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The role of culture and traditional knowledge in climate change adaptation: Insights from East Kimberley, Australia

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ABSTRACT

Indigenous peoples offer alternative knowledge about climate variability and change based on their own locally developed knowledges and practices of resource use. In this article we discuss the role of traditional ecological knowledge in monitoring and adapting to changing environmental conditions. Our case study documents a project to record the seasonal knowledge of the Miriwoong people in northern Australia. The study demonstrates how indigenous groups' accumulate detailed baseline information about their environment to guide their resource use and management, and develop worldviews and cultural values associated with this knowledge. We highlight how traditional ecological knowledge plays a critical role in mediating indigenous individuals and communities' understandings of environmental changes in the East Kimberley region of north-west Australia, and how these beliefs may influence future decision-making about how to go about adapting to climate change at a local level.

1. Introduction

The projected impacts of climate change on Australian ecosystems and settlements are well documented (CSIRO and BoM, 2007). More recently, several studies have suggested that Australia's indigenous communities are especially vulnerable to the impacts of climate change; in particular, climate models indicate that sea level rise and storm surges will affect Australian indigenous coastal communities (Hennessey et al., 2007). Emergent research also indicates that Aboriginal and Torres Strait Islander communities' who depend on bush or sea food for their livelihoods (both subsistence and market-based) are particularly at risk to future climate changes (Green et al., 2009). Unsurprisingly, the issue of how Indigenous communities can respond to climate change is an increasingly prominent topic of discussion amongst Indigenous communities and governments (Hunter and Leonard, 2010; Petheram et al., 2010; Sinnamon and Mango, 2010; TSRA, 2010).

Worldviews are an underappreciated element of adaptation as they shape how people understand the causes of phenomenon that can be linked to climate change, which in turn influences the acceptability of adaptation responses (O'Brien, 2009; Adger et al., 2009a,b). Each adaptation option and any decision about the governance and institutional arrangements for adaptation is underpinned by a set of values associated to particular worldviews that shape what is considered to be worthwhile adaptation action and what it not (Jacob et al., 2010; Wolf and Moser, 2011; Spence et al., 2011). Worldviews not only influence what adaptation strategies are deemed possible, but also what people considered to be a barrier or limit to adaptation (Adger et al., 2009a,b). Although this point might seem obvious, it was not until comparatively recently that researchers began to explore how worldviews and associated value systems shape adaptation in any great detail (Coulthard, 2009; O'Brien, 2009; Wolf, 2011). Research from around the world highlights how competing worldviews can result in different stakeholder groups' favouring dissimilar adaptation options and perceptions of what constitutes successful adaptation (O'Brien et al., 2009; O'Brien, 2009; Ensor and Berger, 2009; Heyd and Brooks, 2009). In coastal settings, for instance, adaptive management is increasingly a pivotal part of planning for future sea level rise and as a means to reconcile conflicting goals (Tompkins et al., 2008). However in regards to indigenous peoples there is only limited engagement with the idea that indigenous value systems may shape both the process and outcomes of climate change adaptation for indigenous communities world-wide. In this article we explore the critical role traditional ecological knowledge plays in mediating indigenous individuals and communities' understandings of environmental change in the East Kimberley region of north-west Australia, and how these beliefs may influence future decision-making about whether and

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how to go about adapting to climate change. In this paper, we first provide a brief overview of recent research into traditional ecological knowledge, environmental management, and climate change. We then proceed to discuss the historic, geographic and social setting of this research as well as the methodology we adopted. Finally we outline our research findings, which are structured into three themes: specific environmental knowledge, use and management techniques, and worldviews.

1.1. Traditional ecological knowledge

In this paper we use the term traditional ecological knowledge to refer to knowledge of the environment that is derived from experience and traditions particular to a specific group of people (Berkes, 1999; Houde, 2007). Traditional ecological knowledge can be seen as both dynamic and cumulative, building on past experiences and adapting to changing circumstances. Such knowledge is commonly held collectively within a community or society, with aspects of it only known by specific members of the group such as specialists, elders, descendents (lineage) or gender groups. Moreover it is a specific attribute of societies and groups with historical continuity in resource use within a particular area or environment (Berkes et al., 2000). The majority of these are non-industrial focused societies; many are tribal or indigenous, however not exclusively. Some non-indigenous groups nevertheless hold traditional ecological knowledge (Neis, 1992, 1997).

Over the last three decades, numerous scholars have sought to understand traditional ecological knowledge and how it can inform western scientific knowledge and environmental management practices (Berkes, 1999; Berkes et al., 2000; Lantz and Turner, 2003; Moller et al., 2004; Briggs, 2005; Langton et al., 2005; Coombes, 2007; Clarke, 2009; Moller et al., 2009; Prober et al., 2011). Some have distinguished between different elements of traditional ecological knowledge which, when combined together, form the traditional ecological knowledge of a particular social group (Usher, 2000; Houde, 2007). Others take a broader, less explicit approach to traditional ecological knowledge that encompass all knowledge and practices of Indigenous or local peoples. In this article, we have grouped Miriwoong traditional ecological knowledge in three categories, which are interconnected and mutually informing, in an effort to demonstrate in a concise and simplified manner how traditional ecological knowledge can be considered in climate change adaptation strategies. Our three categories are adapted from Houde (2007) and Prober et al. (2011) see Table 1.

1.2. Traditional ecological knowledge and climate change

Increasingly researchers are turning their attention to examine the ways in which indigenous and local groups' knowledge of the environment can be used to inform climate change mitigation and adaptation, including monitoring the impacts of climate change, carbon abatement initiatives, and the development of local strategies (Ford et al., 2007; Salick and Ross, 2009; Turner and Clifton, 2009; Dumaru, 2010; Green et al., 2010). At present the majority of research efforts are directed towards the use of traditional ecological knowledge for monitoring the impacts of climate change and to inform mitigation activities. Limited attention has been given to the role traditional ecological knowledge, as part of a wider belief system, plays in shaping individuals and communities' perceptions and responses to environmental changes. In research undertaken in northeast Arnhem Land (Northern Territory, Australia), Petheram et al. (2010) note that although the Yolngu people (Aboriginal traditional owner group) were aware of climate change, they did not consider climate risks to be of primary importance to their community. Yolngu interpreted the 'strange changes' they had been witnessing over the last five years in part the consequence of inappropriate actions and land use changes including mining activities, recreational fishing and tourism rather than to global environmental change (Petheram et al., 2010). Moreover Yolngu community organisations refused to disconnect climate risk in northeast Arnhem Land from the other sources of risk they faced, most notably the endemic poverty and the absence of essential services which is characteristic of remote indigenous communities throughout Australia (Petheram et al., 2010; Howitt et al., 2011). Similarly in the international context, Byg and Salick (2009) report that Tibetan villages perceived changes in climate to be related to local phenomena, such as spiritual retribution, overpopulation, and increased electricity consumption.

In both places, people conceptualise observed climate changes as inherently local phenomena, yet ultimately attribute them to the actions of humans (either by influencing the spiritual world, or acting directly on the environment), and do not necessarily prioritise climate risks above others. Indigenous peoples' perspectives on the environment are typically defined in terms of worldviews or cosmologies, traditional ecological knowledge and associated cultural protocol form the socio-environmental relationships that link the environmental system to peoples' identities, attachments to places, livelihoods, histories, economic and political contexts (Donner, 2007; Wolf, 2011). The challenge is how to incorporate the multiplicity of climate change narratives into community-based plans and projects to enable successful adaptation. This challenge is particularly significant in the context of indigenous rights and knowledges in Australia because of the long history of paternalistic colonial and postcolonial policies and practices. This resulted in Australian Aboriginal and Torres Strait Islander communities being managed as simultaneously needy and problematic populations requiring external control and the risk remains that similar

Table 1
TEK classification systems.

TEK categories (Houde, 2007)	TEK categories (Prober et al., 2011)	TEK categories (this article)	Miriwoong TEK discussed in this article
Factual observations	Basic knowledge of the environment	Environmental knowledge	• Classification of weather conditions • Seasonal indicators • Observations of climate variability and change • Water availability
Management systems Past and current uses	Knowledge of Aboriginal use and management of the environment	Use of biodiversity resources and management of environment	• Fire management • Harvesting activities • Water way management • Biodiversity monitoring
Ethics and values Culture and identity Cosmology	Knowledge Frameworks	Worldview	• Ethics and values • Cultural identity • Adaptation options