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Linking adaptation science to action to build food secure Pacific Island communities

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ABSTRACT

Climate change is a major threat to food security in Pacific Island countries, with declines in food production and increasing variability in food supplies already evident across the region. Such impacts have already led to observed consequences for human health, safety and economic prosperity. Enhancing the adaptive capacity of Pacific Island communities is one way to reduce vulnerability and is underpinned by the extent to which people can access, understand and use new knowledge to inform their decision-making processes. However, effective engagement of Pacific Island communities in climate adaption remains variable and is an ongoing and significant challenge. Here, we use a qualitative research approach to identify the impediments to engaging Pacific Island communities in the adaptations needed to safeguard food security. The main barriers include cultural differences between western science and cultural knowledge, a lack of trust among local communities and external scientists, inappropriate governance structures, and a lack of political and technical support. We identify the importance of adaptation science, local social networks, key actors (i.e., influential and trusted individuals), and relevant forms of knowledge exchange as being critical to overcoming these barriers. We also identify the importance of co-ordination with existing on-ground activities to effectively leverage, as opposed to duplicating, capacity.

1. Introduction

Anthropogenic climate change is widely regarded as one of the most significant threats to global food security, impacting all dimensions of food production, availability, stability and utilisation (Schmidhuber and Tubiello, 2007; Wheeler and

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Von Braun, 2013; Gbegbelegbe et al., 2014; Tai et al., 2014). For example, climate change has been shown to directly impact food production through changes in agro-ecological conditions, with declines in food production and increasing variability of food supply already attributed to observed warming and changes in regional rainfall patterns (e.g. Parry et al., 2004, 2005; Fischer et al., 2005). Climate change also affects the ability of individuals to access and use food effectively by altering the conditions for food safety and increasing the risks of vector-, water- and food-borne diseases (Githeko et al., 2000; Patz et al., 2005). As a result, it has been projected that the number of undernourished people may increase by up to 26% by 2080 (Fischer et al., 2005). Consequently, achieving food security under the changing climate is a critical public policy problem, particularly given the tendency of climate change to interact with other economic, political, temporal and biophysical drivers (Ericksen et al., 2009).

Although climate change will have significant impacts on food security globally, the vulnerability of individual communities is likely to differ substantially (Allison et al., 2009; IPCC, 2014). Recent studies show that communities in Pacific Island Countries (PICs) are expected to be among the most vulnerable (Barnett, 2011). For example, climate change is projected to have profound impacts on the production of coastal fisheries throughout the Pacific Island region (Bell et al., 2013), and reduce the productivity of coastal aquaculture (reviewed by Bell et al., 2011). Consequently, the ability of Pacific Island communities to access fish will be adversely affected, which is a significant concern given that fish provide between 50% and 90% of animal protein for rural communities in the majority of PICs (Bell et al., 2009). Similarly, agricultural production throughout the Pacific Island region will be adversely affected by climate change through the loss of coastal lands, increased contamination of groundwater and estuaries by saltwater incursion, and losses associated with the increased frequency and severity of events such as cyclones, heat stress and drought. For example, the estimated loss of up to 80% of local food production in Vanuatu due to Tropical Cyclone Pam in 2015 is a recent, potent case in point. The impacts of climate change on food security in PICs are compounded by geographical isolation, high rates of population growth, limited land area, widespread poverty and a very high dependence on subsistence fishing and agriculture for livelihoods (Barnett and Campbell, 2010; Bell et al., 2011; Bell and Taylor, 2015).

Given the significant risk posed by climate change to food security in PICs, adaptation and in particular the enhancement of adaptive capacity, is considered to be a key priority to ensure the long-term sustainability, health and safety of local communities (Barnett and Campbell, 2010). In the broadest sense, adaptive capacity refers to the ability or potential of complex social-ecological systems to respond successfully to climate variability and climate change (Adger et al., 2007). As such, adaptive capacity is a necessary condition for the design and implementation of effective adaptation strategies to reduce the risks posed by climate change (Brooks and Adger, 2005). To this end, adaptive capacity not only encompasses the preconditions required to enable adaption, but also the ability to mobilise and utilise them as required (Nelson et al., 2007; Park et al., 2012). In doing so, adaptive capacity mediates the vulnerability of communities to climate change (Adger et al., 2005; Marshall et al., 2012, 2014).

Adaptive capacity, however, is highly variable across both spatial and temporal scales (Smit and Wandel, 2006). The factors that underpin the development and use of adaptive capacity at the community level include the ability of individuals to access, understand and apply the knowledge needed to inform their decision-making processes. While a range of knowledge types can contribute to developing adaptive capacity (i.e. – both positivist and interpretivist epistemological orientations), it is widely accepted that adaptation science is of critical importance given its ability to facilitate the effective identification and assessment of threats, risks and uncertainties associated with climate change. Adaptation science also generates the information, knowledge and insight required to steer socio-ecological systems towards increased adaptive capacity and performance (Meinke et al., 2009; Howden et al., 2014). In doing so, adaptation science analyses problems without a predefined disciplinary lens, allowing for the inclusion of multiple perspectives and knowledge bases (e.g., cultural knowledge) to generate adaptation pathways to support societal responses to global environmental change (Butler et al., 2014; Wise et al., 2014). As a result, adaptation science is considered to be a specialised form of sustainability science at the boundary between science and society (Meinke et al., 2009).

The accumulation of adaption science alone, however, is insufficient for building adaptive capacity to enhance food security (Howden et al., 2013). Rather, adaptive capacity at the community level is dependent on the extent to which the information from adaptation science is accessed and used to precipitate action in response to the changing climate (Van Kerkhoff and Lebel, 2006; Howden et al., 2007; Jacobs et al., 2010). For this reason, it has been argued that adaptation scientists have an ethical responsibility to engage better with end-users to enhance adaptive capacity (Lacey et al., 2015). The engagement of end-users in adaption science, however, remains an ongoing and significant challenge that has resulted in a growing body of literature on climate change communication and stakeholder engagement, most of which is focused in the context of developed countries (e.g., Moser and Dilling, 2007; Nisbet, 2009; O'Neill and Nicholson-Cole, 2009; Cunningham et al., 2015). In contrast, understanding how to engage end-users in climate change science in developing countries, such as in the Pacific region, has received less attention and available studies are largely location specific case-studies with limited application to the Pacific Islands region (reviewed in Moser, 2010 – but see Hay and Mimura, 2006; Dumaru, 2010; McNaught et al., 2014). Thus, climate scientists still have limited resources to assist them in developing improved communication and end-user engagement strategies for PICs. Therefore, the aim of this study was to identify practical strategies for engaging Pacific Island communities in adaptation science to enhance food security. Specifically, we build a narrative that (1) determines the role and importance of adaptation science for contributing to future food security in the Pacific Island region, (2) identifies the primary barriers inhibiting community engagement in adaptation science, and (3) develops recommendations for overcoming these barriers.