, pattern coding to create the typology, and consistent crosschecking with the context of the original references in the submissions to maintain the meaning and nuance of the original data sources. We recorded each barrier that was explicitly referred to as a 'barrier' anywhere in each submission, including those that were framed as being encompassed by adaptation to climate hazards/risks and equally barriers that arose from adaptation to changes in climate change policy development. While this approach does

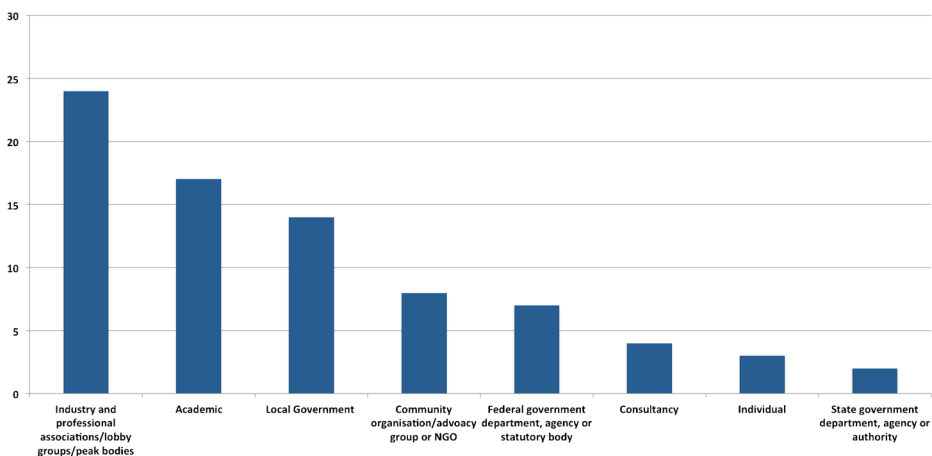


Fig. 1 Number of submissions by groups of respondents

overlook those barriers that are implicit or expressed subtly, it has the advantage of producing a focused, consistent, and bounded analysis.

To create the typology we recorded each time a barrier was mentioned in its original context (including adjoining or qualifying sentences) and examined these references for similarities and differences in meaning, as well as context and expression, eliminating those that were obviously repetitive. Next, using the method of pattern coding (Miles and Huberman 1994) we reviewed the total record of distinct barriers and analysed them for higher commonality. Pattern coding allows for the data to be broken into smaller analytic units, which can then be analysed for overarching themes or types, which have greater explicatory value, thus creating a broad typology.

In order to develop an understanding of the relative importance of barriers, repetition of mentions of distinct barriers across the respondent types is important. Thus working from the original list of distinct barriers, overlaid with the barrier type categories, we summed the total number of mentions of barrier type by respondent type. Here, we did not count repetition of distinct barriers within submissions. For example, if a submission identified a lack of leadership as a barrier and mentioned it frequently this was counted only once for that submission. Figure 2 shows the sum of the distinct barriers mentioned in the submissions by each of the five groups that made the most submissions, aggregated into barrier type.

The limitation in enumerating and aggregating qualitative data in this way is that some of the nuances in the submissions may be lost. This problem was minimised by continuous cross checking with the original submission at each stage of the systematic data analysis process; for example the original submission context was referred to each time a reference was to be eliminated for repetition or considered for a category in the pattern coding process. Thus, the method allowed both the coding process and the typology development to occur in an iterative way, which reflects the context of the perceptions in the submissions. Thus our analysis is inductive in that the barriers we identify emerge from the data, and the method has ensured that this has been done in a manner that is true to the meaning of the submissions.

This method is not intended to be a statistically significant assessment of the relative importance of barriers to all respondents: the frequency of mentions of barrier types cannot be said to perfectly reflect the relative importance of barriers to each group. Our study is exploratory: the method provides meaningful insights into the types of barriers identified by those undertaking adaptation, and it indicates broadly that some barriers are more important to certain groups. An intended outcome of this analysis is that these barrier types and priorities can be tested for their veracity and usefulness in the real world context of adaptation policy and practice in Australia and other country contexts.

4 Results: five types of barriers

There were 50 distinct barriers identified in the submissions, which together were mentioned 372 times. Pattern coding analysis of these suggested that these could be grouped into five types—governance, policy, psychosocial, resources and information—as these best fit the emphasis, language and examples that the respondents put forward in the submissions. Taken together, these 50 distinct barriers, classified into five major types, convey the wide spectrum of impediments to adaptation in Australia, though of course they are not clearly distinct issues, but rather are related and overlapping to varying degrees. Table 1 identifies each of the fifty distinct barriers that were mentioned in the submissions to the inquiry. This is the basis for the subsequent analysis of which barriers are most important to which groups of respondents.

Though our method was inductive, it is notable that the barriers identified in the submissions generally align with those identified in the research on this topic, as outlined in the introduction to this paper. The broad typology that emerges from our analysis is similar to, and certainly does not contradict those that have been developed to date (Field et al. 2007; Jones and Boyd 2011; Adger et al. 2007; Moser and Ekstrom 2010). For example, in their analysis of barriers to adaptation in North America, Field et al. (2010) classify barriers into three groups—social and cultural barriers; information and technological barriers; and financial and market barriers (Field et al. 2007), and this corresponds well with the psychosocial, information, and resource barriers mentioned in the submissions. Few submissions mentioned what Jones and Boyd (2011) call ‘natural’ barriers that include physical and ecological barriers.

Our analysis has also identified barriers relating to governance and policy. Governance is the process of steering adaptation, and the barriers identified by respondents cover a broad range of operational issues that hinder the process of decision making for adaptation. We also identify policy related barriers, which are impediments that arise from existing policy regimes and associated regulations and laws, are which are focused on the outcomes of decision-making processes. Governance is often mentioned as a barrier to adaptation (Amundsen et al. 2010), although such discussions usually include policy issues, whereas the majority of submissions to the Productivity Commission Inquiry emphasise that these are quite different barrier types, either by explicitly saying so or sectioning or numbering their reference in the submission. Together these two comprise much of the content of what the literature sometimes calls ‘institutional’ barriers, which according to our analysis does not seem to be a useful (or familiar) framing for those who responded to this inquiry.

In addition, there are some differences between how the barrier of uncertainty is described in the literature compared to the submissions to Productivity Commission Inquiry. The respondents rarely identify the barrier of uncertainty per se, but instead draw on specific contexts and instances where information needs pose challenges to adaptation. For example many submissions noted that a lack of information at local scales or a lack of access to information were barriers to adaptation. Thus we have called this group of barriers ‘information’ and not uncertainty. Similarly those barriers that relate to resources do not generally refer to a scarcity of funding for adaptation relative to cost, rather, they emphasise problems associated with the distribution of adaptation funds to particular localities and groups. In both these categories these responses are nuanced and are informed by practical examples of barriers across different scales and sectors.

Our analysis of submissions to the Productivity Commission Inquiry broadly supports the findings from related research on the barriers to adaptation: governance, policy, information, resources and psychosocial factors can impede adaptation. This data also allows us to compare the relative importance of different types of values across industries and sectors.

5 Frequency of mention of different types of barrier

To understand the importance of barrier types to different respondent groups, we analysed the frequency of mention of barrier types across the submissions. For reasons of simplification, we present here only the analysis of the submissions from the five groups that made the most submissions to the inquiry—that is those from industry and professional associations, academics, local governments, federal agencies, and community organisations. Figure 2 shows which of the five types of barriers were most mentioned across these five groups.

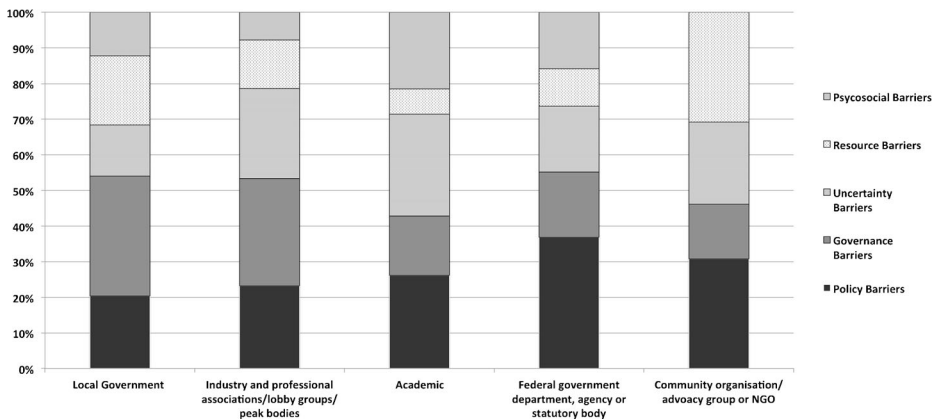


Fig. 2 Frequency of mention of types of barriers for each of the five groups that made the most submissions

5.1 Local government

The major barriers identified in submissions from local governments to the inquiry concerned governance. The submissions frequently referred to a lack of leadership at higher levels of government and ambiguity about roles and responsibilities for adaptation as being a key barrier to adaptation. For example, the Northern Alliance for Greenhouse Action stated that:

There is continuing uncertainty about the scope of roles and responsibilities of different levels of government, and the need for coordination between local governments, particularly at a regional scale.

The second major concern of the local government submissions was specific policy issues, with many identifying the risk of legal challenges as the result of land use planning decisions that reduce the value of existing properties through prohibitions on development, or through planned retreat in the case of areas at risk from sea-level rise. For example, for the Sunshine Coast Council.

The potential exposure of local governments to major financial and economic implications of injurious affection could preclude the effective implementation of climate change adaptation policy decisions.

Psychosocial barriers were also seen to be important, in particular the perceived apathy and denial in their constituencies that they suggested resulted in a ‘mandate barrier’ to adaptation.

5.2 Industry and professional associations

Similar to local governments, the submissions to the inquiry from industry and professional associations were most concerned about governance. The respondents identified challenges associated with continuity in business operations arising from changing policy regimes and complex and inconsistent jurisdictional boundaries. For example, for the Investor Group on Climate Change:

Different levels of government and different regulatory instruments have overlapping roles in terms of adaptation planning, which poses challenges for investors and insurers.

Table 1 Fifty distinct barriers to adaptation, grouped by type

Governance	Policy	Information	Resources	Psychosocial
<ul style="list-style-type: none"> o A lack of clarity on roles and responsibilities across levels of government o A lack of clarity on roles and responsibilities between the public and private sector o A lack of leadership at state and federal levels o A lack of leadership from organisations and business o A lack of coordination among arms of government o Competing demands between the public and private sectors o A mismatch between the time horizons for adaptation and political and management practices o Inconsistency in standards and policies across jurisdictions o Difficulties in trade offs between policy priorities 	<ul style="list-style-type: none"> o Lack of clarity on liability for decision making o Lack of certainty around compensation and injurious affection o Weak planning legislation unable to control development o Lack of uniformity in building regulations o The focus on mitigation has been a barrier to accepting adaptation o Regulation comes before appropriate technology o Insurance policies are unclear o Taxes on insurance products o A focus on disaster recovery rather than disaster prevention o A lack of consideration of equity in current policies 	<ul style="list-style-type: none"> o Uncertainty about climate impacts o A lack of data at local and regional scales o A lack of confidence in climate change projections at a local level o A lack of knowledge on implementation o A lack of support for interpretation of data o Uncertainty about appropriate planning tools and methodologies o A lack of research focusing on adaptation o A reliance on historical data and experience o Information not directed at specific audiences o Information is not relevant to many people o A lack of standards for interpreting data reliability 	<ul style="list-style-type: none"> o A lack of staffing, skills and expertise—particularly in local government o The cost of implementing adaptation actions o A lack of access to funding o Local governments constrained in their ability to raise revenue o The capital costs of engineering solutions o Constraints on the efficient use of capital for adaptation o A lack of targeted funding to vulnerable groups and areas o Increasing cost of doing business due to climate change policies o Low returns and limited markets for investment in adaptation 	<ul style="list-style-type: none"> o Perceptions of a lack of efficacy o Public disbelief in the science of climate change o The contestability of climate change, which creates a 'mandate barrier' o The tendency of people to discount future benefits o An emphasis on the individual rather than community o A lack of public understanding about levels of risk that they face o Cultural resistance to change o The adversarial nature of Australian politics o The 'desirability' of living in high risk areas o Apathy and issue fatigue o A fear of the unknown, resulting in denial

These different roles result in inconsistencies and uncertainties, which raise due diligence costs and increase the likelihood of ineffective adaptation measures being implemented.

The second most important barrier type mentioned in these submissions was information, and in particular the difficulty of gaining access to information that meets the needs of industry and business. Many submissions highlighted that while information on adaptation does exist, the problem was more to do with their own capacity to understand it, and the lack of tools and techniques to translate information into informed decisions. A lack of capacity to judge the reliability and quality of information coming from multiple sources was also seen to be a key barrier, as noted by The Property Council of Australia:

Confusion and inconsistency in climate change adaptation is being exacerbated by the myriad sources of information and research available from Australia and overseas.

These submissions also identified policies or aspects of policies and regulations that were specific to their particular industry as barriers to adaptation. For instance, for developers and those in the building industry an important policy barrier was the lack of regulatory or statutory imperatives requiring potential future climate change risks to be addressed for proposed developments. There are however some policy barriers that are common across different industry sectors in this grouping, for example taxes on insurance products and inconsistency in taxation regulations across States were both seen as barriers to the effective use of insurance as an adaptation measure.

5.3 Academics

The academic respondents to the inquiry most frequently identified information as a barrier to adaptation. For the most part, these references were similar to those expressed by industry organisations, although there was more emphasis placed on communication of science as a barrier to adaptation. Policy barriers were also seen to be important by this group, with a strong focus in the submissions on short policy cycles, and to the inadequate allocation of liability for risk management.

Psychosocial barriers were the third most frequently mentioned barrier type in the submissions from academics. For the most part these barriers are broad in scope and include the collective unwillingness to change in some communities, and the significance of shared values and norms in creating barriers and enablers to adaptation. For example some identified the ‘desirability’ of living in high-risk areas, like in bushfire-prone areas in the peri-urban zone, or on sandy coasts, to be a barrier to effective land use planning for adaptation. The submission from the National Climate Change Adaptation Research Facility’s (NCCARF) Settlements and Infrastructure Network identified a barrier where:

The coast is so highly valued that developers and homeowners did not want to understand the risks involved. This was not because information is not available but rather because of the attractiveness of certain lifestyles.

5.4 Federal government

The submissions that came from federal government agencies were predominantly focused on policy barriers, including gaps and inconsistencies in current policy regimes particularly in

planning policy. The submission from the Department of Climate Change and Energy Efficiency stated that:

There is growing evidence that the regulation underpinning land-use planning poses a barrier to the adaptation of urban development, particularly in coastal or flood-prone regions.

The governance barriers that are identified by these respondents matched well with those identified by industry and local government groups, which suggests that there is agreement across a broad spectrum that issues of coordination and a lack of clarity around responsibility are key barriers to adaptation.

5.5 Community organisations

Community organisations are the only group to identify resource barriers as the major barrier to adaptation, almost certainly because of their reliance on government funding for adaptation activities. The majority of barriers in this group were concerned with a lack of skills and resources at a local scale, which is consistent with the distribution issue identified by academics.

Policy barriers were the second most mentioned barrier for the community organisations, and these generally reflect their advocacy role. For example Good Sheppard Australia and New Zealand states that:

The lack of gendering within climate change policies will continue to be a systemic barrier to adaptation unless remedied through research and effective policy development.

Like the Industry and Professional submissions, the Information barriers that were identified related to a lack of ‘targeted’ information on climate change, creating uncertainty on the types of options available for particular groups, particularly those with existing vulnerabilities.

Despite these differences in emphasis on barriers among respondents, some barriers emerge as being generally more important than others. As Fig. 2 shows, governance and policy barriers are important to all groups, (whereas) there are competing concerns about the importance of other barrier categories across the respondent types.

6 Conclusions

Our analysis offers a number of lessons for adaptation research and policy. In terms of research, the evidence from submissions to the Productivity Commission’s inquiry into *Barriers to Effective Climate Change Adaptation* helps to consolidate the existing knowledge on barriers to adaptation reviewed earlier in this paper. Our results suggest that there is both coherence and convergence in the types of barriers that are being identified in the literature and those that are identified by practitioners and benefactors of adaptation in Australia, albeit with some differences in framing and emphasis. Barriers that concern governance, information, psychological and cultural factors, and resources matter to those actors in Australia that are engaged in adaptation. The analysis also demonstrates the ability of those undertaking adaptation to identify and express the barriers that are occurring as adaptation actually takes place. This indicates that there may be a need for there to be a shift in research focus from identifying barriers to understanding the various circumstances and sectors in which they arise, and how they can be most effectively addressed.

With that aim in mind we draw two important implications for adaptation policy from our analysis. As Fig. 2 shows, the groups that made submissions prioritised barriers differently according

to the sector in which they operate, and there are competing concerns about the importance of particular barriers across these sectors. This has implications for policy: governments are not going to be able to address every group's adaptation concerns at once and decisions will have to be made about those that are prioritised. This analysis shows that adaptation is an inherently political process in which competing demands will require tradeoffs in policy decisions. A more nuanced understanding about what barriers matter most to whom is therefore a key knowledge need for policy makers.

In this respect, our analysis shows that some barriers are generally more important than others, with ambiguity about governance and policy being significant barriers to most groups of respondents (see Table 1). Thus, a strong message coming from the majority of respondents to the Productivity Commission Inquiry is that adaptation first and foremost requires clear governance arrangements, and appropriate policy and legislation to implement change. Addressing these major impediments to adaptation is therefore seen by these respondents to be primarily the responsibility of government. In framing barriers to adaptation in this way they are essentially calling for a stronger role for government in adaptation, and a more proactive approach from government in addressing barriers.

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