

Climate Change Adaptation and the Pivotal Role of Water: Proposed Policy Response for Australia

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The impact of climate change continues to dominate the world's scientific and policy agendas. One fundamental concern is the adverse effect of climate change on water availability. This is especially true given potential future levels of greenhouse gas (GHG) emissions in the atmosphere are likely to contribute to both more frequent and more extreme weather events in many regions. As one of the driest inhabited continents Australia has a lot to gain from climate action. Some commentators have suggested that climate policy should be lead by the states. This article argues that with the Paris Agreement coming into force and the federal government committed to a review of its climate change policy Australia needs a credible plan to meet its international commitments. The paper concludes that only the federal government can deliver the scalable climate policy needed for Australia's future water security and sustainability.

Introduction

Understanding the problem of climate change requires an understanding of how it affects all aspects of our lives; and how to increase our resilience by adapting to its effects. Adaptation, or managing anticipated adverse consequences of a changing climate, is an essential aspect of climate policy. Adaptation has become unavoidable and can take various forms; subject to how climate change responses are planned and implemented (Zahar, Peel & Godden, 2013:p.373). Recent reports estimate that climate change adaptation costs could reach between \$70 and \$100 billion a year by 2050 (Chambwera et al., 2014:p.959). Yet, according to others, early action on climate change, including a reduction of broad ranging damages to the environment and any gains associated with protecting communities and strengthening the resilience of the economy, would far outweigh the costs of inaction (Stern Report, 2007:p.vii; World bank, 2010). Furthermore, adaptation measures are a flexible process that need continuous elaboration, best practice scientific knowledge, and to interpret uncertainty to promote decision-making (Hallegatte, Przulski & Vogt-Schilb, 2011; IPCC, 2012). In a federal system, such as Australia, climate adaption is likely to elicit a mix of federal and state responses, although states may play a leading role. This notion must be understood in a broader sense, whereby climate action embraces adaptation as an essential component of mitigation efforts (the mechanisms for reducing GHG emissions, especially carbon dioxide) and key elements of any strategy to combat climate change.

The effects of climate change on water resources are considerable and nowhere more so than in arid and semi-arid countries. Australia, a land of climate extremes where a growing population relies fundamentally on water and the benefits derived from healthy functioning ecosystems, has a lot to gain from adapting to a future where the water supply is predicted to be more variable, with potentially added impacts on agriculture. A lack of federal action has prompted some authors to suggest that climate change policy should be led by the states, as this approach would yield favourable outcomes among more progressive governments. To support this argument, this article will proceed in two sections. The first provides a brief overview of the scope of the issue and critically explores the significance of adaptation in the context of, and alongside, GHG emissions mitigation efforts. The second critically evaluates Australia's current climate change policy, before exploring ways in which governments have adapted to prolonged drought and water scarcity to achieve sustainable management in the face of climate change. The article concludes that there are some merits to exploring a state-based system, since climate change adaptation is generally suited to more local levels of governance. However, the role of federal government is key to implementation and monitoring progress, as mandatory national standards and financial support spur the adaptation and innovation needed to deliver a sound approach to water management.

Adapting to climatic variability: a brief overview

In 2007, the Intergovernmental Panel on Climate Change (IPCC) defined climate change adaptation as 'the adjustment of natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (IPCC, 2007). This concept underpins the key role of international and national adaptation governance (Zahar, Peel & Godden, 2013:p.376), such as various core systems that include, for example, natural resource allocation, financial planning and institutional arrangements to promote adaptation. The idea that human being and natural systems need to adapt to changing circumstances is not new, nor necessarily confined to climate change (Barnett & Campbell, 2010:p.1). What is different about climate change, is that it introduces a strong impetus for change prompted by various adaptive responses not confined to public policy and top-down governance options (Ruhl, 2010:p.382), but also along a spectrum of public, private action and community initiatives (IPCC, 2007:p.720; Tan, 2010:p.137).

According to Cole (2008) and others (Piekle et al., 2007) the role of adaptation needs to be better acknowledged by decision makers as we have passed the point where mitigation efforts alone can deal with the problems that climate change has created. This notion was prompted by commentators (Cole, 2008:p.2; Mackintosh, 2010:p.39) who suggest that much of the focus of climate change, whether expressed through international agreements (see Paris Agreement, 2016) or at national level (see for example Craig, 2010:p.9), tends to focus on mitigation. Yet, adaptation and mitigation efforts are not mutually exclusive; both are essential parts of a comprehensive climate change response strategy. Helberg (2009:p.89) explains that adaptation must become a co-strategy with mitigation efforts to deal with climate change, since '[r]isks associated with climate change could greatly increase vulnerability unless adaptation is stepped up'. Consequently, implementing successful mitigation strategies is critical to prevent natural systems and societies

from exceeding all capacities to adapt (Craig, 2010:p.14). This suggests that the role of mitigation is an essential component of climate policy efforts, alongside adaptation. Nevertheless, the benefits of today's mitigation is predicted to be evident in several decades, due to so-called ancillary benefits (levels of GHGs will persist for at least decades, with average global temperatures predicted to rise up) (Klein, 2007). By contrast, adaptation measures and taking appropriate action can prevent or minimize the adverse effects of climate change.

Water resource management is a critical component of a climate change adaptation strategy. More generally, comprehensive water planning forms part of the extensive reforms needed to support adaptation to prolonged drought conditions and water scarcity (Zahar, Peel & Godden, 2013:p.391). To ensure that water systems can cope with diminishing water supply due to (actual or predicted) rising temperatures as a result of climate change, we are required to improve adaptive capacity and scientific uncertainty. Tan suggests, for example, that 'if we are to build adaptive capacity in the water sector, the first issue to address is over-allocation' (2010:p.43). To ensure that water systems can cope with the predicted stresses of climate change, the balance between consumptive and environmental flows (the amount of water left in rivers) needs to be addressed (Craig, 2010:p.43). While that may be true, severe floods are also a key component of adaptation and a reminder that climate change brings variability (see IPCC, 2007). Periods of water scarcity alternate with periods of intense precipitation (IPCC, 2007), suggesting that the reliability of seasonal water is unpredictable and can further undermine sustainable water resource management.

Another issue worth considering when formulating strategic water planning is the notion of uncertainty. According to Heazle (2010:p.135), uncertainty can play a key role when policy makers attempt to justify one policy framing to be more objective or rational, than another and therefore more legitimate. Uncertainty about climate change impacts, in particular, is regarded as a significant source of political, public and interests groups' resistance to initiating climate change adaptation strategies, particularly when such measures involve changes in business conduct, or limitations of growth and lifestyle (Craig, 2010:p.43). Determining the right policy responses to climate change for mitigation and adaptation strategies, Heazle suggests (2010:p.77), is an entirely political process that must manage competing values, ideologies and preferences. In short, policy making in this context is about the reality of what is acceptable and achievable in the political world. The central policy question, he argues, should not be about 'who has got it right'; the focus should be about what is the best course of action even if the expected effects of climate change are wrong, at least until the degree of uncertainty has been addressed. Still, uncertainty is a valid factor that can influence decision-making.

A common view among policy makers is that while climate change mitigation is primarily a task for international agreements and national governments, responsibility for adaptation policies should fall within the remit of state and/or local government (Garnaut, 2011). But, does the distinction hold, given the ongoing failure of many developed countries, including Australia, to reduce GHG emissions? In the Australian system of government, where authority is divided between the federal government and the state governments, we are yet to see who is likely to take the lead and why. Exploring this idea is particularly relevant because adaptation and

mitigation efforts are interrelated issues, as each element impacts on the overall effectiveness of a climate change response strategy.

Climate Change Policy: an Australian perspective

In the context of global change initiatives, Australia's national engagement with climate change action has left many observers perplexed (see Zahar, Peel & Godden, 2013:p.17; Hamilton, 2001). The idea is best illustrated by the then Tony Abbott Australian Coalition government's repeal of the Clean Energy Act 2011 (Cth) 'as an act of political revenge' (Lyster, 2011:p.446) and against international trends. The decision was made despite wide support for a policy that promised to reduce GHG emissions by 5% below 2000 levels by 2020 and 26-28% below 2005 levels by 2030 (Australia Government, 2015). To replace the Clean Energy Act, the same Coalition government implemented the Emission Reduction Fund (ERF), the centerpiece of Australia's current Direct Action Plan for emissions reduction (Department of the Environment and Energy, 2014). Although this scheme is an important step towards curbing emissions, this instrument is widely regarded as inadequate and poorly designed (Hawkins, 2014). The current coalition government has scheduled a review of the role and operation of the ERF and its safeguard mechanism, as a central thrust of the Terms of References for its own climate policy review during 2017 (Australian Government, 2017). A review of the ERF suggests that the future of the Fund may be jeopardized, if it does receive extra funding from the coalition government (Ludlow, 2016).

By contrast, water resource management in Australia has been about adapting to change. Australia is effectively shaped by water, or the lack of it. As a notoriously arid country where water availability is highly variable (see Cullen et al., 2002) and rivers are shared across multiple states and territories, adapting to water scarcity and increased salinity combined with the need to secure future growth, prosperity and increasing stakeholder demands has been challenging (see Kildea & Williams, 2011; Papas, 2015). Meanwhile, most jurisdictions have introduced strategic water planning instruments to support adaptation to the prolonged drought and scarcity predicted for much of the country under climate change (Stoeckel et al., 2012). While acknowledging that, historically, water legislation and water management institutions were predominantly state-based (section 100 of the Australian Constitution provides that primary responsibility for water rests with state governments), policy development has also been pursued through cooperative federalism. Namely the Council of the Australian Governments (COAG), a political institutions that requires the cooperation of both federal and state governments on issues of national importance.

Strategic water planning has formed part of extensive reforms to Australia's water policy and governance systems first initiated in 1994. The most recent water policy platform, the National Water Initiative (NWI) of 2004, is a comprehensive strategy regarded as Australia's primary water policy, outlining principles to improve the efficiency and sustainability of water management (COAG, 2004), as well as the introduction of far-reaching Commonwealth¹ water legislation in response to the

¹ A Commonwealth legislation is a law enacted by the Parliament of Australia. The federal Parliament legislates or makes laws for the whole of Australia

Millennium Drought (s 51) (see Stoeckel et al., 2011). Although much progress has been made, by way of statutory and institutional reforms for the management and allocation of water at the state level (Gardner & Bowmer, 2007), water governance is slipping from the national agenda. Despite significant implementation challenges and drought risks, some academics argue that there is little detailed intergovernmental direction about the 'next steps' in Australia's water strategy (Holley & Sinclair, 2016). One key point relates to the legal and governance issues of water markets and the overall effectiveness of water trading (cap and trade scheme). Although this regulatory instrument is thought to guide rational individuals to promote 'public interests' by relocating natural resources to those who value them the most (Bradley, Archon & Sabel, 2000), fundamental challenges remain for Australia's water markets and their future governance (for more discussion see Holley & Sinclair, 2016:p.314). In this respect, it is vital to have a robust system in place to withstand higher temperatures.

Indeed, a key concern is that the impact of existing water use regime (water extractions levels) will be exacerbated under climate change (Grafton et al., 2013). Following a study carried out across four major river systems, including the Murray-Darling Basin, Australia's most prominent river system, several researchers found that the effects of water extractions and projected climate change on river flows consistently produced a similar result, the hydrological effects of past and current water extractions far exceeded projected impacts of climate change (Grafton et al., 2013:p.1). In other words, reductions of water availability due to rising temperatures and possibly evaporation is likely to result in reduced flows and may require further reduction of water entitlements. This notion has been advanced by other academics who point out that those who bear the risk from climate change induced water reductions, namely the states, are not to be compensated by the government (Gardner, Blakers & Hartley, 2014:p.8; Papas, 2016). Although this policy is regarded as 'significantly unjust' and inconsistent with the 'polluter pays principle', despite the obvious concessions to the complexities of accounting for the extent to which climate change causes the event that gives rise to loss and reduction (Gardner, Blakers & Hartley 2014:p.8), it reaffirms the need to strengthen water management planning to ensure that water is used sustainably.

The way forward: what can be expected?

The need to develop robust and adaptive arrangements for the allocation of water resources cannot be understated. Climate change is one of the biggest challenges of our time to equitable and sustainable resources use. The combination of change in supply, suggesting that past hydrological experiences are no longer a reliable guide to future conditions, and the increased demand of crops responding to higher temperatures (Jimenez et al., 2014), together challenge governance approaches adopted under what Milly et al. (2008:p.573) calls 'the assumption of stationarity'. He explains:

[s]tationarity – the idea that natural systems fluctuate within an unchanging envelope of variability – is a foundational concept that permeates training and practice in water-resource engineering

However, climate change undermines the above assumption. Predictions that increased levels of GHGs in the atmosphere are likely to precipitate these changes and result in more extreme weather patterns, including flood and drought (Jimenez, 2014) require a degree of adaptability and flexibility in governance ‘that has yet to be attempted’ (Cosens, 2016:p.373). In this respect, Australia has demonstrated an extraordinary capacity to adapt its water policy and laws to suit the demands of the day but more will be needed in the future, particularly in respect to ancillary benefits. What is less clear, therefore, is the future trajectory of mitigation efforts given the federal government’s ambivalence on the matter.

As previously mentioned, mitigation and adaptation efforts are two elements of a whole. In other words, they are not mutually exclusive approaches. The lack of initiative by the federal government, and Australia’s national stance on renewable energy schemes more generally, has prompted some commentators to suggest that, relying on states to implement climate policies could produce better outcomes (Alexander, 2015; see Harris, 2016). Indeed, a state-based trend could become the norm, especially if the current Australian coalition government fails to promote its climate policies.

Much has been said about the Turnbull federal government having no credible path to meet Australia’s Paris Agreement commitments and pledge to reduce emissions by 26-28% by 2030 (Australian Climate Authority, 2014; Hannam, 2016). However, the government is currently undergoing a review of its climate policy scheduled to conclude by the end of 2017. The review should be an opportunity for the government to address a number of key issues, including bolster the Direct Action scheme by tightening its emissions baseline to force big polluters to change their behavior and reduce their emissions (Ludlow, 2016). As it currently stands the safeguard mechanisms that set emission baselines for over 150 of Australia’s biggest polluters can be changed if they exceed their limits (Ludlow, 2016), resulting in a scheme that does not compel major carbon emitters to significantly reduce their GHG emissions.

Meanwhile, state and territory governments have announced or already implemented their own emissions target and renewable energy schemes. For example, the Victorian Labor government has announced an ‘ambitious and achievable’ Victorian Renewable Energy Target (VRET), which will commit the state to generating 25% of its electricity from renewable energy by 2020 and 40% by 2025 (Premier of Victoria, 2016). According to Victorian energy minister Lily D’Ambrosio, a key motivation for the scheme was to restore confidence and side-step the uncertainty that has plagued the renewables industry in recent years (Parkinson & Vorrath, 2016). While details of the VRET are yet to be clearly defined, the scheme indicates that Victoria intends to take the lead on climate change, thereby shifting climate responsibility from federal to state government. More recently, the Australian Capital Territory reiterated previous commitments of 100% renewable energy to meet its electricity needs by 2020 (ACT Government, 2016). Similarly, South Australia announced in 2014 a 50% target by 2025 (Government of South Australia, 2014), further demonstrating that Australian states are committed to renewable energy and take climate change seriously.

Despite criticism for their lack of coordination at a national level, or failing to consider implications for system reliability and security (for more discussion see Slezak, 2016), state-based targets and schemes seek to lay the foundations for long-lasting climate change actions. For Australia's climate, 2016 was the hottest year on record (Bureau of Meteorology, 2016), pointing to higher temperatures and increased levels of GHGs in the atmosphere, which in future will result, in greater extremes in weather patterns and variable precipitations. Despite Australia's response to extended drought and scarcity (including flooding), offering a window on the way in which governments are balancing water allocation among consumptive and environmental uses to effectively achieve sustainable management have translated into little action. Yet, in order to effectively address climate change, GHG emissions in the atmosphere must be significantly reduced. Emissions are the primary driver of the strong warming of the planet that precipitate change.

As previously mentioned, establishing a credible and scalable national climate change policy to curb emission reductions is generally the responsibility of national governments. Of course, the onus to reduce emissions does not rest on national governments alone, but a national reform sets best practice mandatory standards for states and territories to act in the spirit of national cooperation. Meanwhile, states premiers and territory counterparts are to be applauded for their initiative in instigating targets and renewable energy schemes. For now, the fundamental driver behind the federal government's position on climate change has been relegated to the Terms of Reference review for 2017. The outcome will hopefully highlight the need for a significant transition to lower-emissions and boosting renewable energies.

Conclusion

Climate change is one of the biggest threats of our time. The combination of historical change in supply (change in hydrological cycle), increase in demand for both consumptive use (the response of vegetation to higher temperatures) and stakeholders' allocations (reduction of entitlements) is a constant reminder that change is inevitable. Climate change adaptation measures are either driven by improving methods and models to assess and predict climate change impacts on water systems, or as a more preemptive and broadly based assessment of vulnerability. These assessments are then combined with policies to develop a strategic capacity to respond to potential impacts. However, adaptation must also be combined with mitigation efforts, to produce a strategy to combat climate change. In Australia, strategic water planning has for several decades formed part of extensive reforms to adapt to water scarcity. Yet, a key concern is that the existing water use regime will be exacerbated by the effects of climate change and progress on adaptation will be distorted by the common assumption that adaptation is naturally suited to more local levels of governance, whereas mitigation is a national issue. The Australian federal government's lack of action on mitigation could have grave consequences for water resources if the government does not act soon. The 2017 federal government climate policy review is an important first step, but we are yet to see whether the government will take the lead.

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