Indigenous communities and climate change: a Recognition, Empowerment and Devolution (RED) framework in the Murray-Darling Basin, Australia
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ABSTRACT
Climate change directly threatens Indigenous cultures and livelihoods across Australia’s Murray-Darling Basin (MDB). Using a modified grounded theory methodology, this study draws on in-depth interviews with Indigenous leaders and elders across the MDB to highlight that climate variability and over-extraction of water resources by agricultural users directly threatens the integrity of aquatic systems. As a consequence, Indigenous cultures and livelihoods reliant on these natural systems are at risk. Interviewees identify a range of systemic barriers that entrench vulnerability of Indigenous Peoples (IPs) in the MDB. Building on insights from the literature and from interviews, a Recognition, Empowerment and Devolution (RED) framework is developed to establish possible pathways to support climate adaptation by rural IPs. Fundamental to this RED framework is the need for non-Indigenous socio-institutional structures to create a ‘space’ to allow IPs the ability to adapt in their own ways to climate impacts.

Key words | adaptation, climate change, Indigenous peoples, Murray-Darling Basin Australia, Recognition, Empowerment and Devolution framework, vulnerability

INTRODUCTION
Indigenous peoples (IPs) are especially vulnerable to the effects of climate change because many live on marginal lands and are also more reliant on natural resources for their livelihoods and wellbeing (Macchi et al. 2008). Compounding the vulnerability of IPs is a socio-economic disadvantage that constrains their ability to respond to the effects of climate change (IPCC 2007b, 2007c). A global challenge is how to assist IPs to adapt in their own ways to the effects of climate change.

Using data from in-depth interviews and engagement with Indigenous communities in the Murray-Darling Basin (MDB) in south-Eastern Australia, we provide a framework for understanding the ways that IPs can adapt to climate change. A key feature of these communities is that as a result of the reallocation of land and water to European settlers, much of the landscape is dominated by intensive agricultural practices (Crase 2009; Weir 2009). While there is convincing anthropological evidence that IPs across Australia have successfully adapted to gradual climate variability for tens of thousands of years (Green et al. 2010b), the cultural knowledge that has served them well for millennia has never encountered the rapid environmental change that is a direct result of modern anthropogenic activity. For example, in the MDB cease-to-flow events at the Murray River mouth have increased from 1% of the time before European colonization to 40% under current development conditions (CSIRO 2008).

As a result of environmental change, IPs in the MDB have argued for official access to water that has been termed ‘cultural flows’. There are diverse perspectives on what is a cultural flow. For the purposes of this paper we define cultural flows as stream flows intended to ensure a cultural continuity of practices reliant on river flow. Thus, cultural flows may assist IPs in coping with environmental
change. Nevertheless, the extent to which additional measures are required to assist adaptation is not obvious, as more immediate stressors and problems take precedence in many Indigenous communities (see Petheram et al. 2010).

Using a modified grounded theory methodology, we explore the perceptions of 30 Indigenous leaders across the MDB (see Appendix, available with the online version of this paper) to answer the following questions:
1. How is climate change framed by IPs in the MDB?
2. What are the costs and benefits from climate change?
3. What is required to support Indigenous adaptation in the MDB?

A key feature of our work is that we adopt a socio-constructivist perspective that allows local knowledge to be generated to respond to local socio-ecological problems (Berkes 1995, 1999). From this perspective, and based on our interviews with Indigenous leaders, we develop a Recognition, Empowerment and Devolution (RED) framework that sets out possible pathways to enable IPs to shift from a position of vulnerability to adaptability.

Background

The MDB includes more than 2 million residents who depend on its water for drinking, for agriculture and industry, and for recreational purposes (see Figure 1). The MDB is an important agricultural region that produces 40% of Australia’s agricultural output, by value, with a significant proportion provided by irrigated agriculture such as cotton, rice and dairy (ABS/ABARE/BRS 2009).

Prior to colonization, the region was one of the most densely populated in Australia, and today the MDB is home to some 70,000 IPs (3.4% of the MDB’s population), who typically live in remote and very remote parts of the region (Taylor & Biddle 2004). However, IPs only own 0.2% of the land-base in the MDB (MLDRIN 2009). There are more than 30 diverse Indigenous nations across the region, each with a traditional connection and a range of spatial responsibilities to land and water (Weir 2007). Unfortunately, Indigenous communities are more likely to suffer from socio-economic disadvantage than non-Indigenous populations in the region, and their participation in the agricultural sector, the biggest economic driver in the region, is low (Taylor & Biddle 2004). In sum, distributive justice for water resources management is viewed as an issue of national importance in the MDB (Lukasiewicz & Baldwin 2014).

Over the last decade the MDB experienced unprecedented heat waves, drought, and low annual flows (CSIRO 2008), resulting in 20 of the 23 MDB river valleys being deemed to be in poor or very poor health (Davies et al. 2010). This ‘Millennium drought’ that ended in 2010 imposed significant environmental costs, and may be a harbinger of future droughts that could increase in intensity with climate change (IPCC 2007a; CSIRO 2008).

The Millennium drought is consistent with projected trends of reduced water availability and hotter temperatures, with a noticeable drying trend in the southern Basin (CSIRO 2008). In response to this drought, the federal government legislated the Water Act 2007 (Commonwealth) and created a federal water governance agency, the Murray-Darling Basin Authority (MDBA) (MDBA 2014). The MDBA is responsible for developing a Basin Plan that ensures sufficient water for environmental flows and general river health. This is to be accomplished primarily by the establishment of Sustainable Diversion Limits (SDLs) for irrigators and other consumptive users (MDBA 2014). The Basin Plan’s key arrangements came into effect on 1 July 2014, and should reallocate about one quarter of recent historical water extraction to environmental flows within the coming decade (Grafton et al. 2014). While this reallocation has met with controversy among irrigators, communities,
Assessing the costs and benefits to climate change. Individuals with limited information tend to assign a higher probability of power and risk to climate change. We describe adaptation (and adaptive capacity) as emergent opportunities, or benefits, while we characterize vulnerabilities as existing and potential costs. Adaptation to change is viewed as a defining characteristic of IPs in the MDB, as they have lived continuously with variability, and have had to cope with immense social change since colonization (Weir 2009). Some literature argues that Indigenous knowledge and Traditional Ecological Knowledge (TEK) is undervalued, but this knowledge could be important in responding to new challenges posed by climate change and to foster resilience (see Ross & Gerrard 2008; Turner & Clifton 2009; Weir 2009).

Gerrard (2008a) describes climate change as a ‘double edged sword’ for IPs in Australia, on one side representing an acute threat to Indigenous livelihoods, while on the other presenting new economic opportunities around carbon and biodiversity markets. According to Gerrard (2008b), as climate change policy develops, it may offer opportunities to integrate TEK with market-based measures (such as carbon trading). Gerrard contends that the threat of climate change could create an enhanced value and appreciation of TEK because it may help mitigate climate change impacts on land and water. In turn, such knowledge offers economic opportunities to IPs.

Tran et al. (2013) document that the return of custodial lands can lead to enhanced adaptive capacity, particularly where it enables Indigenous groups to improve environmental management and resilience. They also describe that the transfer of Indigenous knowledge can lead to better adaptation planning among the broader polity. To be realized, such opportunities will require a ‘space’ to be created by policy-makers to enable IPs access to adaptation mechanisms and the flow of benefits from local resources. By contrast, according to Gerrard (2008b), there is typically no clear support for IPs in climate adaptation and mitigation measures. This is because adaptation measures are most often established and enabled by groups with power. Thus, support to enhance the adaptive capacity of marginalized groups is given a lower priority (Adger et al. 2005).

The accepted view is that IPs are more vulnerable to the impacts from climate change as a result of their location on marginal lands and socio-economic disadvantage, which constrains their ability to adapt to change (Macchi et al. 2008; Green et al. 2009a; Green et al. 2009a). Living in rural or isolated regions can also increase vulnerability to climate change. For instance, research in the Torres Strait Islands indicates inadequate scientific assessments of climactic risks, and a lack of knowledge of potential hazards...
(Green et al. 2010a). Other research shows that climate change will have an undue effect on the health of Indigenous Australians because of the nexus between the health of land and the health of people (Green et al. 2009b). In addition, Milne et al. (2008) observe that the impacts of drought in the MDB were only one factor affecting communities, and not always the most significant, in what they describe as ‘a layering of cumulative pressures and impacts’ (p. 33). Under this perspective, exposure to pressures to change behaviors and an awareness of the adverse consequences of climate change may actually increase vulnerability to negative impacts and reduce adaptive capacity (King et al. 2009).

Despite recognition of climate change, a range of sowers on communities may take priority, including alcohol management and youth issues (Petheram et al. 2010). Petheram et al. (2010) describe how the ecological changes attributed by IPs to climate change, such as increased hazardous climatic events and reduced abundance in wildlife and vegetation, can contribute to feelings of disempowerment. In such cases, poverty can marginalize communities from effective decision-making and engagement with appropriate authorities. Further, there remains a dearth of information about the costs of climate change on the rights and interests of Australia’s IPs (Altman & Jordan 2008). Without this understanding, it is impossible to effectively develop adaptation measures that support Indigenous aspirations and livelihoods at the community level (IPCC 2007b).

**Determinants of access**

Climate change has the potential to re-shape the landscape and accelerate socio-economic change in the MDB. We know in the MDB that Aboriginal culture is deeply intertwined with the land, but Indigenous land tenure and access to land, as well as access to natural resource governance and economic power, is highly constrained (Weir 2009). The landscape in the MDB is dominated by the expansion of irrigated agriculture; simultaneously, Indigenous livelihoods are affected by climate variability, drought, and unsustainable agricultural practices (Morgan et al. 2006; Weir 2007).

The challenges faced by IPs can be mitigated. In particular, Ribot & Peluso (2003) illuminate how social and power relations mediate the ability to benefit from land and natural resources. Mechanisms that can influence access to land and resource benefits, in lieu of property rights, include knowledge, or the ways discourse is shaped to maintain access. Another mechanism that affects access is authorities, including groups or individuals who may sanction access opportunities for particular actors or activities. Unfortunately, the ability to influence these authorities may be limited for ethnic and cultural minorities such as IPs. A third mechanism on which we focus in this paper is social identity, or group membership, which can mediate resource or land access in either inclusive or exclusive ways. In the context of social identity, native title law may include particular Indigenous groups in access to resources, but it may exclude others who cannot prove their connection in the courts and those without a traditional connection to a specific area.

**METHODS**

The purpose of our work is to develop an understanding of the perceptions of IPs to climate change in the MDB, how it is framed in terms of cause and risk, and to illuminate the costs and benefits. Such understanding helps to determine possible adaptation responses and pathways. Our research was undertaken over the period 14 April–20 May 2010 and involved 30 interviews in seven locations in the MDB.

Our study draws on literature to inform and guide our interview protocol and data collection, and then we test and extend this theory through primary data collection, comprising personal interviews with Indigenous leaders across the MDB. While there may be bias from leaders who want to advocate a position, our purpose is to show how climate change is understood by Indigenous groups, how such knowledge is generated within socio-cultural processes, and where this knowledge takes meaning and is given expression. Our approach recognizes the value of local knowledge in ecological and social research, and is based on the principle that such knowledge is fundamental to developing solutions to local problems (Berkes 1993, 1999).

Our study follows a ‘grounded theory methodology’, where we worked inductively to generate themes and theory throughout fieldwork and analysis (Strauss &
Corbin 1990; Glaser 1994). This method allows participants to derive practical outcomes from the study (Berman & Kofinas 2004; Petheram et al. 2010), and enables researchers to delve more deeply into the research problem by probing into emerging areas as they arise (Whyte 1991). Our interview questions were initially drawn from theoretical concepts in literature, such as cultural frames, vulnerability and adaptation. In keeping with the participatory nature of the study, we drew insights from initial discussions with Indigenous research partners. This helped us to guide the research agenda, to ensure it was relevant, and to answer questions partners wanted answered. The Indigenous research partners’ contribution, MLDRIN, also ensured our work was of practical importance in the planning efforts at the MDBA, and thus relevant to the interests of Indigenous participants (Smith 1999).

We initially used a purposive approach to select interviewees, generating a list of individuals actively engaged in advocacy on land and resource management from the research partner. Fieldwork was undertaken in the towns of Albury-Wodonga, Dubbo, Deniliquin, Weilmoringle, and Brewarrina, with additional interviews held in Sydney and Brisbane. A ‘snowball’ approach was then used to access elders and other individuals with cultural authority and expertise on climate change in communities (Guest et al. 2006; Noy 2008). Drawing from the networks of the researcher partners, we typically asked individuals to talk about their experiences with reference to their traditional territory in the MDB. Two participants were in representative positions, but they did not have traditional territory in the MDB. A snowball approach can help broaden the perspectives analysed in a study and avoid the bias that can result when interviewees are involved in interest groups (Syme & Nancarrow 2000).

There were four instances where the researcher was unable to meet with interviewees in person, and in these cases telephone interviews were conducted. Interviews lasted up to 3 hours, many undertaken at the kitchen table of the homes of interviewees. While the sample is not representative for all IPs in the MDB, it did allow us to test for shared insights among a diverse group of Indigenous leaders in the MDB. All responses are listed as anonymous, but we do provide a description of the gender and role of the expert in the quotes (see Appendix, available with the online version of this paper).

We contend that personal interviews are an effective way to understand perspectives on climate change in the Indigenous context (Petheram et al. 2010). Interviews were conversational in nature, with the researchers and participants following structured questions, such as ‘What does climate change mean to you?’ Answers from participants were followed with probes like: ‘What has been your experience’ and then ‘Is your experience unique? If so, why?’ Lines of inquiry were pursued until they were exhausted – only then was the next question asked. This kind of probing, and assurances of anonymity, can help mitigate overt bias and cognitive heuristics among interviewees (Tversky & Kahneman 1974).

Data analysis

Interviews were audio-recorded, transcribed, verified and then imported into a data analysis program, NVIVO, which has been widely used in social science research (Bazeley 2007). Analysis was undertaken by an independent researcher, who adopted a procedure established by Miles & Huberman (1994). This procedure assigns descriptive codes to segments of data from which themes and patterns are then determined. Data were visualized in NVIVO according to questions, and the responses of interviewees were assigned codes, and then clustered into themes. The frequency of the theme was then recorded. The process for coding was inductive, with some codes and themes amalgamated or dispensed with during the process, and preliminary findings were drawn once data was exhausted and the themes saturated. Interviewees were sent preliminary results to verify the relevance of the findings; from this feedback findings were clarified and then finalized. The results presented in this paper were sent out to participants and the relevant representative bodies.

RESULTS

How is climate change framed?

‘We aren’t putting a word on it or trying to name it, we just have an instinct that things are changing for the worse…we have felt this change many many years before climate change came on the arena.’ (16)
All interviewees viewed climate change negatively and many perceived it to be part of an ongoing colonial project that heightens Indigenous vulnerability. It was articulated that climate change is ‘an added stress on country that people see as out of their control…a white man’s problem, and it is seen as an insurmountable’ (1). A third of interviewees noted that their community’s understanding of climate change is limited as ‘people are struggling to survive, they are not thinking about this big thing out there that they are not quite sure about…’ (15). Overall, the sense of helplessness and vulnerability was strong. There was also a sentiment among a third of interviewees that climate variability is a natural phenomenon in their territory, an elder explains, ‘This country it’s ruled by three aspects: drought, fire and flood, in that order’ (24), but these cycles have become more intense, and even more destructive because agricultural expansion has left ecosystems and the cultures reliant on them less resilient.

‘It’s changing the environment. Changing the atmosphere. Changing the air that we breathe. Changing the water that we drink. It’s changing the ecosystems. It’s changing the weather patterns.’ (18)

Twenty-one of 30 interviewees personally described a decline in native species because of a drying effect in their country combined with the expansion of irrigated agriculture – which means less habitat, and less water of a healthy quality. ‘Around here they grew a lot of rice. If you drive around you’ll see a big patch of white, it’s salt, where the salt has destroyed the land…’ (12). Land clearing has reduced the number of emus, koalas, wombats, kangaroos, wallabies and dingoes while irrigation, and the creation of dams, has reduced aquatic species such as fresh water mussels, yabbies, crayfish and fish. These species are more difficult to find, or extirpated from certain areas.

‘Whether you call this climate change or not…the plants and crustaceans, fish…[We] used to be able to gather those things and eat them, but now you can’t see them. Another thing the mussels, the crayfish and the turtl, are they safe to eat? I wouldn’t eat anything where we used to go years ago because of the pollution to the water.’ (28)

Changing flood patterns and deforestation were key issues in the health of riverine environments. One interviewee (19) describes the unsustainable private land management practices in his territory: ‘they [farmers] have no idea how to manage the land, they are completely overstocked, or they have cleared the floodplain of all the red gum, black box and salt bush and turned them all into irrigation banks’. While an elder proffered: ‘We are not going to have any water! Because the landscape and everything that brings the water to the landscape is gone. If you haven’t got anything to cool the landscape down it’s going to be barren’ (8). These changes, according to some interviewees, are pushing the resilience of ecosystems in the MDB beyond its limits – ‘this land is not a deep fertile land, it was not to be ripped apart’ (12).

The link between the health of the country and the health of its people is present in the discussion provided by every interviewee. An elder related: ‘Our mob talk about cultural decline to the degree where we will no longer exist, in the true sense, being unable to undertake our cultural practices because the changes will be that great’ (7). In a very real sense the issues linked with climate change highlight the vulnerability of communities already struggling with the demands of living on the margins of Australian society.

Risks: the impacts from climate change

There were four areas that were viewed as key risks for IPs in the MDB from climate change: (1) further constrained access to land and resources; (2) effect on cultural sites; (3) economic impacts; and (4) physical and mental stress.

Constrained access to land and resources

Indigenous groups are under-represented in ownership of land and water rights, which means their ability to undertake customary practices is constrained. An interviewee described:

‘The large areas we used to be able to access and gather resources from are now in the hands of private property owners. And unless you are on good terms with
the landowners then you have Buckley’s and none for getting access to resources...’ (19) [‘Buckley’s’ is a local Australian idiom for a slim chance.]

Interviewees emphasized that without having access to land they cannot connect their children and grandchildren to country, or care for sites and meet cultural responsibilities, threatening the continuity of their culture. Without land ownership, IPs also remain at the periphery of power, where the full breadth of their values are not accommodated or heard in climate change debate. An elder reflected that: ‘My people weren’t farmers, we lived off our traditional areas and had our own little place and moved around and took what we needed and moved... My people didn’t own the land, they belonged to it’ (12).

Colonization resulted in IPs across the MDB often being relegated to small reserves, such that much of their ‘country’ or territories were lost to settlers who converted it to agricultural land. In the past few decades water rights (Grafton & Horne 2014) established to deal with scarcity were allocated almost exclusively to irrigated farmers and non-IPs. The process of colonization begun over a century ago has created a set of land use conditions that continue to reinforce economic and social vulnerabilities among IPs in the MDB.

Interviewees expressed their desire for greater access to land and influence in land management to maintain the integrity of ecosystems. They also want the implementation of cultural flow regimes to meet their cultural objectives to water. But, as four interviewees suggested, market values of land and water rights in the MDB are likely to increase because of scarcity, which will make it more inaccessible to purchase by IPs who are already socio-economically disadvantaged. The potential to increase IPs’ influence over land and water, and connect future generations to land and their culture would appear, therefore, to be greatly circumscribed.

**Cultural sites**

The MDB Plan focuses on the conservation of specific icon sites of high conservation value, 18 in total. Interviewees in this study emphasized that managing on a site-by-site basis ignores the interconnectivity of land and waters in the MDB. Three interviewees likened land and water in the MDB to a human body, underscoring the importance of managing holistically. An interviewee described:

‘If our response to climate change is going to be site based then we’re in trouble again ‘cos surely what climate change teaches us is the connectivity of everything...The River is one whole entity. It’s like your body. It’s no point to save your liver if your brain is gone.’ (1)

The response by government, to conserve 18 important sites that are important to IPs, but represent only a fraction of their cultural sites, is too simplistic according to three interviewees. An interviewee explains:

‘This MDB Plan is all about the environment and SDL’s and how much water can we get from here or there to put into the Iconic sites... What they’ve done they’ve calculated how much water needs to flow through them... But it’s no use letting water run down the river the Lower Balonne and not let it run outside the banks.’ (18)

It was stressed that the MDB needs to flood, so that water can run across floodplains, fill billabongs and sacred areas. However, it is noted that there is mistrust among IPs about sharing sacred sites with government and the broader polity.

**Physical and mental health**

Five interviewees reflected on the negative impacts of climate change with a focus on the physical health of IPs across the MDB as traditional foods have become scarcer or extirpated. In turn, this has increased reliance on store bought food and associated lifestyle diseases. Six interviewees reasoned that their identity is intertwined with land and water; where these are unhealthy they too suffer personally:

‘It’s the mental health of our people because we’ve got an inherent right to live life in a certain kind of way as Aboriginal people... And we find it difficult to continue our cultural business especially in relation to waterways and the land.’ (26)
Other issues raised by interviewees were linked to the impact of heat waves. Heat waves put added stress on people living with substandard housing, little disposable income for electricity bills for cooling, and limited access to good quality, potable water. They also compromise the safety of communities due to fire risk.

**Economic**

Four interviewees responded that climate change has, and may continue to have, an economic impact on IPs across the MDB. These include effects on the customary economy (which supplies nutrition and medicines to people), and also on the agricultural economy (where employment is in steady decline). Two interviewees reflected that government services might diminish in remote areas across the MDB because of structural adjustments, forcing people to migrate to urban centers and cities. One leader stated: ‘sustaining ourselves is going to be at risk...because of the economic constraints that are going to be placed on living in the bush’ (18). It was also argued that reduced services would compound social vulnerability given the pre-existing health problems in aboriginal communities.

**Adaptation and opportunities from climate change**

‘People are aware and they are adapting to a change of life which has been introduced to them. [But] progress has killed off a lot of things.’ (12)

Interviewees overwhelmingly agreed that to support adaptation among IPs, and in the environment, IPs need to be empowered in land and resource governance. An interviewee described: ‘You know all we do is advise these groups...We don’t want to be sitting there feeding them information. We want to be at the table making decisions with them’ (14).

To date, there has been little expansion in co-management or shared decision-making, with IPs absent from policy making on climate change. Fifteen interviewees urged true engagement between Indigenous and government organizations, not just ‘tick the box’ consultations. It was also stated that ‘you restore pride...if you give people their own land... They could lead the way with practices and traditional land uses, and diversify into other areas’ (19). These interviewees concluded that progress is likely to be insubstantial unless IPs are supported by rights and access to both land and water.

Thirteen of 30 interviewees stressed the need for capacity building within communities to support adaptation. Education, in particular, is crucial to future success within their communities, as an elder stated: ‘the future for IP is what we make it...we need to be educating our kids to work in those places with government, to know and understand what the requirements are and take our culture into the future’ (9). Climate change information, interviewees argued, should be provided in an accessible form so that IPs can make informed decisions on their land and future.

Half of the interviewees, 15 in total, did not see any positive opportunities from climate change. The other half saw opportunities that could result from an increased emphasis on holistic land management based on traditional knowledge, such as land rehabilitation through Caring for Our Country schemes, or through the Indigenous Protected Areas (IPA) Programs. These programs fund Indigenous participants to generate rehabilitation and conservation outcomes on their own land and farmers’ land (voluntarily), which can be categorized as government funded Payment for Ecosystem Services (PES) arrangements. A participant in the IPA program elaborated:

‘We’ve just put 5,000 hectares under conservation under the IPA scheme and it’s creating jobs as well. You’ve got to look at the different avenues of economic development. And in the past it was the old traditional and farming practices...but now we have to become smart land managers. Now we have to manage our land in conjunction with the environment and our culture.’ (18)

There are multiple objectives from these schemes, an interviewee adds that ‘Aboriginal people involved in Caring for Country are healthier, are better off...the trees are there, the water is there, the snags are there for the fish...then that culture lives. That site lives’ (3). Achieving a range of ecological, social and economic objectives, like that generated in the PES schemes above, is fundamental to adaptation according to those interviewees who saw opportunities from climate change.
DISCUSSION

How is climate change and risk framed?

Risk is formed within social and cultural processes (Tansey & O’Riordan 1999). We observed in interviews that climate change and its causes are underpinned by narratives of colonization, dispossession and vulnerability. Climate change is framed as part of a cumulative process that began with European colonization. Interviewees are painfully aware of the challenges their communities face if the climate trends predicted accelerate the ecological destruction of their traditional territories. Given the connectivity between IPs and land and water in the MDB, and the deterioration of ecological resilience they have witnessed, it is unsurprising that interviewees fear for the survival of their cultural practices and livelihoods.

Climate change by IPs is framed from a localized, immediate perspective as current problems related to irrigation, land management and community troubles are experienced personally by interviewees. Indigenous Australians have adapted to natural climate variability for thousands of years, but it is acknowledged in this study that defining climate change can be complex; it is often difficult for communities to distinguish between ‘natural variability, natural hazards and extreme weather caused by climate change’ (Green et al. 2010b, p. 351).

Interviewees see the effects of climate variability and the intensity of drought as being compounded by local deforestation, regulation of waterways through dams, and intensive irrigation practices. There exist a range of barriers that today prevent groups from responding to the ecological, social and economic systems affected by climate change. These barriers range from more immediate stressors like social dysfunction (such as alcohol management and youth suicide) to the ongoing marginalization and inequity experienced by IPs in the MDB. For Indigenous groups, these immediate stressors may inhibit the implementation of coping and adaptive strategies (Petheram et al. 2010).

How are costs and benefits weighed?

The non-market, cultural, spiritual and subsistence costs from climate change are a high priority for IPs in the MDB. Weir (2009) identifies that ‘connections’ are central to understanding the MDB and that the MDB ‘is not a pristine wilderness that needs to be locked off for its own protection but an extended network of rivers linking communities, livelihoods and life’ (p. 26). This connection reflects the holistic worldviews of interviewees. Identifying impacts from climate change in a singular way under-represents the complexity of impacts, and the depth of connection of interviewees to ‘country’. For instance, it was emphasized that climate change, and its associated impacts, are taking a toll on the health and mental wellbeing of Indigenous groups in the MDB. This aligns with previous research showing that the river and aquatic systems in the MDB have significant therapeutic value (Weir 2009), and that IPs are likely more vulnerable to ongoing ecological degradation, because of the nexus between the health of the land and their own health (Green et al. 2009b).

We observed from interviewees the effect of ‘a layering of cumulative pressures and impacts’ on IPs (Milne et al. 2008, p. 33). Like Petheram et al. (2010) found in northern Australia, the ecological changes attributed by Aboriginal communities to climate change, such as increased hazardous climatic events and reduced abundance in wildlife and vegetation, only contribute to feelings of disempowerment. In sum, poverty can marginalize communities from effective decision-making and engagement with appropriate authorities.

Adaptation measures are typically established and enabled by groups with power (Adger et al. 2005). For instance, we note the absence of an Indigenous voice in the Garnaut Report, which outlined the risks and adaptive options for the broader Australian polity from climate change (Altman & Jordan 2008). While there has been collective action among IPs through MLDRIN and NBAN, to re-orient the conversation on climate adaptation and mitigation in the MDB, there has been observed a failure among policy-makers to accommodate the diverse perspectives of IPs across the Basin.

Climate adaptation and mitigation is subject to power relations. In the MDB, Weir (2009) describes that there are the dominant interests, or the ‘moderns’, focusing on economic outcomes, efficiency and use; while Indigenous interests are focused on spiritual connection, customary aspirations, ecological integrity as well as market values within webs of connectivity. These interests are often
competing, and may become more acute as water becomes scarcer and of a reduced quality due to drought and diversions (Weir 2009). It is also important to acknowledge that Indigenous values are diverse across the region, as are the perspectives on the costs and benefits flowing from climate change.

Limited land ownership and access to resources constrain the ability of Indigenous groups to take a greater role in land and water management and to respond with resilience to environmental degradation (Forward NRM & Arrilla Aboriginal Training & Development 2005; MLDRIN 2009). The level of involvement sought by IPs is more than simply site management, but is an active co-management of the landscape as a whole (Morgan et al. 2006). Governments are creating some access for IPs to land and resource management through the creation of initiatives such as the Caring for Our Country program, which includes the IPAs initiative. Within the IPAs, Indigenous groups are able to balance conservation and economic values in pursuing livelihoods, such as managing sheep grazing with the environmental and heritage commitments set out in the IPA framework. This allows groups to build social and ecological resilience. In terms of the responses from our interviews of Indigenous leaders, three of the interviewees were involved in successful IPA initiatives in the MDB, and all acknowledged the importance of IPAs in supporting adaptation.

The RED framework

Climate variability, coupled with unsustainable agricultural practices, has led to ecological vulnerability in the MDB. This, in turn, threatens Indigenous cultures and livelihoods that rely on healthy aquatic systems in the region. Our interviews highlight that Indigenous groups across the MDB carry a heavier social, economic and cultural burden that arises from a drier and hotter climate across the MDB than the general population due to the long-term impacts of colonization. A central theme in interviews was the need to broaden the scope of Indigenous participation in land and resource management, and to enable an Indigenous perspective, such as TEK, to guide the management of land and water in a holistic way. The interviewees were pessimistic about a future based on the status quo. Instead, they want innovative policy to facilitate and support their adaptation to climate change.

Consistent with our findings, Ross & Gerrard (2008) highlight an urgent need for a ‘human rights’ based approach to climate change policy, with improved dialog and engagement with Indigenous groups. Such a rights-based approach would be useful over the long term, but rights to land and water are uncertain, contested, slow acting, and highly politicized. By contrast, the impacts from climate variability and unsustainable agriculture are immediate and profound, requiring prompt action. In lieu of rights, we identify the potential for access to resources as a path to deliver important gains to support adaptability in the MDB.

Building on insights from the interviews and the existing adaptation literature, Figure 2 presents a ‘Recognition, Empowerment and Devolution’ (RED) framework to assist IPs to adapt to climate change. Figure 2 offers a pathway for addressing the vulnerability of IPs in the MDB to shocks by identifying structural factors to be addressed within a society, including recognizing IPs and respecting their unique rights and knowledge (Howitt et al. 2012). Also, following the empirical work of Adger (2006), the figure identifies the importance of creating access to resources to support involvement of IPs in decision-making, which in turn can help mitigate vulnerability. The

![Figure 2](https://iwaponline.com/jwcc/article-pdf/7/1/169/373979/jwc0070169.pdf)
next step is to devolve decision-making powers to IPs that allow them to create local solutions for local problems.

This figure sets out a dynamic process of removing barriers from, and enhancing the capabilities of IPs so as to respond to the effects of climate change. The radial distance from the center of the figure to where IPs are located on the spiral proxies the change required in the non-Indigenous socio-cultural environment associated with Recognition, Empowerment and Devolution to give ‘voice’ to IPs’ needs and actions.

The first stage in this time spiral toward adaptability is Recognition of TEK in resource governance. This includes recognition of the need to enhance Indigenous access to land and water resources. Including TEK in resource governance is consistent with a more holistic approach to land and water management, recognizing the connectivity between land and waterways in the MDB, and also the connection between the health of people and the health of ecosystems. This holistic perspective runs counter to conventional governance approaches to conservation that are site-based in the MDB.

Access to resources is important to deal with climate change, particularly for IPs who are under-represented in terms of access and ownership in the MDB. Resource access allows IPs entry into the economy, and jurisdiction over land and water to exert their authority and management preferences to deliver the desired market and non-market outcomes – the latter, we document in our study, is highly important to interviewees. To illustrate, we observe that the Nari-Nari Nation in New South Wales utilize market mechanisms for trading commercial water they have rights to, and use the proceeds from the sale of commercial water to purchase a Cultural Water License from the State of New South Wales. This water is pumped to inundate wetlands that are important cultural heritage sites to this community (Locke 2016). Thus, while the Nari-Nari Nation does not have ownership rights to the water, the access to commercial water is enabling non-market outcomes and is consistent with the view of Ribot & Peluso (2003) that access can deliver the requisite gains where rights are contested, or unavailable to Indigenous groups.

Empowerment of individuals and groups to identify their needs and make decisions, and to take action to meet these needs, is the second part of the RED framework. As Macchi et al. (2008) underscore globally, ‘...there is a lack of recognition of the importance which traditional people may play in their own future adaptation to climate change’ (p. 7). Creating a space for Indigenous voices at the ‘policy table’ is a first step in the MDB to facilitate adaptability, but the next phase requires government support to empower Indigenous groups to make effective decisions. The Human Rights and Equal Opportunity Commission (2009) identifies the hurdles Indigenous groups face in tackling climate change. These include constrained capacity, and a lack of resources and information to participate in adaptation and mitigation measures like carbon, water and biodiversity markets. The use of market-based approaches, unless inclusive, will further entrench power dynamics. Our research suggests a need for targeted educational opportunities and culturally sensitive research that can build capacity within communities.

For those Indigenous groups who do not have links to their traditional country, or for those living in centers and towns, away from their land, a more inclusive approach of participation is required. As Carter & Hollingsworth (2009) identify, IPs want to engage in Natural Resources Management (NRM), but NRM institutions demand ‘authenticity’ for IPs, which is usually associated with ‘remote’ IPs engaged in traditional activities, such as environmental and cultural heritage management on their traditional lands. This is highlighted in the interviews, where interviewees emphasized that Indigenous values have typically been rendered as ‘cultural heritage’ without consideration of Indigenous livelihoods. Unfortunately, such a view neglects the full gamut of Indigenous values that are affected by climate change and has the consequence of relegating Indigenous voices to the fringe of the debate where the central focus is dominated by agricultural interests.

Empowerment builds on Recognition. For example, the federal ‘Caring for our Country’ program, where $1.7 billion has been committed for land managers to generate environmental outcomes (Commonwealth of Australia 2011), includes the IPA program and an Indigenous Heritage Program. Both programs require Indigenous groups to have access to land and resources to participate. The IPA program, for instance, supports Indigenous groups to manage their own agricultural properties for conservation and cultural heritage in line with International Union for
Conservation of Nature (IUCN) guidelines. Evidence shows these programs to be effective economically and socially, as Indigenous participants in NRM on their lands have reduced incidence of lifestyle diseases. This is consistent with the findings of Burgess et al. (2005) who show that a connection with, and also management of ancestral lands, is a critical determinant to Indigenous health.

Linking Indigenous practices to environmental management can enhance resilience and sustainability at the landscape level (Berkes & Folke 1998). There are 40 declared IPAs across Australia, ranging in size from 32 hectares to 9.8 million hectares and covering a total of 26 million hectares, with plans to increase this figure by 40% over the next 5 years (or 8 million hectares) (DSEWPC 201b). From the IPA program there are success stories including the Queensland MDB Community Rangers Program, a Working on Country project. This program includes 8 traditional groups working with 60 landowners (including farmers and graziers) on 10 million hectares to implement a number of projects to address ecological and heritage degradation (DSEWPC 201a). This last project highlights how legitimate access to a flow of benefits from the land can be created through agreements with landowners, but we note that it is dependent on negotiations with and consent from landowners.

The third stage of the RED framework, Devolution, takes Empowerment to the next level, and involves the devolution to IPs of an equitable share in decision-making over land and water in the MDB, and devolution of equitable access and rights to ownership and benefits of land and water. What is equitable should be determined in a collaborative process between IPs, government and stakeholders (see Nikolakis & Grafton 2014). Devolution of authority can encourage the protection of non-market values by formalizing an Indigenous voice at the decision-making table. Localized authority provides autonomy to generate local solutions for local problems, which is crucial in communities with wide ranging social and environmental stressors. At the same time, bringing a holistic perspective to decision-making can honor the connectivity that is important to the health of the MDB. Devolving rights can facilitate wealth creation in ways that are consistent with Indigenous values, while rights to resources create certainty and build security for Indigenous groups. Where access is pragmatic, it is also dependent on goodwill and negotiation (e.g. the Community Rangers Program); while a rights-based approach entrenches IP at the ‘decision-making table’ and creates an official space for an Indigenous voice.

CONCLUSIONS

In the MDB, the causes and impacts of climate change on IPs are intertwined with narratives of colonialism, dispossession and localized effects from agricultural development – these combine to create a sense of vulnerability in considering adaptation strategies. This problem is exacerbated by the fact that the effects of climate change are part of broader cumulative pressures that are less pressing on a day-to-day basis than more immediate community stressors.

To assess the impacts of climate change on IPs in the MDB, we undertook in-depth interviews with Indigenous leaders throughout the Basin over the period 14 April–20 May 2010. The findings from these interviews provide the perspectives of Indigenous interviewees on climate change, the possible costs and benefits of climate change, and the support they believe they need to adapt. Our work is part of a discourse on how differences in risk perception related to climate change feed into bigger political discord on power and fairness in the allocation of resources (Tansey & O’Riordan 1999).

The costs from climate change identified by interviewees are focused on the connection to land, as well as spiritual and cultural values. Development, or market focused values, are often of secondary importance to Indigenous interviewees compared to the ‘health of country’. But these market driven values are often the primary focus of dominant interests. Our view is that in order to meet the ambitions of communities a balancing act is required, where jobs are created on one hand, and land and culture is supported on the other.

The challenge is that access to land, resources and climate policy processes in the MDB are highly constrained according to the Indigenous interviewees in our study, which prevents communities from meeting their objectives. As Petheram et al. (2010) underscore, our research demonstrates that self-determination and recognition of
links to country are important to increase adaptive capacity and resilience within Indigenous communities. Through their representative groups, IPs across the MDB are advocating for these important objectives. Among IPs in the MDB there is often strong social capital, reflected in the resilience of these communities and the collective activities of representative organizations such as MLDRIN and NBAN. Social capital is also an important mediator for enabling collective action (Adger 2003). Building stronger social capital and connecting across IPs and non-IPS to create institutions and policies that enable adaptation is important to address climate change, and to be more inclusive of Indigenous interests (Turner & Clifton 2009). A persistent effect of colonialism is that IPs in the MDB are marginalized from institutions that develop adaptation measures. This marginalization compounds vulnerability.

The ambition described by Indigenous interviewees going forward is to have greater access to land and decision-making, so that IPs can play a meaningful role in climate response measures to meet their ambitions. Drawing on the Recognition-Empowerment-Devolution framework we developed, the first step to encouraging adaptability is the Recognition of Indigenous TEK and access to resources. It is important to create a formal space for an Indigenous voice in resource governance, include more holistic perspectives, and provide scope for Indigenous groups to generate benefits from access to land and resources. The second step is Empowerment of IPs to achieve their desired outcomes. In short, providing support for IPs to develop the toolkit needed to manage innovations such as the cultural flow, and to make informed decisions for their land and communities. Devolution is the third step of this dynamic process and involves devolving authority to Indigenous groups to make decisions for land and water at a local level. It involves creating more certainty for IPs in the economy, and a shift from their role of operating at the fringes of power.

The RED process is continuous, evolves over time and provides an opportunity to shift from vulnerability towards greater capacity to adapt. This framework offers the possibility that IPs have their ‘voices’ heard and be given the opportunity and resources to adapt to climate change in their own ways. This could allow IPs to maintain their culture and livelihoods, with full recognition of the climate, political, ecological, social and economic stressors they face.

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