The role of culture in adaptive responses to climate and environmental change in a Fijian village

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Abstract

Adapting to the new challenges climate change will bring is vital. Pacific Islands are often cited as being at the forefront of climate change, and despite a growing body of regional research there has been limited climate change adaptation research in regional deltas. The capacity of households and communities to respond to climate change in the face of multiple stressors is influenced by a variety of factors and elements shaped by the underlying social and cultural context. Recent work has highlighted a gap in empirically-based understandings of the relationship between adaptation and sociocultural contexts, and this thesis addresses this by examining the relationships between culture, risk perceptions, social capital and indigenous worldviews in a case study of Tikina Toga in Fiji's Rewa River delta. Although well-recognised that adaptation to climate and environmental change is context specific, this case study contributes to our knowledge base around the role of and relationship between culture and potential adaptation actions. I use the Vanua, an indigenous concept and worldview, as a lens to examine potential adaptation and social capital at the household and community scale. The Vanua provides an explanatory depth to potential adaptation actions, especially around understandings of resource access, risk perceptions, perceived self- and collective-efficacy and the role of social capital in adaptation. With an increasing number of climate change initiatives in Pacific Island Countries, this thesis highlights the importance of integrating local-level understandings and processes that influence household and community potential adaptation actions in strategic planning for future climate change responses and development initiatives.

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Acronyms and Glossary

dalo	taro, tuber and primary food crop throughout the Pacific region
ENSO	El Niño Southern-Oscillation
FJD	Fijian dollar
kai	freshwater clams, *Batissa violacea,* common in Fijian rivers
moci	freshwater shrimp
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-tropical Convergence Zone
iTaukei	indigenous Fijian
IPCC	Intergovernmental Panel on Climate Change
hurricane	Although the technical term in this region of the South Pacific is 'cyclone' and that is what is used by the Fijian Meteorological service, I use hurricane in this thesis as it is the term used within the village
kai viti	a member of the iTaukei community
kava	in Fijian 'yaqona'; dried and ground root of the *Piper methysticum* plant. Very important in Fijian ceremonies, and is consumed as a drink ceremonially and socially in Fiji (and other parts of the Pacific)
kerekere	a cultural practice of requesting something, for example food small amounts of cash, time or other small material goods from another household or person (see page 128)
mataqali	clan, several make up a yavusa
na i vakarau vakavanua	Fijian term for culture
NLTB	Native Land Trust Board
SPCZ	South Pacific Convergence Zone
sautu	concept of "health and wealth" or "fullness", not limited to physical body or tangible possessions, includes social relationships and understanding of holistic well being
sulu jaba	women's traditional village clothing consisting of a ankle-length piece of cloth tied around the waist or skirt, and a top that covers shoulders and hips. Often bright prints and made from cotton or polyester.
tabu	'taboo', a practice where a moratorium is placed on going into or harvesting resources from an area or species, such as certain fish or fruits
talanoa	an indigenous Fijian research approach based on conversation and sharing stories. *Talanoa* also refers to sharing, discussing or storytelling and can be formal (e.g. by elders) or informal (e.g. between friends)
tikina	district
tokatoka	smaller family unit (can be a single household or larger), several make up a mataqali
turaga ni koro	village headman (elected position separate from the chiefly hierarchy, although in practice can be an individual related to the chief, such as his some)
USP	University of the South Pacific

vanua	land
Vanua	the land, water, social connections, rules and norms that govern behaviour within the place in between all the people; can be referred to as one of the levels in social hierarchy of Fiji, but also includes the entire traditional chiefly hierarchy from individual to High Chief
yavusa	tribe

A note on pronunciation

In Fijian, most words are pronounced phonetically, however the letters 'c', 'b', 'd', 'g' and 'q' are pronounced as follows:

Letter	Pronunciation	Example
c	th	'Macieu' is pronounced like the name 'Matthew'
b	mb	Navatuyaba is 'Nava-tu-yamba'
d	nd	Nadi is pronounced 'Nandi'
g	ng (like in 'sing')	Toga is pronounced 'Ton-ga'
q	ng (hard g)	mataqali is pronounced 'mat-an-gali'

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Chapter 1. Introduction

1.1. Climate change challenges

Anthropogenic climate change is projected to unevenly affect the globe, especially in small islands and developing states (Nurse et al. 2014). Although the Pacific region is vulnerable to climate change impacts (Nurse et al. 2014), it has been pursuing climate change adaptation activities at various scales (Barnett and Campbell 2010). However, it is also increasingly recognised that adaptation to climate change may not be able to prevent negative impacts (Adger et al. 2009; Stafford Smith et al. 2011). It is therefore important that adaptation programmes and projects are relevant and useful to the communities and countries that they target, especially as many of those most likely to experience the impacts of climate change soonest are some of the poorest and most vulnerable in society who contributed little to global greenhouse emissions (Adger et al. 2003; Nurse et al. 2014).

There is a growing research focus on adaptation to climate change (Arnell 2010). While this body of research is increasing, gaps in our understanding still remain, especially around sociocultural elements, such as the role of culture and social capital in adaptation (Pelling and High 2005; Adger et al. 2013). The broad goal of this research is to explore the relationship between culture, social relationships, and climate change adaptation. This was inspired by my own experiences as a child living in the Marshall Islands and later working in the Pacific on climate change adaptation projects at the territorial and local level with the American Samoan government (2010-2011). Part of my position was to develop a territorial programme on climate change, and I began to realise that the approaches and understandings of climate change and community development promoted by the organisations I worked with made assumptions about development, climate change adaptation and how communities operated that did not always match community expectations. Through these experiences I began to question assumptions held by myself and organisations I worked with about development, climate change and the role of culture in adapting to climate change. This questioning is what eventually led me to do a PhD degree at the University of East Anglia.

The remainder of this chapter introduces the main research areas presented in this thesis and their associated gaps. I then briefly introduce the study area in Fiji and discuss the research objective, followed by an overview of the remainder of the thesis.

1.2. Adaptation, social capital and culture

Adaptation to climate change can encompass a diversity of activities at multiple scales either in reaction to or in anticipation of changes in climatic variability and trends, including gradual changes and changes in the frequency and magnitude of extreme events (Smit et al. 2001). Adaptation can be limited by thresholds in the biophysical environment or barriers in cultural or social norms that prevent or constrain adaptation decision-making (Barnett et al. 2015; Liechenko et al. 2015). There is a growing body of research on social barriers; however the importance of socio-cognitive factors influencing adaptation decision-making is little understood (Grothmann and Patt 2005; Jones and Boyd 2011). Adaptation barriers or limits are also conceived in relation to risk perceptions, where action on climate change is initiated based on whether a risk is perceived as tolerable or intolerable (Slovic et al. 2000; Dow et al. 2013). Perceptions of risk are based on many factors including experience and cultural risk preference/avoidance and play an important role in climate change adaptation (Adger et al. 2009; Dow et al. 2013). In addition to risk perception, there is also increasing recognition of the role of culture and values in shaping responses to climate change (O'Brien 2009; Adger et al. 2013). In other words, adaptation involves a variety of responses at different scales to climate change, but these responses depend on the ability to act which is mediated by institutions and structures (Adger et al. 2005; Tompkins and Adger 2004) as well as internal, normative and cultural processes (Grothmann and Patt 2005; McNeeley and Lazrus 2014; Jain et al. 2015).

Climate change adaptation does not occur in a social vacuum. The context in which people may decisions about responding to climate is social. Social relationships and networks, trust and collective action are vital for adaptation (Adger 2003; Pelling and High 2005; Wolf et al. 2010). Climate change will impact natural resources and livelihoods, and the ability to respond to these will require networks of support and collective action (Adger 2003). The norms that guide relationships, networks and resource access are rooted in culturally defined roles and understandings of behaviour, and these are part of the cultural context that shapes potential adaptation actions (Nuttall 2009; McNeeley and Lazrus 2014).

The expanding body of research examining the role of culture in adaptation demonstrates how culture can explain the diverse responses to climate impacts and drivers (Ensor and Berger 2009; O'Brien 2009; Adger et al. 2013). This research has also been in response to critiques of climate change adaptation research that was focused on adaptation as a technical and scientific problem (e.g. Barnett

2010) and there are a growing number of studies that include sociocultural aspects of adaptation and approach adaptation holistically (Buggy and McNamara 2016).

This approach is important in areas such as the Pacific, where there is a growing number of climate change adaptation projects (Barnett and Campbell 2010). The Pacific has the highest global per capita development aid flows (Feeny and Clark 2009); however this has not necessarily resulted in development gains at the local level (Pawar 2009; Barnett and Campbell 2010). Impacts from climate change sit alongside existing developmental and environmental change challenges, and it is therefore important to consider climate change as another development challenge and approach adaptation holistically with consideration of the local ecological and cultural context (Buggy and McNamara 2016).

The primary research in this thesis is located in Fiji. Fiji published a national climate change policy in 2012 (Government of Fiji 2012) and numerous community-based climate change and development activities have been on-going for over a decade (Nakalevu et al. 2005). However, not all the projects have led to sustainable change leading to disappointment or frustration within villages (e.g. Aalbersberg et al. 2010) due to issues with funding or priorities within funding organisations (Buggy and McNamara 2016). Research (or development) in Fiji must be sensitive to the cultural, biophysical and political contexts to be useful. This research seeks to address this need by exploring these contexts for a community in Fiji by incorporating an indigenous concept and worldview, the Vanua, to add explanatory and analytical depth (see Sections 2.6 and 4.2).

1.3. Research objectives

The main aim of this thesis is to understand the way that culture, understood as a set of shared norms, influences risk perceptions and the tensions between potential adaptation actions at the level of the village and the households within it. To accomplish this, there are three sub-objectives of this research. The first of these is to understand how people have responded to natural variability and environmental change in the past, if and how these are understood as risks or threats, and to whom and what. The second objective is to explore in what way culturally-based norms, relationships and networks (social capital), and associated behaviours influence adaptation action. This also includes examining how a worldview and concept, the Vanua, shapes and influences behaviour related to adaptation, contributing to our knowledge around the role of culture and social capital in responding to climate change in Fiji. The final objective is to identify and assess the barriers and opportunties to potential adaptation action.

The work in this thesis contributes to our empirical and theoretical understandings of the relationship between culture, adaptation social capital and indigenous worldviews. Whilst focusing on a Fiji village

as case study, the findings are envisioned to add to our understanding of culture and climate change. Contributions to knowledge from this work are threefold. Firstly, the research responds to calls for more research examining the sociocultural context of climate change adaptation (e.g. Barnett 2010; Adger et al. 2013). The application of the Vanua as a concept to understanding social capital and potential adaptation action adds analytical depth as well as ensures that the cultural context is central to the research. Secondly, this thesis includes a critical exploration of social capital in Fiji which generates insight into the relationship between social capital and adaptation (Pelling and High 2005). Thirdly, the research contributes to theorising on the relationship between culture and potential adaptation action and highlights the contributions of situating a study of potential adaptation action in a specific cultural context.

1.4. Thesis overview

I begin by introducing my conceptual framework in Chapter 2, drawing from different areas of research and identify and develop the research questions guiding this research. I review literature around climate change adaptation, culture and values, and social capital, and argue that using an indigenous Fijian concept, the Vanua, as a lens to explore the relationship between culture, potential adaptation actions and social capital adds depth to our understandings of potential adaptation actions at the household and community level in Fiji. I propose using cultural models to understand local culturally-based conceptualisations of social capital and how those can relate to potential adaptation actions, as well as draw from an existing Pacific-specific adaptive capacity evaluation framework. I conclude Chapter 2 with a presentation of my research questions.

Chapter 3 presents my methodology, including the epistemological and methodological considerations of my case study. I describe data collection methods and my analytical approach and briefly introduce my case study area. I also reflect on limitations of the research and ethical considerations. Chapter 4 introduces the research area in more detail, including Fiji's biophysical context. I also introduce the sociocultural context, including social structures and the Vanua.

I then begin to answer my research questions in the following chapters. Differences in risk perceptions at different scales and current and past responses to environmental variability and change are presented and discussed in Chapter 5. The chapter characterises the kinds of risks perceived as threats to the household and collectively (to the Vanua), and discusses how differences in experience and culturally defined roles influence risk perceptions.

Social capital is explored in the context of my case study site, drawing on cultural understandings of social relationships, norms and behaviour to reveal cultural models relevant to potential adaptation actions in Chapter 6. Cultural models of relationships, behaviour within the village and what constitutes respect are discussed in relation to support networks and collective decision-making, demonstrating how social capital is a public good in this context.

I build on these cultural models in Chapter 7 to discuss shared understandings of the cultural model of the 'Vanua' and implications for potential adaptation actions. While social capital can be considered high in this context, outcomes are not equally distributed within the community. The relationship between the households and the village is complex, with potential adaptation actions at each scale both influencing and being impacted by the other scale.

Chapter 8 discusses the barriers and opportunities for adaptation in Toga, drawing from a Pacific-specific adaptive capacity framework. There are a mix of barriers and opportunties for potential adaptation actions in the case study site, and I discuss connections between worldviews and cultural models shaping perceived collective-efficacy with implications for potential adaptation actions. I also discuss that while this framework, developed specifically for use in the Pacific regions, is useful for guiding examination of adaptive capacity in the Pacific, there are some areas where further clarification could potentially improve outcomes.

I conclude in Chapter 9 with a synthesis and discussion of the main findings from this research, including how potential adaptation actions can be considered as being embedded in cultural practices. I highlight theoretical and empirical contributions as well as policy relevance and areas for culturally sensitive research.

Chapter 2. Responding to change in Fiji: linking adaptation, culture, social capital and the Vanua

2.1. Introduction

People respond to environmental change by drawing on different types of resources, and how people can access these is influenced by social and cultural contexts. This thesis explores the relationship between these elements and the way that culture, understood as a set of shared norms, influences risk perceptions and the tensions between potential adaptation actions at the level of the village and the households within it.

The following sections introduce the key concepts in my research. I begin with an introduction to climate change adaptation (2.2). In Section 2.3 I discuss the role culture, especially values, norms, worldviews and perceptions play in adaptation and highlight current research gaps. I then explore the use of social capital as a lens to understand relationships and collective action and review and explore its potential role in adaptation (Section 2.4). I situate the research in its cultural context with the indigenous Fijian concept of the Vanua (Section 2.6) and review cultural models as tools to link understandings, perceptions and behaviour. I conclude with research questions (2.7) that underpin the remainder of the thesis.

2.2. Climate change adaptation

As large-scale efforts to address climate change via mitigation have not resulted in effective greenhouse gas reductions, emphasis on adaptation to its impacts has grown (Pielke et al. 2007; Dow et al. 2013). Adaptation to climate change as it is currently conceived has its origins in the biological sciences (e.g. Smit and Wandel, 2006), but has also been influenced by understandings from social sciences (e.g. anthropology; Engle, 2011). The concept has evolved to acquire multiple meanings in different disciplinary fields; research approaches to adaptation can employ different meanings or emphasise different aspects (Moser and Ekstrom 2010).

For this thesis I follow Moser and Ekstrom (2010) and their broad and generic definition of climate change adaptation: "adaptation involves changes in social-ecological systems in response to actual and expected impacts of climate change in the context of interacting nonclimatic changes. Adaptation strategies and actions can range from short-term coping to longer, deeper transformations, aim to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting

beneficial opportunities" (ibid:22026). This definition refers to activities that are autonomous or planned, and reactive or anticipatory. It also include activities that are not directly related to climate risks and activities that arise from a non-climate window of opportunity such as replacing infrastructure or updating land-use plans (Moser and Ekstrom 2010). This definition also recognises that adaptation may consider non-climate related goals or changes, implying an approach to climate change adaptation that is more holistic and inclusive of other development goals or priorities. Moser and Ekstrom (2010) also consider social and ecological systems together rather than separately, reflecting an approach that can be more holistic as well as rooted in resilience thinking (where socioecological systems are frequently the focal unit).

Additionally, not all adaptation activities mitigate harm. Maladaptation occurs when an adaptation exacerbates, rather than mitigates the negative effect of an impact (Adger et al. 2005; Barnett and O'Neill 2010), although this may be experienced at a different spatial or temporal scale than the initial adaptation (Wilbanks and Kates 1999; Magnan et al. 2016). It can sometimes be unclear what exactly distinguishes coping from adaptation, and despite general agreement in the literature about the distinction between coping and adaptation, there is overlap between different conceptualisations (Berman et al. 2012). Generally, the distinction is made in terms of permanence, timescale and planning. Coping strategies or actions are typically understood to be those that are done in reaction to specific events that may change how things are done or that have an impact on shorter timescales (e.g. Brown and Westaway 2011; Berman et al. 2014). Engagement in coping behaviours does not necessarily preclude adaptation, as these behaviours may be part of a wider suite of actions people employ to manage short-term variability. However coping behaviours may not address underlying inequalities that can exacerbate vulnerability to specific hazards or overall reduced resilience (e.g. Berman et al. 2012; Berman et al. 2014). As coping behaviours are part of the suite of actions employed to manage variability, in this thesis I consider them part of adaptive actions.

A review of climate change adaptation approaches categorised research into four groups based on analytical focus: impact analysis, behaviour analysis, institutional analysis and decision analysis (Hinkel and Bisaro 2015). These approaches have a diversity of goals, such as addressing theoretical or conceptual issues or testing specific hypotheses (Arnell 2010; Hinkel and Bisaro 2015), and some have been critiqued based on epistemological grounds or scale of focus. There are a growing number of studies and approaches using alternative epistemologies (e.g. non-positivist), however the most common approaches fall into an impact analysis (i.e. focused on trend detection, impact projection or attribution) or behavioural analysis category (i.e. focused on cognition to describe or predict behaviour,

often drawing from rational choice and social psychology; Hinkel and Bisaro 2015). Critiqued aspects in some of these approaches include assumptions of linearity, rational choice on the part of individuals, what constitutes knowledge and who is able to generate it and how problems are defined (*ibid*). Problems defined based on these assumptions often offer "appropriate" solutions that leave little space for traditional rational decision-maker-based approaches to be challenged (Wise et al. 2014). Approaches attempting to bring adaptation into climate change models often assume simple cause-and-effect relationships between risk and response, which rarely reflects actual responses. This inability to account for different responses to similar stimuli is likely a result of cultural-based differences in responses (Adger et al. 2013). Efforts to address these critiques have brought a focus onto the sociocultural context of adaptation, such as emphasising values and culture (Tschakert 2007; Ensor and Berger 2009; O'Brien 2009; Adger et al. 2013).

2.2.1. Adaptive Capacity

Related to adaptation is the capacity to respond or adapt, adaptive capacity. In this thesis, I define adaptive capacity as the capacity of a system to respond to a singular or recurring event in a way that the system desires; it includes availability of resources required for the system to adapt and learn (Nelson et al. 2007; Brown and Westaway 2011). Adaptive capacity has been examined at multiple scales, and conceptualised in different literatures as the necessary preconditions (Nelson et al. 2007), the property of actors within a system (Walker et al. 2004) or properties of the system itself (Gallopín 2006) to influence resilience, reduce vulnerability, adjust to disturbances and enable adaptation. The concept is not new; it has been related to coping, resilience, adaptability and response capacity (Tompkins and Adger 2004; Füssel and Klein 2006; Gallopín 2006; Smit and Wandel 2006; Nelson et al. 2007; Engle 2011). Adaptive capacity is considered a positive attribute (Brooks et al. 2005; Engle 2011), and is context specific (Smit and Wandel 2006). Additionally, the capacity of actors at different scales (e.g. household, community, nation) can be related to one another through existing conditions enabling coping and adaptation behaviours (Smit and Wandel 2006; Vincent 2007).

One way to think of adaptive capacity is as a combination of objective and subjective factors or determinants consisting broadly of the availability of different resources and the ability to access and utilise those resources (with well recognised interactions and interdependencies) to manage variability and change. However, as mentioned above adaptive capacity can also include strategies and behaviours to manage variability. Over the last decade research and theorising has examined the role of institutions and governance (e.g. Brooks et al. 2005; Gupta et al. 2010; Berman et al. 2012; Upton 2012), collective action (e.g. Adger 2003; Pelling and High 2005) and cognitive elements (e.g. Grothmann and Patt 2005;

O'Brien 2009; Eakin et al. 2010). However, empirical testing of some these determinants of adaptive capacity has been limited (Lemos et al. 2013).

Our understanding of the determinants of adaptive capacity has developed over recent years. Research has tested and clarified our understanding of adaptive capacity at different spatial scales and explored the role of subjective elements such as perceptions, values and cognition and the importance of culture and worldviews. Determinants of adaptive capacity were theorised to be a combination of resources, technology, human capital, institutions, equity, technology, social capital and infrastructure (Smit et al. 2001; Yohe and Tol 2002). The IPCC included economic resources, technology, information and skills, infrastructure, institutions and equity in their initial definition of adaptive capacity (Smit et al. 2001). Yohe and Tol (2002) expanded on the six determinants from the IPCC as part of a process to develop and test a method to evaluate the relative contribution of adaptive capacity determinants for different systems and stressors, primarily focused on the national scale. In contrast, Grothmann and Patt (2005) examined adaptive capacity at the individual scale, drawing from health behaviour theory to develop a model for private and proactive climate change adaptation with a focus primarily on individual cognitive determinants such as risk perceptions, attitudes and perceived self-efficacy. Elements influencing collective action, such as perceptions, social networks, values and traditions were included in Adger et al. (2007; the Fourth IPCC Assessment Report). While the authors referenced here recognise the role and influence of institutions in adaptive capacity, Gupta et al. (2010) were among the first to specifically examine the role and determinants of institutional adaptive capacity. All these studies, and many more, recognised the heterogeneity of adaptive capacity determinants (e.g. Adger 2003; Eakin et al. 2010; Berman et al. 2012; Lemos et al. 2013) at different spatial (e.g. individual, household, community, nation) and temporal scales, to different hazards and climate risks as well as within different sociocultural contexts (Adger et al. 2013).

In addition to involving multiple factors that are not easily observable such as values or perceptions, adaptive capacity is also hard to observe due to its latency. Adaptive capacity of a system is mobilised in response to an extreme event, which is otherwise unobservable (Engle 2011). Sometimes the decision to not act is not made consciously, but rather through the prioritisation of other actions. This could be due to cultural norms influencing how priorities are decided or socioeconomic pressures resulting in the prioritisation of near-term needs (e.g. food or income) rather than investing in longer-term actions.

2.2.2. Barriers to adaptation

It is recognised that there are opportunities for adaptation, however these opportunities as well as barriers to adaptation are unevenly spread globally (Klein et al. 2014). A barrier is an obstacle, such as a

policy that would create disincentives for adaptation (Hulme et al. 2007). A limit to adaptation is a threshold where, once exceeded in social or biophysical systems, there is a significant threat to natural or human system sustainability and welfare (Adger et al. 2009). Social barriers or limits may mean that adaptation is finite for some actors, however as barriers or limits may present in different ways in different situations it is important to be able to identify them and potential strategies for overcoming them (Dow et al. 2013). Social limits to adaptation can include diverse adaptation goals based on diverse values held by stakeholders and decision-makers (and how these are negotiated may paralyse decision-making or result in ineffective implementation); uncertainty in forecasts at various scales leading to inaction; perceptions and understanding of risk at individual and collective levels precluding adaptation at large scales; and the fact that involuntary loss or significant change to place can lead to loss of cultural assets and values (Adger et al. 2009).

The barriers or limits to adaptation may be specific to specified adaptation actions, or more related to general resilience or vulnerability. Additionally, climate impacts will interact with other stressors potentially exacerbating impacts on more vulnerable populations (Eakin and Lemos 2006). These other stressors may compromise adaptation by increasing vulnerability/reducing resilience if they exacerbate inequality, affect livelihoods or social networks (e.g. conflict or political unrest resulting in uncertainty in markets or destruction of resources for subsistence or forced displacement breaking apart social networks).

A growing body of research examining the role of culture in adaptation demonstrates how culture can explain some of the diverse responses to climate impacts and drivers, including barriers to adaptation (e.g. Ensor and Berger 2009; Heyd and Brooks 2009; O'Brien 2009; Nielsen and Reenberg 2010; Adger et al. 2013). A study of barriers to climate change adaptation in Fiji's Rewa delta (Lata and Nunn 2012) found that traditional leadership structures, short-term thinking, lack of awareness and attribution of climate change to divine will were barriers to adaptation. However, aspects of the work in this thesis support the critique of that research by Hall and Sanders (2013) which highlight how the identification of issues and barriers to adaptation by Lata and Nunn (2012) were based on assumptions that linked awareness and understanding of the technical nature of climate change with "appropriate action" (Lata and Nunn 2012:183; implying a problematic knowledge-deficit model; see Hall and Sanders 2013), as well as assumptions that traditional and hierarchical leadership in rural communities were not capable of dealing with long-term changes. Embedding research in a specific context can enable more rigorous reflection on potential research (and researcher) assumptions, as the issues in the Lata and Nunn (2012) study highlight.

The following section (2.3) discusses the role of culture in adaptation and how culturally-based values and norms can shape potential adaptation actions.

2.3. Culture and adaptation

It is well-recognised that cultural norms, rules and values play an important role in shaping adaptation (Adger et al. 2009; Heyd and Brooks 2009; O'Brien 2009; Adger et al. 2013). . Roncoli et al. (2009) emphasise the role of culture in adaptation, stating "culture frames the way people perceive, understand, experience and respond to key elements of the worlds which they live in" (pp 87). Decisions about adaptation are made within a context that includes cultural and socio-political settings, age and gender, and decision-making processes and mechanisms. Cultural dimensions also include risk perceptions and perceptions related to decision-making such as perceived efficacy

I define culture here as "…culture resides in a set of public meaningful forms, which can most often be seen or heard…, [however] these overt forms are only rendered meaningful because human minds contain the instruments for their interpretation." (Hannerz 1992:4). This captures both the public and private aspects of culture as something that exists within individuals and their minds, but influences and shapes the nature of motivations, actions, intrapersonal interactions, social structures and symbols that occur in public spaces. Keesing (1974) considers the various ways culture is conceived as a adaptive or ideational, based on cognitive, structural or symbolic systems. He argues that culture is "created, shaped and constrained by individual minds" (*ibid*: 86), and individual behaviour is shaped by cultural principles and norms, and individuals making choices about behaviour, interactions and relationships create social life. However, no one individual can "know" all of any culture, resulting in variation in understanding and interpretation cultural symbols and meanings.

In the context of this research, culture can be considered an institution. Institutions can be conceived of as the "public rules of action and thought", a definition put forward by Hubert and Mauss (as discussed in Durão and Lopes 2011 and Pina-Cabral 2011). The 'public' refers to being shared collectively, 'rule' as organising principles or norms, 'action' can be behaviours or more widely practices and 'thought' captures perceptions and ways of understanding. Therefore, if culture is public forms that are only given meaning by individual minds that possess the tools to interpret these meanings, is follows that there is a collective understanding of how to interpret meanings, and these will be based on shared rules for how to understanding and enact (e.g. through behaviours or social interactions). These rules may be take the form of behavioural norms, and exploring culture through the examination

of these norms can offer insight into how aspects of culture, such as values or risk perceptions, are understood and acted upon.

This section examines the relationship between cultural dimensions (values, perceptions, worldviews; Section 2.3.1), risk perceptions (Section 2.3.2), efficacy perceptions (Section 2.3.3) and climate change adaptation. This section also includes a review framework rooted in the geographic and cultural context of the Pacific Islands region to evaluate adaptation and adaptive capacity (Section 2.3.4)

2.3.1. Values, norms, perceptions and worldviews

Internal and normative processes that shape responses are based on antecedents located within contextual elements such as norms, perceptions, values and attitudes at the individual and group level (Grothmann and Patt 2005; Adger et al. 2009; O'Brien 2009). By values I mean subjective aspects of the nonmaterial and material world often ascribed a meaning or judgement, closely related to worldviews and culture (O'Brien and Wolf 2010). Values and social norms frame how people respond to environmental variability. In two examples from India and Burkina Faso groups living in similar environments make different choices about livelihoods and diversification due to cultural preferences, values and social norms. Coulthard (2008) demonstrates how cultural values and norms shape fisher decisions to engage (or not) in livelihood diversification in an Indian lagoon. Villagers have access to fishing grounds in the lagoon under a traditional system which regulates the timing and fishing gear that can be used. While one village, populated by the traditional lagoon fishing caste, has access to the highest quality fishing grounds, their unwillingness to engage in other kinds of fishing activity or livelihood diversification means they rely heavily on fishing. The nearby village of lower caste fishers that have access to lower quality fishing ground follow the traditional fishing system, but also supplement that activity with other fishing and livelihoods. The higher caste villagers are unwilling to diversify due to the association of other fishing gears as 'poor people's' activities. While the social and cultural norms around keeping up the traditional fishing system prevent overfishing in abundant years, the system is inflexible and choosing not to fish in other areas with other gear means that the higher caste villagers choose to wait out lean years and hope for abundant years to follow. Nielsen and Reenberg (2010) also found that culturally-based preferences and norms around livelihoods influenced adaptation and livelihood choices by two different cultural groups in Burkina Faso. Similar to the example in India above, in Burkina Faso two pastoralist groups with culturally and historically-based power dynamics (the Rimaiibe were previously slaves of the Fulbe) responded differently to similar environmental pressures. Fulbe cultural values lead to preference for living in the bush and practicing transhumance rather than living in a village with the Rimaiibe, restricting Fulbe access to livelihood

diversification and other opportunities (e.g. work with development projects, labour migration) due to location but also perceived associations with other livelihoods (such as gardening) as "slave work" (Nielsen and Reenberg 2010). Culture shapes values, and differences in values can also result in tensions or different understandings of what is an effective or important adaptation between different groups (e.g. government and local communities; O'Brien and Wolf 2010). There is also potential for this tension to be a result of competing norms or values at different scales, for example at the household and community scale, if the actions associated with values and norms for one level could result in different or negative outcomes for the other level.

As research and theorising on adaptive actions to climate change have developed, there has been an increasing focus and recognition of the importance of internal and subjective (and culturally-based) elements such as cognition and perceptions. In Kiribati, Kurrupu and Liverman (2011) found that perceptions of self-efficacy for specific actions (responding to water stress) were related to action intention; adaptation intentions were formed when perceptions of self-efficacy were higher. At the community level, Eakin et al. (2010) found that perceived responsibility and impact of water management combined with institutional traditions between rural and urban communities led to reduced community-level capacity to respond to flooding. In both these studies perceptions played important roles in shaping capacity to respond to environmental changes, as well as important context specific components. In Mexico, the history of understanding flooding as an agricultural problem, and therefore separate from urban problems or management, highlighted the gaps and overlaps in local and municipal water management (Eakin et al. 2010). A potential source of overconfidence in abilities to respond to change in Kiribati could be linked to lifestyles on outer islands, where subsistence and livelihoods are often conducted in remote areas (Kurrupu and Liverman 2011). Frank et al. (2011) explore the role of social identity and perceptions of information, risk and adaptation. They find that social identity influences motivation for adaptation, and differences between in-group and out-group identities influence perceptions and use of climate risk information.

Culturally-based worldviews[1] influence behaviour. In Greenland Inuit communities' flexibility, innovation and acceptance of change are integral aspects of Inuit worldviews which have lead to successful responses to environmental variability and change (Nuttall 2009). It was found that the environment is not understood to be changing, but rather in a process of becoming. As it is therefore in flux, there is no equilibrium state to be deviated from, and instead surprise and uncertainty are expected, accepted and dealt with by relying on social networks and willingness to embrace change

1. Worldviews are "the constellation of values and beliefs about how society should be organised" (McNeeley and Lazrus 2014:507).

(*ibid*). These culturally-rooted worldviews influenced not only how environmental variability is understood and valued, but also shape responses to variability and change.

After examining the adaptive capacity of the Nez Perce and other indigenous tribes in the US from an anthropological perspective, Colombi (2012) and Colombi and Smith (2012) propose thinking of adaptive capacity as a cultural practice. They argue that the norms, values and agency in making decisions about land use and sovereignty over the last 300 years are embedded in cultural understandings and practices that are shared and reinforced via language, traditional practices and the adoption of new practices into traditional ones. The cultural persistence of the Nez Perce (and other groups, e.g. the Grand Ronde tribe of Oregon; Colombi and Smith 2012) is achieved through adopting new ideologies and knowledge within the context of changing sociological systems. For example, the Grand Ronde escaped a poverty trap common to other US tribal groups as they adopted casinos as their primary income source when land-based subsistence was no longer possible (Colombi and Smith 2012). The Nez Perce used traditional knowledge (of water and salmon) and leadership traditions to negotiate sovereignty and access over their lands in the face of dam building and previous treaties with the US. Colombi (2012) argues that cultural agency is an adaptive strategy used to confront change, which fits with a system understanding better explained by the concept of socioecological resilience. Colombi considers the equilibrium state of the Nez Perce cultural system as one desired and defined by the Nez Perce, using cultural tools to absorb disturbances and undergo changes (and therefore retaining the culturally-defined function, structure and identity of their system; Folke et al. 2010).

2.3.2. Risk Perceptions

One way to frame responses to climate change is to relate them to how risk is perceived, evaluated and acted upon (Dow et al. 2013). Risk here refers to more than the physical or social source of potential harm; it includes the perceived probability and magnitude of an impact which differs in different cultures (Slovic et al. 2000; Rohrmann and Renn 2000; Renn 2008). Risk perceptions have been shown to be strongly influenced by socio-psychological factors and underlying cultural and social processes (e.g. perceived controllability, fear associations, and attitudes toward environment or technology; Rohrmann and Renn 2000). These processes operate at individual and collective levels. Context-specific and culturally-influenced understandings shape risk perceptions, including what is perceived as threatening and therefore requires action (Slovic and Peters 2006; Whitmarsh 2008; Wolf et al. 2010; Nolet 2016). Nolet (2016) found that culturally-based flooding attribution, such as to divine will and also as a naturally occurring part of the landscape, in conjunction with perceptions of flooding as

positive events and reliance on traditional coping measures, shaped perceptions of risk and actions to mediate that risk (or not) in Fiji's Rewa Delta.

Direct experience is also suggested as influencing risk perception and action (i.e. the availability heuristic; Tversky and Kahneman 1973). Whitmarsh (2008) found very little difference in understandings and responses to climate change between non-flood and flood victims in the UK, however people with direct experience of air pollution were found to perceive climate change as a higher risk. This could be related to the availability heuristic of air pollution as a personal experience, combined with an understanding of climate change as an issue directly related to air pollution, while flood victims understood flooding and climate change as separate issues (Whitmarsh 2008).

Other recent work has suggested that although direct experience can play a role in risk perceptions other factors such as culture, environmental values or place identity are also important (e.g. Adger et al. 2011; Quinn 2014). Direct experience can also be mediated by identity and knowledge within a social group (Frank et al. 2011). In addition to risk, perceptions of what climate change and environmental change are, what adaptation means, time-orientation (Zimbardo and Boyd 1999) and what the community values (e.g. whether threats to individuals, family or community are deemed highest priority) can influence how risk from environmental change is perceived and shapes responses and adaptation choices.

As risk perceptions play an important role in climate change adaptation (Adger et al. 2009; Dow et al. 2013) and as risk perceptions are affected by worldviews and values which are underpinned by cultural contexts (e.g. Douglas and Wildavsky 1982), it is important that the role of culture in adaptation receives more attention. McNeeley and Lazrus (2014) used the Cultural Theory of Risk and myths of nature to examine barriers and conflicts over adaptation decision-making in four cultural contexts. The Cultural Theory of Risk posits that there are four general worldviews (hierarchical, egalitarian, individualist, fatalist) shaped by social organisation (level of social bonding and degree of social rules), and these shape how people perceive risk (Douglas and Wildavsky 1982). For example, hierarchists have more social stratification (high grid) and more social cohesion (more group) and their corresponding myth of nature is that nature is tolerant and manageable, and therefore can accommodate human action (to a point, and these points can be identified by scientific experts). Egalitarians have less social stratification (low grid) and high social cohesion (high group) and correspondingly view nature as fragile and sensitive to human influence leading to tipping points (McNeeley and Lazrus 2014). McNeeley and Lazrus (2014) linked conflict over adaptation decisions to differing myths of nature and worldviews in case studies from Alaska and Tuvalu. Egalitarian Inuit

communities and hierarchical US government agencies in Alaska clashed over local natural resource control and the privileging of Western scientific knowledge for decision-making. In Tuvalu, risk communications were framed according to hierarchical aid agency bureaucracies, however these did not match with local egalitarian priorities and although the project (a local marine protected area) was established, the external organisation and the local community implemented it under different rationales. These examples demonstrate the importance of culture and risk perceptions, especially in regions where there may be cultural differences between governments or external organisations and local communities, such as in Pacific Island Countries.

2.3.3. Perceived Efficacy

This thesis is examining potential adaptation action, therefore agency is therefore an important component of potential adaptation and adaptive capacity (Brown and Westaway 2011). Perceived efficacy is the perception that one can successfully accomplish an action (Bandura 1977), and is a component of personal agency (Bandura 1989). The strength of this belief influences whether a behaviour will be initiated and the amount of effort and time that will be expended. Efficacy beliefs have been found important for climate change adaptation. Efficacy beliefs are also specific to behavioural domain (e.g. plumbing) and behaviours (e.g. reducing water use; Bandura 1997). Truelove et al. (2015) looked at risk perceptions, efficacy and norms found that efficacy perceptions were the strongest predictor of behavioural intentions for agricultural adaptation among Sri Lankan rice farmers. Eakin et al. (2016) found that uncertainty in self-efficacy had the potential to lead farmers in the US to choose different livelihood options which they were already engaged in, rather than encouraging new innovation in technology or farm strategy.

In addition to personal efficacy, Bandura (2000, 2002) highlights the importance of collective efficacy perceptions in addition to personal perceptions. Perceived collective-efficacy is more than an extension of perceived self-efficacy, it is "a sense of collective competence shared among individuals when allocating, coordinating and integrating their resources in a successful concerted response to specific situational demands" (Zaccaro et al. 1995:309). Implicit in this definition is the sharedness of the perceived belief in not simply accomplishing an action, but the tasks of allocating, coordinating and integrating resources as a group. The concept has been used in understanding neighbourhood dynamics (e.g. Duncan et al. 2003) and health behaviour (e.g. Peterson and Stunkard 1989) and is an important concept in understanding collective action.

Perceived self and group efficacy were initially developed in Western and Northern contexts where culture is more dominantly individualist and therefore places more emphasis on the self, which some

hypothesise makes the self-appraisal portion of perceived self-efficacy more salient (e.g. Oettingen 1995). However, the concept of efficacy logically is applicable cross-culturally as it is a component of agency (Bandura, 2000). Klassen (2004) reviewed the cross-cultural applicability of perceived collective efficacy and found that although there are variations in reporting, the concept was still relevant. The authors also found that self-efficacy beliefs operated differently in non-Western cultures; they were reported as lower in more collectivist cultures (as opposed to individualist), but found to be more predictive of performance than those from individualist cultures. Klassen (*ibid*) also found that collective efficacy could be more salient in collectivist cultures and potentially replace the role of self-efficacy in some cases.

Research has established that perceived self-efficacy is important for initiating adaptation action (e.g. Grothmann and Patt 2005), and as adaptation will also require collective action (Adger, 2003), collective efficacy is therefore also likely to be an important component of potential adaptation actions. Although research on perceived collective-efficacy and climate change is currently limited, studies have shown that it can be important. For example, Thaker et al. (2016) found that higher collective efficacy was strongly associated with community engagement in water scarcity adaptation activities in India.

As collective efficacy is related to social relationships and collective action, social capital can provide a lens to understand some of these dynamics, as well as the some of the sociocultural aspects of adaptation discussed above. Section 2.4 reviews the concept of social capital and discusses its relevance to adaptation.

As discussed above, there is a need for context specific understandings of adaptation. The following section (2.3.4) introduces a framework to evaluate adaptation and adaptive capacity developed specifically for the Pacific region, drawing upon many of the elements discussed above (e.g. risk perceptions, perceived efficacy).

2.3.4. Pacific Adaptive Capacity Framework (PACAF)

Researchers and practitioners in the Pacific region have stated that climate change adaptation and adaptive capacity and its determinants are not always culturally contextualised and can be influenced by Western assumptions and worldviews (e.g. nature-human dichotomy; Barnett 2001; Barnett et al. 2008; Barnett and Campbell 2010). Although a number of programmes and projects categorised as addressing climate change have focused on technological adaptations or economic development in the Pacific region (Barnett and Campbell 2010), this emphasis is not necessarily as appropriate or important within communities where traditional values, kinship, and reciprocal relationships have been utilised for

generations to respond to environmental variability and change (Barnett and Campbell 2010; Lazrus 2012). The University of the South Pacific developed a Pacific Adaptive Capacity Analysis Framework (PACAF; USP et al. 2012; Warrick et al. 2016) to attempt to address this gap.

Seven categories of community adaptive capacity determinants were identified through a process of consultation and literature review, drawing on expertise from researchers, disaster risk managers as well as community development and community adaptation practitioners with a long history of working at the community level in the Pacific region. The PACAF was not intended as a "one-size-fits-all" proscriptive framework, but rather a guide to understanding adaptive capacity in a specific cultural and regional context, and the categories of adaptive capacity determinants were developed to reflect this. These categories are: human capital; social capital; belief systems, worldviews and values; resources and distribution; options; information and awareness; and history of dealing with climate events (USP et al. 2012; Warrick et al. 2016). Each of the seven categories has a number of subfactors developed with Pacific cultures in mind. For example, one of the sub-factors under belief systems differentiates between traditional, Western and church values and knowledge. This differentiation is important in an area where customary, church and modern/Western knowledge and values are different and at times competing (e.g. Farrelly 2011).

The applicability of the PACAF was tested on 12 rural communities in the Pacific (Vanuatu, Fiji, Samoa, Cook Islands, Kiribati, Tuvalu, Palau and the Solomon Islands) that had participated in community-level climate change adaptation projects. The PACAF was found to provide a helpful structure to examine community adaptive capacity determinants related to process and cognition, especially in areas where policy approaches to address issues with asset-based determinants are limited or unlikely to be changed, such as small remote island communities (Warrick 2011; USP et al. 2012; Warrick et al. 2016). For example, Warrick et al. (2016) also found that in the Solomon Islands determinants of community adaptive capacity related to cognition (e.g. perceptions and understandings) and process were more important for community adaptive capacity than asset-based (i.e. more importance on resource access as opposed to the resources themselves). However the PACAF has only been applied in a small number of communities that participated in climate change adaptation projects and further testing is needed to determine its strengths and weaknesses in different Pacific Island contexts. The PACAF is used to guide exploration of barriers and opportunities to potential adaptation in Chapter 8.

2.3.5. Summary

The cultural dimensions discussed in this section are used to explore the relationships between adaptation and culture. This section has described the role cultural dimensions play in adaptation and emphasises the importance of cultural understandings to context-specific understandings to enhance exploration of potential adaptation action. Although adaptation has been researched in a variety of cultural contexts using different research approaches, there still remain gaps in our understanding of the role of culture in adaptation and how different cultural dimensions (e.g. risk perceptions, values) may interact at the household and community scale. The role of sociocultural and cognitive elements, including worldviews and perceptions, in shaping adaptation is an area receiving increasing attention (e.g. Kuruppu and Liverman 2011; McNeeley and Lazrus 2014; Eakin et al. 2016) as well as frameworks to acknowledge the specific cultural context of the Pacific (USP et al. 2012; Warrick et al. 2016), however there is still scope for empirical studies to increase our understanding (Nurse et al. 2014). As an important part of the sociocultural context are the social relationships, I introduce social capital in the next section (2.4) as a concept to understand the social aspects of adaptation.

2.4. Social Capital

As mentioned above, decisions to adapt, or not, take place within a social context. Within any given social context, people do not act independently; their actions, decisions, perceptions and values are shaped by the relationships with other people, and climate change research has been increasingly recognising the potential role of social capital in adaptation (e.g. Adger 2003; Pelling and High 2005; Wolf et al. 2010). In this section I trace the history of the concept and discuss different forms of social capital and its relevance for adpatation.

One of the most frequently used definitions of social capital is "features of social life – networks, norms and trust – that enable participants to act together more effectively to pursue shared objectives" (Putnam 1995:664 – 665). Social capital is based on the premise that relationships are important and these interactions permit building of communities and functioning societies (Field 2008). Although the concept of social capital has been employed to varying degrees since the early 20th century (e.g. Hanifan 1920), its application did not become more widespread until research by Coleman (1994) and Putnam (1995; 2000) on education and civic participation respectively (Woolcock and Narayan 2000).

There are three major thinkers whose ideas have shaped the concept of social capital in its current form: Bourdieu (1986), Coleman (1988) and Putnam (1993; 2000). For Bourdieu social capital existed

almost exclusively for those privileged in society and used to maintain and further their power and social position (Bourdieu 1986). His work on social capital was part of his wider work on other forms of capital (e.g. cultural, economic), with the aim of understanding social hierarchy and was influenced by a broadly Marxist framework (Field 2008). Coleman approached social capital from a rational choice perspective, arguing that social capital comes about as actors choose to engage in behaviours for other purposes related to their self-interest, distinguishing social capital from physical or human capital which arise from deliberate choices (Coleman 1994; Field 2008). In contrast to Bourdieu, Coleman viewed social capital as both an individual and collective property for all actors regardless of position in the social hierarchy and as a positive public good. Putnam (1995; 2000) approaches social capital from a political science perspective, drawing from work in Italy and the United States defining it as "connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them" (Putnam 2000:19). Putnam's observation was that social capital permits collective action via promoting smooth functioning of communities, providing deeper connections between individuals and communities and facilitating the flow of information and goods to promote positive outcomes (*ibid*).

One major critique of Putnam's view is he assumes that social capital is universally beneficial (Portes 1998), although Putnam does acknowledge there could be negative aspects. Both Coleman and Bourdieu have also been critiqued for treating social capital as a positive attribute to be acquired, and all three have been critiqued for not differentiating between different forms of social capital (Field 2008). Despite these three authors generally treating social capital as a positive attribute, further research has revealed that social capital can have negative consequences. For example, too much internal network strength can lead to restrictive social norms that can hinder innovation (Newman and Dale 2005a;b), while a high reliance on external networks can indicate lower internal stability within a community (Osbahr et al. 2010). These downsides and the role of different forms of social capital is discussed on the following page and in Section 2.4.1.

The concept of social capital has been debated since its initial proposition (Woolcock 1998), often due to epistemological differences, i.e. whether social capital is something consciously maintained (and therefore socially constructed) by actors or an unintentional outcome of relationships and social interactions (Pelling and High 2005; Field 2008). Social capital can be private (held by individuals or households) or public (a product of communities and groups; Dasgupta 2000), and at its core are relationships of trust, exchange, reciprocity rules, norms and networks (bonding, bridging, linking;

Woolcock and Narayan 2000; Adger 2003; Ostrom and Ahn 2003). It is one of the elements that facilitates people to act collectively with roles for civil society and collective action (Adger 2003).

Although the concept has been in increasingly common use for over 20 years, there remain a number of criticisms. These relate to a lack of coherence and analytical rigour (e.g. Portes 1998; Fine 1999; Field 2008), oversight regarding issues of power, inequality and gender (e.g. Fine 1999; Harriss 2002; Molyneux 2002), the potential to emphasise economic over social with important policy implications (e.g. Fine 2002; Law and Mooney 2006a; Law and Mooney 2006b). To address these, there have been calls for more theoretical clarity supported by empirical evidence (e.g. Ostrom and Ahn 2003; Field 2008), to differentiate between the sources and outcomes of social capital (e.g. Woolcock 1998; Woolcock and Narayan 2000; Ostrom and Ahn 2003), and further critical engagement with issues around power (e.g. Harriss 2002; Schneider 2006).

I understand social capital as a concept that brings a relational understanding to rational choice-based understandings of human interactions, providing a way to examine the role of agency within structures (Field 2008). In this thesis I adopt the definition of social capital as "the norms and networks that enable people to act collectively" (Woolcock and Narayan 2000:226), including the differentiated forms discussed below. I see norms and networks as the sources of social capital and outcomes of social capital consisting of trust and reciprocity.

Differentiating forms of social capital is important, as varying combinations of the different forms could have alternate outcomes (Woolcock 2001). Distinctions have been made between three forms of social capital: bonding, bridging and linking, describing different kinds of interpersonal relationships (Woolcock and Narayan 2000; Woolcock 2001). Bonding capital is horizontal relationships between individuals that identify as part of the same group. Bridging capital is relationships between individuals that identify as members of different groups, and linking capital is vertical relationships between different groups, for example between government employees and rural villagers or between donors and recipients (Woolcock and Narayan 2000). Another distinction is made between the strength of relationships, characterised as 'strong ties' or 'weak ties' (Granovetter 1973;1983). Bonding social capital is not synonymous with 'strong ties', while bridging social capital may consist of 'strong' or 'weak' ties (Leonard and Onyx 2003).

Trust manifests among individuals of either the same or different groups, or manifests in individuals trusting society at large, and is related an individual's position or role within a group or society (Putnam et al. 1993; Putnam 2000). For some trust is a source of social capital, rather than an outcome (Fukuyama 1995; Portes 1998). Related to trust is reciprocity; reciprocity is often based on mutual

understandings of trust, but not always, and reinforced through trust (Pelling and High,2005). Reciprocity can be divided into balanced and generalised forms (Putnam et al. 1993). Balanced reciprocity refers to a relatively equal exchange of gifts, favours, etc. this type of reciprocity is a cornerstone of indigenous Fijian culture[2] and ideas of exchange within a community (Nainoca 2011). Generalised reciprocity refers to an individual providing a gift, favour or assistance of some kind without the expectation of return of equal value exchange. This kind of reciprocity also ensures that the reputation of those that offer this kind of help or assistance is associated with generosity, and the withdrawal of that reputation provides some sanction against free riding (Putnam et al. 1993). Trust and reciprocity are based on expectations of honest, consistent and/or cooperative behaviour based on shared norms and values (Putnam 2000). There can be a 'dark side' to trust, for example excessive in-group trust (related to bonding social capital and in this example based on ethnicity) can result in economic bubbles affecting both in-group members and wider society (Levine et al. 2014; Portes 2014). Wolf et al. (2010) found that bonding networks were not always positive in assisting the elderly in responding to heat stress in the UK, in fact there was potential for these networks to increase vulnerability.

2.4.1. Social Capital and Adaptation

There are an increasing number of empirical studies which examine social capital's role in adaptation , often focusing on collective action, resource management, livelihood options and coping strategies. In general, these studies demonstrate that the relationship between social capital and adaptation is complex and neither overwhelmingly beneficial or negative for those involved in those social networks. Goulden et al. (2013) demonstrated, for instance, how drawing on social capital is one of several important strategies used by lakeshore village residents in Uganda to increase social resilience to environmental change. However, although social capital proved important for collective responses, its different forms led to different resilience outcomes. There were instances where bonding social capital led to decreased resilience (due to obligations to share food in famine times) and high bridging and linking social capital for some individuals (but not others) led to decreased bonding social capital and associated trust (Goulden et al. 2013).

2. iTaukei will be used from here to refer to indigenous Fijian. The term became official in the early 2000s as efforts to reduce ethnic tensions in Fiji clarified that all Fijian citizens were referred to as Fijian. Before, 'Fijian' was commonly used to refer only to indigenous Fijians, excluding other ethnic groups. After a 2010 decree the term Fijian now applies to all citizens of Fiji, while indigenous Fijians are known as iTaukei. SOURCE: Fiji Ministry of iTaukei Affairs website: "*iTaukei*" *now replaces* "*Fijian*" *and* "*Indigenous Fijian*". http:/ /www.fijianaffairs.gov.fj/iTaukei.html. Accessed 7 April 2015.

Jordan (2015) discussed how exchange and reciprocity-based relationships influence responses to climate stress in coastal Bangladesh. She found that bonding social capital was more important for coping behaviours (or in her terms, reactive resilience), while a diversity of linking and bridging capitals was associated with more proactive behaviours. However these bonding networks can also be used by elites to reinforce the status quo, maintaining existing inequalities (Jordan 2015). Some research has suggested that bonding ties are more closely associated with survival and other reactive or coping behaviours (e.g. during and post natural disasters; Pelling 2003; Pelling and High 2005; Osbahr et al. 2010). Disasters/hazardous events are often framed as opportunities for positive change, which Jordan (2015) demonstrates are also opportunities for behaviour by elites drawing on exclusionary forms of social capital (e.g. bonding) to perpetuate inequality or solidify existing power structures.

A study about common property resource management in coastal Fiji highlighted that building stronger bridging relationships in addition to existing strong bonding networks facilitated access to new information, and that assisted reducing conflict with nearby communities and enhanced collective resources management (Sano 2008).

2.4.2. Summary

Social relationships by their very nature are dynamic throughout time, and operate and manifest at different scales in response to a variety of stressors. Various forms of social capital are not mutually exclusive and several can be present at any one time within and between groups. These relationships are based on common rules and understandings of trust, reciprocity and exchange (Adger 2003; Ostrom and Ahn 2003), and how people use and understand them are part of social capital (Pelling and High 2005). This research examines the sources and outcomes of social capital (norms, networks, reciprocity and trust in the Fijian context) and explores the connection between these and potential adaptation actions in Chapters 6, 7 and 8.

The role of social capital and its forms are complicated and context-specific. There is increased recognition of the concept's importance and potential contribution to adaptation to climate change (e.g. Adger 2003; Pelling and High 2005; Jordan 2015), however there have been limited empirical studies examining the relationship between social capital and adaptation. Although social capital has been examined and applied in various cultural contexts, including the Pacific, the interactions between the different forms, sources and outcomes will vary as shared meanings, social rules and norms governing human agency within social institutions vary in different contexts. It is therefore important to situate empirical research of social capital in a sociocultural context. Cultural models are an approach to

understanding these and how they interact with social capital and adaptation and are introduced in the next section (2.5).

2.5. Cultural models and adaptation

This section introduces cultural models and schema, borrowing from cognitive anthropology, and how these can be used to gain insight into culturally-based understandings of norms important for adaptation. In this thesis, schemas, or cultural models, are used to understand the relationship between forms of social capital, norms and adaptation. Cultural models are similar to mental models (Jones et al. 2011), and some descriptions of mental models are the same as cultural models (e.g. Jones et al. 2011; Lynam and Brown 2011). In this thesis I refer to cultural models, rather than mental models to emphasise the sharedness and sociocultural basis for these mental constructions.

The mental structures to make sense of the world and organise interpretation and understanding are also known as schemas. Schemas are "conceptual structure[s] which makes possible the identification of objects and events" (D'Andrade 1992:28). For example, hearing someone tell a story about an event that happened at a restaurant, you won't need to be told that they first sat down, looked at a menu, ordered food and drink, etc. since you have an idea of what going to a restaurant involves – in hearing that story you place it in the context 'restaurant' based on the schema you hold for a restaurant. Schemas are not simply static templates, but are involved in shaping perceptions and understanding. As "learned, internalised patterns of thought-feeling[3] that mediate both the interpretation of on-going experience and the reconstruction of memories" (Strauss 1992a:3), schemas also are vital for remembering, making inferences about and acting in the world (Casson 1983). Schemas have also been referred to as "frames", "scenarios" and "scripts" (*ibid*).

What makes a schema cultural is that it is shared, based on similar socially mediated experiences (Strauss and Quinn 1997:48). These shared schemas are cultural in that they are shared with other people but not with everyone. Schemas are not distinct, but loosely collected elements that work together to help process information (*ibid*: 49). The 'sharedness' of schemas does not mean that people have the same experience, but that they experience similar patterns (*ibid*:122-123) and that these schema are held in peoples' heads (D'Andrade 1992; 1995; Garro 2000). Cultural schemas may not be clearly demarcated in terms of sharedness, in fact "at what point in the continuum of sharedness we decide to

3. The concept of 'thought-feeling' is used to recognise that thoughts are not just conscious logical processes, but include affect and recognises the interdependence of cognition, emotion and motivation (Strauss 1992).

call a given schema 'cultural' is simply a matter of taste" (Strauss and Quinn 1997:122). Shared schemas are also referred to as cultural models, which can imply a more complex schema (D'Andrade 1995).

There have been debates between approaches to understanding cognition and culture, and the fields of psychology and anthropology propose different ways to consider and define culture and mental processes. One way to think about aspects of cognition, such as attitudes and subjective norms, is to consider these concepts expressions of culture which are shaped by individual preferences, culture and personal interpretations of culture (see Section 2.3 for a discussion of how culture is defined and conceived in this thesis).

Ultimately to understand why people do things, one needs to understand the cultural constructs that are used to interpret the world. However, Strauss (1992) argues that understanding what these constructs are alone is not enough, understanding how these constructs are internalised is also key to understanding action. There has been resistance from some within anthropology to the study of the internalisation of culture and meanings (Strauss and Quinn 1997:12). A main criticism of studying internalisation is that it reduces understanding of culture to mental phenomena and behaviour patterns (Toren 1990; Strauss 1992). Many anthropological critiques focus on the public (e.g. Geertz) or constructed nature of culture and meanings. Constructivist approaches tend to describe cultural content in terms of public texts and symbols that people passively absorb or reflexively resist (Strauss and Quinn 1997:12-44; Matthews and Moore 2001). Many of these accounts focus on agency, but lack in-depth exploration of how individuals "meet the everyday challenges of thinking, feeling, remembering, and solving problems" (Mathews and Moore 2001:1). This hesitation to focus on internal processes has roots in conceptualisations of the location and definition of culture: Geertz stressing the public nature of culture, such as the metaphor of culture as a "text" that can be read (Geertz 1972; 1994).

A further critique of merging or applying psychological theory to anthropological inquiry (from an interpretivist standpoint) stresses that public symbols are observable, and we should study what we can observe; meanings are intersubjectively shared; meanings are socially established prior to learning them; and thinking often relies on material objects in the world (Strauss and Quinn 1997). Strauss and Quinn (1997) stress that these critiques are valid, however also emphasise that structures of meaning can be both public and psychological states. Although psychological states can not be observed, inferring meaning from symbols or rituals is not different from inferring meaning from "ordinary talk and mundane actions" (*ibid*:15). Strauss and Quinn (*ibid*) also agree that meanings are shared intersubjectively within groups; as people learn to communicate and interpret the world they will

develop similar mental structures. If meanings are intrapersonal (shared but not observable, so private) that does not mean they are idiosyncratic (not shared or observable, also private). Additionally, meanings are not discovered or made up by each individual; they are developed based on explicit and implicit teaching by or observation of others (Toren 1990).

Meanings, as defined by Strauss and Quinn (1997) are both psychological states and social constructions – the mental structures used to interpret the world are learned from interacting with the world. This does not mean that culture isn't as Geertz described, but that to understand culturally informed actions one needs to understand how people understand cultural meanings and privately interpret them (even if these are shared via discussion or other less private social interaction) into meaning (D'Andrade 1992; Strauss 1992). At the heart of anthropological critiques of applying psychological theory to anthropological inquiry is the understanding and location of culture, in addition to issues with social psychological approaches that are positivist and reductionist. The understanding of culture used in this research includes the mental and social constructs that make up meaning, and are examined via public manifestations and expressions of culture, such as actions and intrapersonal interactions.

The cultural schema and models used in this research is a way to bridge this gap between psychological and anthropological understandings of behaviour. Understanding schemas as organised hierarchically draws on a connectionist framework where schemas are viewed as strongly connected networks, arranged hierarchically (Strauss and Quinn, 1997; Garro 2000). Schemas can be connected to several other overarching schemas. Garro (2000) examined cultural understandings of illness causation (specifically focused on diabetes) among the Anishinaabe of Canada and found schemas for 'white man's sickness', 'sickness' and 'Anishinaabe sickness'. These schemas were at the top of the hierarchy of understanding, and lower level schemas related to imbalances in the body were linked to these types of illness causation. However body imbalances due to white man's food were linked to 'white man's sickness' and body imbalance caused by overconsumption were linked to 'sickness'. All participants recognised these schemas, but based on personal history with diabetes they used different schema to attribute their own and the community's experience with diabetes, often either attributing diabetes to 'poisons' (e.g. additives and preservatives) in food, water and the air that were non-existent pre-'white man' or a personal (and community) history of overconsumption, usually of sugary or canned foods and alcohol. Although there are cultural schemas about illness causation, personal experience shaped the interpretation of these schemas for attributing change personally and for the community.

Also important is that schemas are not static. However, they are not dynamic enough to change significantly from interpretation to interpretation, what Strauss and Quinn (1997) refer to as centripetal and centrifugal tendencies of cultural understandings. What makes schemas centripetal is that they can be durable in individuals, have motivational and emotional force which prompt action, and can be reproduced across generations. They can be thematic, so that understandings are shared and present in different contexts (Strauss and Quinn, 1997). The opposite characteristic is that schemas are centrifugal, in that they can be changed within people and across time/generations, they may be limited in their relevant context or motivational force and they may not be shared by many people (*ibid*). For example, Toren (1990) described a social hierarchy schema based on personal history which are held personally (in that cognition, understandings and meanings of social symbols and processes takes place within the mind), but mediated and modified based on experiences in the social environment.

Schemas and cultural models are more than just organisational tools for people to understand and process events and information, as they also enable people to define goals and therefore motivations, both conscious and unconscious (Strauss 1992b). There can be competing schemas and confusion over which schema to access in what context, which could occur in "messy" or "censorship" situations (Holland 1992). A "messy" situation could be a context where it is unclear what action to take or where individuals interpret schema differently, however the development of new or modification of old schema to address situations is possible (*ibid*). Schemas can provide information on what is relevant, but what is not included is also of interest and much more difficult to determine. Schemas can be used to filter out or avoid things, such as harmful behaviours (e.g. fire is hot, don't step in it) or suppress emotions and reactions[4] (*ibid*). Schema theory does not fully address social or psychological conflicts, although research that includes not just cultural products but also what is censored can address these critiques (*ibid*). More recent applications of schema theory are addressing some of the issues with psychological and emotional conflict, looking at conscious and unconscious compartmentalisation, integration, and lip service as methods for addressing conflicting schemas or censorship (Strauss and Quinn 1997).

Cultural models can help explain cultural knowledge and behaviour (e.g. Paolisso 2007), and have been used to explore perceptions and understandings of social hierarchy, climate change, weather and natural resources management (e.g. Toren 1990; Paolisso 2007; Crate 2011; Wolf et al. 2010; Jones et al. 2011; Lynam and Brown 2011). For example, Toren (1990) looked at how understandings of social hierarchy

4. For a discussion of schemas used to suppress emotion for work by airline stewards, which also impacted emotional awareness outside of work situations, see Hochschild (1983), also discussed in Holland (1992).

in Fiji, comprised of status, rank and gender concepts, was a social process whereby actors both constructed and behaved according to their own understandings of these concepts[5]. Toren presents hierarchy as an overarching (or top-level) cultural model, with rank, status and gender as cultural schema underneath. She demonstrates the interconnected nature of these schema through her work with children as they learn about the intricate complexities involved in these schema (e.g., the status and seating positions of an older sister vs. younger brother vs. people from higher ranked villages and context-dependent differences of seating position). Children construct these schemas based on experiences and observation as there is no explicit teaching about hierarchy and deference, and different experiences and observations will lead to slightly different understandings (*ibid*).

A cultural model of the provisioning of crab in the Chesapeake Bay, US by crab fishermen demonstrate that although crab fishermen's cultural model for fishery management is similar to regulatory approaches (in that natural science and regulations are important), for crab fishermen God is the overall provider of the crab, and therefore scientific stock assessments are not a tool they consider effective to provide information on blue crab stocks (Paolisso 2002).

Utilising a cultural models approach can provide valuable insight into values and also perceptions and understandings of how a system (e.g. natural, social) functions with implications for behaviour (Strauss 1992b; Strauss and Quinn 1997; Paolisso 2007; Jones et al. 2011). The following section (2.6) introduces the Vanua, an iTuakei concept that is central to Fijian social relationships, norms and behaviour.

2.6. The Vanua

Indigenous people in the Pacific island region, as all over the world, have their own indigenous worldviews and ideologies that shape interactions with the world around them. As understandings of adaptation and social capital stress the importance of context in exploring and understanding capacities to respond to climate change, I use a Fijian context-specific concept: the Vanua.

The literal meaning of the term 'vanua' is land. However, the Vanua is much more than just land. As a physical place, it encompasses the soil, the water and all the living plants and animals. It also refers to the people that live and are associated with that place and all the social connections, rules and norms that govern behaviour within that place and in between all the people. In a discussion of the meaning of Vanua, Tuwere (2002) describes an additional four symbolic ways the Vanua can be understood: as a

5. Toren (1990) refers to 'schemes' and related sub-constructs, which could also be conceived as schemas as defined by D'Andrade (1992; 1995) and Strauss and Quinn (1997).

means of livelihood; to make sense of time and events; to preserve traditions and memories of ancestors; and as a sense of identity. Livelihood in this case does not only mean sustenance and income, but also a "social fact which for the Fijian people holds life together and gives it meaning." (*ibid*:36). For someone to be cast out of the Vanua means to be cut off from "one's source of life" (*ibid*:36).

The Vanua is a core concept for iTaukei (e.g. Ravuvu 1987; Farrelly 2011; Nainoca 2011). Relationships are important part of iTaukei life, and living life according to Vanua*,* or *va'avanua*, "requires that an individual encourages and maintains social harmony and social solidarity," (Farrelly 2011:824). Identity in iTaukei villages is strongly tied to the village and traditional culture, and observation of Vanua is important for experiencing *sautu* (Ravuvu 1987). *Sautu* is health and wealth, where wellbeing and wealth include physical, spiritual, emotional and psychological health and wealth includes material things but more importantly a diversity of strong relationships and social networks (Nabobo-Baba 2006, as cited in Farrelly 2011). *Sautu* is linked to the importance of the village in everyday life and conceptualisations of the self for rural iTaukei. "Fijians themselves characterise village life as a source of their identity and a symbol of unity" (Sano 2008:20).

As the Vanua embodies social relationships and provides a framework for the structure of norms and networks, it can also be thought of as an important component of social capital (Clark 2008; Farrelly, 2011; Nainoca, 2011). A primary contextual element encompassing natural resources, perceptions and social relationships the Vanua is also important for adaptation. The Vanua is connected to some of the adaptive capacity determinants from the PACAF (see Section 2.3.4), such as beliefs and worldviews. The Vanua, as a cultural concept and worldview, consists of shared meanings and understandings. In this thesis, a community is defined by a based on a geographically determined area (the study site island, and those with cultural connections to this geographic place as discussed in Section 4.2). However I also recognise that a 'community' can extend beyond these geographic boundaries (e.g. a Vanua can be considered a community, with members residing in other places but who are connected to the Vanua through familial or spiritual connections), and includes the sociopolitical context and does not assume that that a community is unified, homogenous or equal (Lane and McDonald 2005; Cannon 2008; Buggy and McNamara 2015). However, to reduce confusion in this thesis the Vanua is understood to be manifest principally at the level of the village, while also recognising that the Vanua encompasses broader geographic, spiritual and elements. More detail on the Vanua, including how it relates to behaviour and is used as as an analytical tool are in Section 4.2.3.

2.7. Research Questions

This chapter has reviewed current conceptualisations and understandings of how people respond to environmental and climate change by drawing on different types of resources. The potential for people to access and mobilise these resources to engage in climate change adaptation is shaped by their social, cultural and institutional contexts, and there are gaps in our understanding of the interactions between these influences. Cultural dimensions, including values, perceptions and norms play an important and varied role in shaping responses to climate and environmental changes.

In this thesis I will focus on potential adaptation actions, as actions to manage environmental variability and climate change may difficult to identify, may be be reactive, initiated for another stated purpose or have not yet occurred. This aligns with my definition of adaptation (Moser and Ekstrom 2010) which is holistic and includes non-climate goals and priorities. The focus on potential adaptation actions also permits exploration of the cultural 'background' in which adaptation is and can take place, without a heavy focus on implemented or ongoing efforts or projects that may involve discussions about the specifics of the effort rather than underlying culture factors influencing norms, perceptions and tensions between households and a wider community. The goal of this research is to understand the way that culture, understood as a set of shared norms, influences risk perceptions and the tensions between potential adaptation actions at the level of the village and the households within it in an iTaukei context. This research does not aim to explore barriers to adaptation, however the focus on potential adaptation requires an exploration of potential barriers (and opportunities) for adaptation. The conceptual framework guiding this research is based on an exploration of the relationship between culture, potential adaptation, and social capital. An indigenous concept (the Vanua) is used to guide the exploration of culture's role in potential adaptation actions. Guided by this framework, I developed three research questions:

1. How is climate variability and environmental change currently understoond and responded to at the household and village level?
2. What are the shared norms that characterise the Vanua? How do these norms relate to social capital, and what role does social capital play in potential adaptation for households and the village?"

3. What are the potential adaptation actions that best serve the interests of the village? What are the potential adaptation actions that best serve the interests of the households? How do these compare?

These questions will add to our understanding of the relationship between culture, adaptation action, and social capital. My main theoretical contribution is to demonstrate the potential for situating studies of potential adaptation in a specific cultural context by incorporating indigenous concepts and how these can provide additional insight into an area receiving increasing attention. Climate change adaptation is an increasing policy goal for governments and aid agencies and this thesis contributes toward understanding the role of culture in adaptation.

The following chapter (Chapter 3) explains the methodology for exploring these research questions in the iTuakei context and introduces the case study.

Chapter 3. Methodology

3.1. Introduction

My research interests are in exploring the relationship between culture, relationships and potential adaptation actions. This chapter outlines the research approach I used to answer the questions from Chapter 2. I describe my research approach and design, epistemology and research site selection process in Section 3.2 and introduce my research site in Section 3.3. The following sections specify my methods and analytical approach (3.4 and 3.5 respectively). This chapter finishes with a reflection on the research process, ethical considerations and limitations of the research (3.6).

3.2. Research Approach

To investigate the interactions between culture, relationships and potential adaptation actions this research adopts a critical realist paradigm. Critical realism posits that "there is a real material world but…our knowledge of it is often socially conditioned and subject to challenge and reinterpretation" (della Porta and Keating 2008:24). Social reality therefore has three domains: the real, actual and empirical (Bhaskar 1975). Additionally, ontologically the world can be interpreted transitively (what we can know) and intransitively (objects of knowledge independent from us; Burnett 2007). Studying people's experiences of climate variability and environmental change implies recognition of concrete phenomena existing without people; however people's experience with climate and environmental change is dependent on social conditions and knowledge used to interpret and assign meaning to these events.

I used an analogue approach to understand how people have responded to climate variability (e.g. flooding) in the past to aid understanding of potential responses in the future (Glantz 1991; Adger et al. 2003; Goulden 2006). Societal responses may be similar in the near future to the near past as societies can be slow to change (Glantz, 1991). Therefore, understanding how people respond to and understand changes in the biophysical environment now and in the past provides potential for insight into future responses and understandings.

My research strategy is a case study employing mixed methods which are both qualitative and quantitative since I am interested in perceptions and understandings held by individuals which are culturally-based. I am also interested in shared understandings and how these interact with aspects of the physical world (e.g. climate variability). Investigating the complex relationships between these

aspects and their context results in many variables of interest. Yin (2014) points out that this is both characteristic of case studies, and also supports moving away from conventional variable-based methods and to more holistic methods.

The following section (3.2.1) details my case study design and methodology, followed by a description of the case study site (3.2.2).

3.2.1. Case Study Methodology

To explore and investigate interactions between potential adaptation actions and culture the research required a strategy that would generate exploratory and explanatory data situated in a particular cultural setting. A case study methodology, which "investigates a contemporary phenomenon (the 'case') in depth and within its real world context" (Yin 2014:16) is well suited for this purpose. Case study methodology is also appropriate when it is unclear where the boundaries between context and the phenomenon lie, requiring in-depth investigation (Yin, 2014).

Case study methodology has been criticised for being ungeneralisable, having more utility as an initial exploratory tool rather than generating or testing hypothesis and prone to validation bias (Flyvbjerg 2006; Yin 2014). However, as both Flyvbjerg (2006) and Yin (2014) point out, the criticism of generalisability could be said of natural science experiments conducted only once: single cases combined can add to theory-building much as multiple experiments do so, and single cases can also be used to question or cast doubt on established theory. Using multiple case studies to test hypotheses rather than at earlier exploratory phases can also provide important information, especially if cases are selected not as representative or random samples but rather based on extremes, maximising variation, etc. (Flyvbjerg 2006). Validation bias in case studies may be no more common than any other social science methodology, and the in-depth nature and reflection associated with case studies mean that the researcher is often confronted with their own bias and is able to reflect and challenge it (Flyvbjerg 2006).

My case study focuses on experience with climate and environmental variability and culture (i.e. indigenous Fijian, iTaukei). The case was chosen not to be a representative case of indigenous Fijian culture, however was chosen to represent a case of iTaukei households in an iTaukei community experiencing changes and conflicts associated with proximity to an urban environment (Bryman 2012), although I do recognise there is cultural variation in Fiji among indigenous Fijians as well as other Fijian ethnicities (e.g. Indo-Fijians). Prior to fieldwork I determined what concepts would be of primary interest to my research based on literature review, but did not hypothesise on the relationships between

them as this is a complex case without clear demarcation between phenomenon and context (Yin 2014).

3.2.2. Site selection process

My case study site selection was based on several criteria: a dynamic biophysical environment, a community that not previously participated in a climate change adaptation project, and a community balancing traditional and Western ways of living simultaneously through proximity to an urban centre. The study site location, in the delta of the Rewa River, was selected for these reasons.

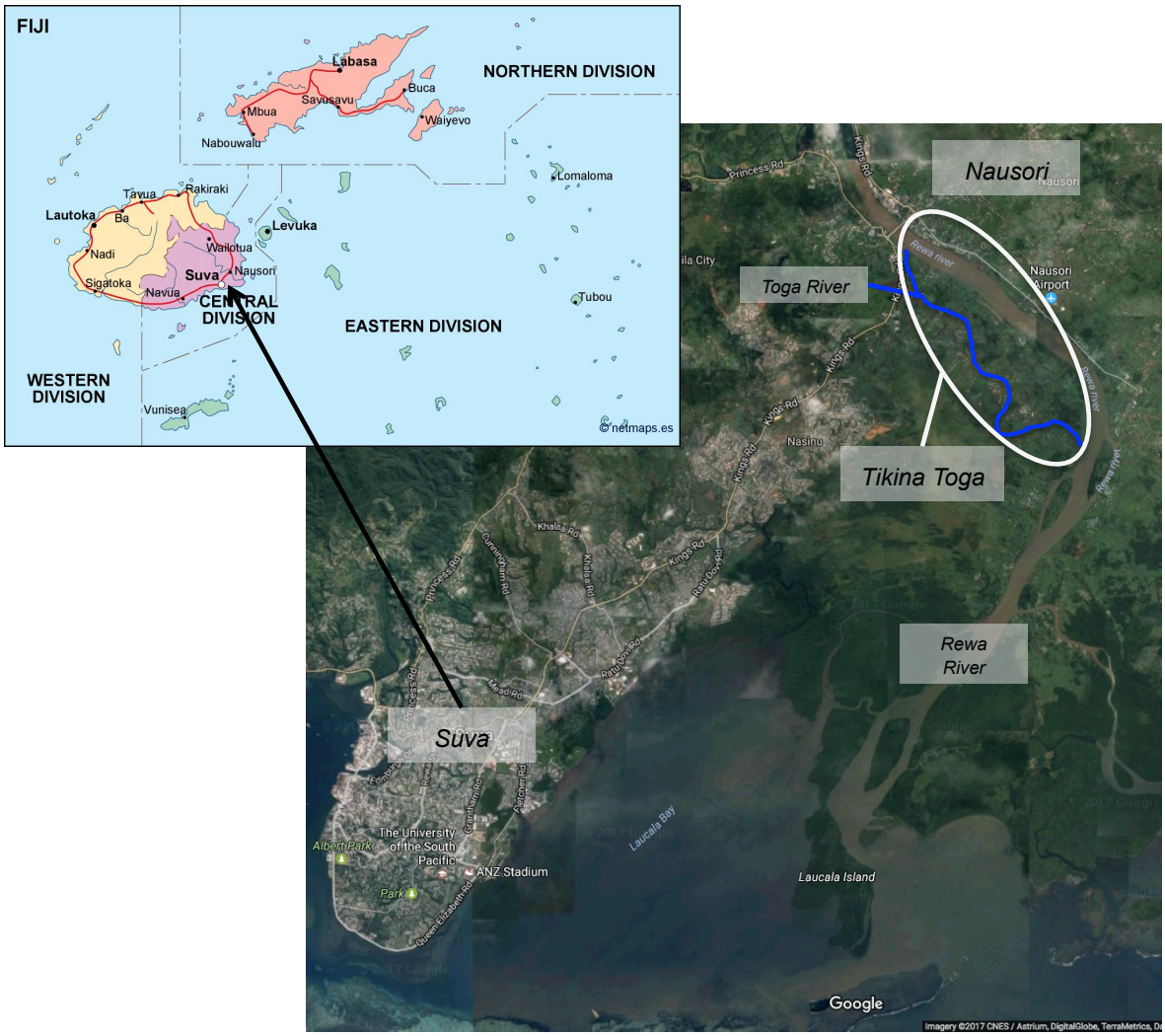

Figure 3.1. Fieldwork site location within Fiji, with Tikina Toga, the Rewa and Toga Rivers. *Toga is the island bounded by the Rewa and Toga Rivers[6], and located near Suva and Nausori. Toga is circled in white, and the Toga River is highlighted in blue. SOURCE: GoogleMaps © 2014*

6. The term 'Toga River' is used to refer to the flowing water on the eastern side of Toga (pronounced "Tonga").

River deltas are areas of constant changes in the biophysical environment. Constant change is present in the form of flooding, accretion and erosion in the Rewa Delta. It is likely that changes in rainfall, more intense tropical storms, deterioration of coral reefs protecting shorelines from storm surge and oceanic waves, as well as sea level rise, will have significant effects on the timing and magnitude of some of these processes (Feresi et al. 2000).

In addition to the dynamic biophysical environment of river deltas, I also wanted to select a case study site that had not taken part in a climate change adaptation project or programme. The reason for this was I was interested in the "before" adaptation, i.e the relationship between culture and potential actions to adapt to climate change and I was concerned that research within a community that had participated in a climate change adaptation project could be dominated by discussions of the project and outcomes. I also wanted to select a case site that was neither rural or urban. Pacific cities are rapidly growing, and many people in Fiji are moving to more suburban or peri-urban areas such as the area between Suva and Nausori. These areas are also sites of rapid cultural changes as people balance the values and norms of employment in a city or town, often based on a capitalist and Western system, while also residing in a village where norms and values are more traditional.

After I had narrowed down to the Rewa Delta as my target area I then relied on assistance and guidance from the Fijian national and provincial government. I knew from my preparatory research, as well as working and living experience in Pacific Islands, that I had to obtain permission from the government and traditional chiefly hierarchy prior to working in a community. I approached the iTaukei Affairs Board in Suva and was directed to a Rewa Provincial government officer. I met the Provincial Officer at his office in Lomonikoro, and he directed me to Navatuyaba in the district (tikina) of Toga (Figure 3.1) to meet with the *turaga ni vanua* (district government liaison). The *turaga ni vanua* was interested in the research, and I returned to the village with a Fijian research assistant and made my formal request and yaqona[7] offering (sevusevu) to the chief and elders and was given permission to do research in the village of Navatuyaba as well as the Vanua of Toga (including two other villages, Vunisei and Muana).

The following section (3.3) provides an introduction to and description of the case study site.

7. Yaqona (kava) is the dried and ground root of the *Piper methysticum* plant and is very important in Fijian ceremonies, as a component of ceremonial exchange, and to demonstrate respect. For more information see e.g. Aporosa (2012).

3.3. Tikina Toga: Case Study Site Description

Tikina (District) Toga is located south of the city of Nausori on an island within the Rewa River, consisting of three villages: Muana, Vunisei and Navatuyaba (Figure 3.2). There are approximately 1700 people living in the three villages, of which Navatuyaba is the largest (population approximately 800) and the chiefly village of Toga (Table 3.1). Toga is on the western side by the Rewa River and access is via an unpaved road which connects to the main road that circumnavigates Viti Levu. Almost all the houses and buildings in the villages are made from concrete or timber framed covered with corrugated tin. Most homes are raised off the ground to varying heights and clustered around a central village area. In the village, the main area is communally held land, i.e. owned by the village, and where most of the churches, community hall and foot paths are located. There are at least five different churches (Methodist, Catholic, Mormon, Assembly of God, and Seventh Day Adventist) and one primary school. Throughout the village there are a series of drainage ditches, dug and maintained by community members[8].

Table 3.1. Population and households in Toga. *Data from Rewa Provincial Council Office 2013.*

Village	Population	Households	Avg. people/household
Navatuyaba	784	97	8
Vunisei	464	40	12
Muana	484	83	6
Total	**1732**	**220**	**8**

Rivers around Toga are tidally influenced although the water is too fresh for mangroves to grow or marine species to be frequently found. Marine fish swim upstream with high tide and are caught occasionally, but the river's primary resources are the *moci* (shrimp, *Macrobrachium spp.*) and *kai* (freshwater clams, *Batissa violacea*) consumed and sold in the villages and at markets in Nausori and Suva. Selling *kai* is more common than *moci* and is frequently done by women. Although collecting *kai* and *moci* was traditionally women's work, in recent years men, women and children will harvest in the river.

8. Page 69 at the end of this chapter contains photographs of Tikina Toga.

Figure 3.2. The three villages of Toga. *The main road connects Toga near Muana, which is the only road crossing the Toga River. SOURCE: GoogleMaps ©2016.*

Land in Toga is either cultivated, forested or has homes built upon it. A plantation or garden is the term used in the villages to describe the plot of land used for agriculture, and the term plantation will be used in this thesis. Plantations are vital sources of subsistence (primarily root crops such as taro or cassava), although fruit trees, firewood and gathering fruits from the forested areas, and fish and shellfish from the Toga and Rewa rivers are also important for subsistence and income. The plantations and river provide some income for 74% of people, while 23% rely exclusively on plantations or the river for their income. Just over half (53%) of households rely on someone working full- or part-time. This data reflects both the ease of access to areas where there is work (e.g. Nausori, Suva) and also the importance of the local land and river resources for livelihoods. This is also reflected in what people eat (Table 3.2). 93% eat from the plantations at least once a week (cassava, taro and greens), while 90% eat

purchased food at least once a week (bread, sugar, tinned food). Food from the river is also eaten at least once a week by 81% of Toga's questionnaire participants (*kai*, *moci*, and fish).

Table 3.2. Access to common plant and animal species. Proportion of surveyed households with access to commonly used plant and animal species. Most of these are used for consumption, but some are also culturally important (e.g. pandanus for mat weaving). *(Data from questionnaires; Toga n=128, Navatuyaba n=59, Vunisei n=30, Muana n=39)*

Plants				
	All Toga	**Navatuyaba**	**Vunisei**	**Muana**
Coconut	98%	98%	97%	97%
Mango	81%	92%	77%	69%
Soursap	39%	41%	43%	33%
Pandanus	44%	54%	43%	28%
Firewood	87%	81%	93%	90%
Papaya	78%	69%	80%	90%
Banana	81%	88%	77%	74%
Animals				
	All Toga	**Navatuyaba**	**Vunisei**	**Muana**
Chicken	59%	51%	50%	38%
Duck	8%	8%	3%	5%
Pig	68%	44%	67%	59%
Cow	36%	32%	37%	15%
Horse	4%	5%	0%	3%

Just to the west of the Rewa River is Suva, Fiji's capital (Figure 3.1). The Suva metro area is one of the most densely populated areas in Fiji. Part of this dense development follows the Queens Highway northeast out of Suva toward Nausori. The Queens Highway continues to circumnavigate the island, however the more dense development quickly disappears after Nausori. Communities close to this corridor typically have access to the main electricity, water and sewage infrastructure of the Suva area, as well as access to buses, mini-buses and taxis that can take them to Nausori or Suva in a relatively short time (e.g. Navatuyaba to Suva via taxi can be done in 20 min, while it can take over 2 hours on public transport). Toga is connected to the main electricity and water, but relies on local septic tanks for sewage and burning trash for rubbish disposal.

This proximity to urban areas provides access to medical care, secondary schools and markets to buy and sell produce and goods. Many households in Toga have members that work in Nausori or Suva, as well as growing crops for their own consumption and often sell in the markets. However most income (as understood locally to be both cash as well as food) comes from the plantations and the river. It is more common for people to sell things when they need cash rather than operate as a commercial

business. Selling produce could be fairly regular (i.e. on a weekly basis), or it could be when cash is required, for example when school fees are due or the mataqali (clan) has requested members to contribute to a funeral or wedding. People are taught English at school, although many may not speak any until they are 5 or 6 years old. Most people speak very good English, although some older and younger people, and people who spend a lot of time in the village (where the local dialect of Fijian is spoken) sometimes struggle to understand or speak English.

Further discussion of the case study site context, including the biophysical context, social structure and culture of Fiji is in Chapter 4. The following section (3.4) describes my data sources and methods of data collection, based on my research questions.

3.4. Data Sources and Collection

The primary objective of this research is to to understand the way that culture, understood as a set of shared norms, influences risk perceptions and the tensions between potential adaptation actions at the level of the village and the households within it in a Fijian context. The units of analysis for this case study were households and the village, however it is individuals who make decisions, interact socially within the household and village, and hold culturally-based perceptions and understandings. This research employed an ethnographic approach to look at potential adaptation actions from the individual scale to the community scale to build an understanding of cultural and social factors affecting potential adaptation actions from the individual to the household and village level. I recognise that it can be difficult to collect data on deeply held beliefs, perceptions and social relationships with a limited time in the field and I employed a variety of methods to overcome some of these challenges.

I combined participant observation, in-depth semi-structured interviews, questionnaire data and meteorological records to both capture a more complete understanding of the complex relationships between culture and experiences of environmental change and to triangulate my data. The quantitative data provides information on the context of people's lives (the 'what') and I use qualitative data to provide additional exploratory depth (the 'how' and the 'why'). I aimed to generate context-specific data about adaptation and provide generalisable insights that could be applied to other indigenous communities responding to climate and environmental change.

The following section discusses some of my fieldwork experiences (3.4.1) as they relate to my research, followed by my experience with employing an iTaukei research approach (talanoa) (3.4.2). I then discuss the methods I used for data collection: interviews (3.4.3), participant observation (3.4.4) and questionnaire (3.4.5).

3.4.1. Fieldwork

Fieldwork took place from November 2013 - May 2014, and was divided into two phases: a preliminary and exploratory stage from November 2013–mid-January 2014 and the main data collection stage from January–May 2014. During the preliminary phase I took Fijian language classes, hired and trained a field assistant, obtained a research permit, conducted key informant interviews with Navatuyaba elders and leaders, piloted interview questions in Navatuyaba and with several government and NGO representatives, and tested a focus group methodology in Navatuyaba.

I conducted the bulk of my fieldwork in Navatuyaba, and hereafter when I refer to "the village" I am referring to Navatuyaba unless otherwise specified. I made the decision to base myself primarily in Navatuyaba as the in-depth interviews required rapport and familiarity with participants that took at least two months to develop and provided opportunity for numerous casual encounters that would not have been possible if I divided my time between Navatuyaba, Muana and Vunisei.

There was no opportunity for me to rent a room or house in the village during my fieldwork, so I stayed in the home of a village leader for 5-6 days every week. I was sensitive to their needs with a stranger coming and going from their house, and behaved in a way I hoped was respectful for them. I modified my coming and going to coincide with theirs as best as I could as well as giving both them and myself a day for 'breathing space' by returning to Suva, usually on Sundays. Sundays as an entire day, including going to church and the meals and gatherings afterward, are a vital part of village social life and my hosts had church-related responsibilities on Sundays. While I was in the village they sometimes modified their schedules to accommodate me, and I did not want them to feel any conflict between anything related to hosting me and their church or Sunday obligations. I did stay in the village for several Sundays, to observe and participate. For example the Methodist Church hosted a service and events on International Women's Day and I assisted in food preparation and attended. I did not pay rent for the room I stayed in as a cash transaction for something that had been offered as a gift would have been considered rude. However I did bring a small bag of groceries (e.g. flour, soap, sugar, eggs) every time I came and gave gifts (electric fans, clothing and cash) at the end of my stay. I also presented a cash gift to Toga at the end of my stay.

I initially hired a research assistant (an undergraduate at the University of the South Pacific recommended to me by a University staff member) who was from a village that had distant connections to Toga. I had done this as people do not typically visit and stay alone in Fijian villages (it can be perceived as having done something to offend all your relatives; Nabobo-Baba 2006), to advise on cultural issues and assist with translation. Additionally I thought a male research assistant would

have access to people or situations that I would not as a female. However, I found that I had more access than I anticipated as an outsider with guest status in the community. I was able to request and meet people that I would not have if I were iTuakei since I was granted more flexibility for following social rules about speaking and access.[9] I then hired a local woman, M, to be my assistant, including help with lining up interviews and translating. I paid M for her time, and brought small amounts of food (e.g. flour, sugar) for her family on my weekly visits.

3.4.2. iTaukei research process and Talanoa

I required a methodology that was flexible and tailored to the context. Informal talanoa[10] is a concept that starts with stories that people tell to establish rapport without concealing feelings and being open and empathetic. These stories that may be about nothing in particular but involve a connection between people, and has been proposed as a research methodology for indigenous Fijian research (Otsuka 2005; Farrelly and Nabobo-Baba 2012; Suaalii-Sauni and Fulu-Aiolupotea 2014). This approach can be time consuming and the stories (narratives) that people share are the primary building block of talanoa, although these should not be confused with informal interviews. In Fiji very direct questions can be seen as rude. Informal talanoa is a way to overcome this as more empathy will permit more directness from the researcher without seeming rude. Answers can still be provided, even to direct questions, although these will likely be presented indirectly via stories (Otsuka 2005). Employing talanoa can permit more in-depth discussions, information sharing and understanding for both the researcher and the participants.

I attempted to apply an informal talanoa approach. However, I was only somewhat effective in using it. The main barriers to my use of talanoa were logistical and language-based. People in the village had an understanding of what research was based on their own experiences, which was a researcher coming and asking a few specific questions as part of a questionnaire and then leaving. When I wanted to spend time in the village observing and participating in activities (e.g. harvesting *kai*, attending meetings) it took close to two months before people understood what I meant and began to accept a stranger 'just being there' with no other obvious (to them) purpose, accepting this as part of a new idea of what 'research' could be. However, while I had built some rapport many casual stories and conversations were held primarily in Fijian, and I was unable to follow or respond as much as I would have liked and this also meant my position as an outsider and guest continued. This continued status as

9. Additionally, this research assistant was unable to continue working past January 2014 due to work and family commitments.

10. As opposed to formal talanoa which takes places in more formal settings, such as meetings or between individuals where there could be a hierarchical (e.g. age) difference (Nabobo-baba 2006).

a frequent visitor, but not someone fully integrated likely also meant that my interview interactions were more formal than they would have been otherwise, and likely impacted the rapport building that would have led to more in depth (potentially contradictory to the 'appropriate') answers and insights.

Although I was unable to employ the talanoa approach as well as I would have liked, I did use the principles of talanoa (e.g. time, silence, space, indirect questions) when designing and conducting interviews. I also was able to spend time with some interview participants outside of the interviews as I attended village functions and observed village life. I also interviewed some of these participants more than once, and felt that the relationships I built with these participants led to deeper and more nuanced conversations in interviews.

Cultural protocols such as *veiwe'ani* (avoidance relationships out of respect), *madua* (manners or shyness), and *va'anomodi* (a respectful silence) are important ways of behaving in Fijian village life, and can limit "talking straight" especially in group discussions (Farrelly 2011). Respect for chiefs, elders, village leaders and certain family members (e.g. between siblings interactions are more formal than between cross-cousins; Ravuvu 1987; Nainoca 2011) is demonstrated through these behaviours and can prevent open discussions, especially if an elder has voiced an opinion that others may feel differently about. I considered these protocols when doing interviews and observation, and in my field notes made notations of interviews or informal conversations where the participant may have changed answers or checked their response with an elder or another individual who was present.

3.4.3. Interviews

In total, I conducted 9 semi-structured interviews with village elders, 39 in-depth semi-structured village-based interviews for a total of 48 interviews in the village, and 7 semi-structured interviews with government, NGO and aid agency representatives in Suva or via Skype (two were based off-island).

The 9 semi-structured interviews with village elders were based around both familiarising myself with Toga, the issues and gathering very general perceptions of the environment, climate change and what kinds of changes (e.g. environmental, social) people considered important. These interviews took place in December 2013. Five of these interviews were conducted in the village hall after a formal introduction of myself to the village with men over 45 (all but one was over 61). I also interviewed four elderly women (over 61 years) in their homes. These informed the design of my in-depth semi-structured interviews, as well enabling me to familiarise myself with how questions and conversations work in these social settings.

The 39 semi-structured interviews took place from February-March 2014. I interviewed 20 men and 19 women, aged from 18 to 61+ (Table 3.3). Income sources, household wealth and household sizes as well as church membership were factors in interview participant selection. I also ensured that at least some interviews took place with people "not from" the village, typically women who had married in and are a group whose voices are sometimes not heard due to norms of respect, belonging and gender. Interviews generally took place in the household the participant resided in, however some took place in the village hall before/after an event. Other family members were often present, or would come and go and at times added to stories or answers that were being told. My research assistant, M, set up and was present for many of the interviews, providing clarification in Fijian or translating answers if the participant was not comfortable answering in English.

My sampling strategy was purposive as I was looking for shared cultural experiences, and gender and age are variables that define cultural experience in the village so I wanted to cover views and experiences from these different groups. I also targeted a variety of livelihoods/income sources (wage employment in town, remittances, plantation/river) and household sizes. I attempted to interview as many different households as possible (i.e. rather than two individuals from the same household) to obtain a wider variety of data on different interpretations of cultural rules/norms around decision-making.

Table 3.3. Semi-structured interview participants by gender and age group.

Age Group	Female	Male	**TOTAL**
18-25	7	6	13
26-35	2	1	3
36-45	2	1	3
46-60	6	9	15
61+	3	2	5
TOTAL	20	19	39

The semi-structured interviews often flowed more like a casual conversation than a semi-structured interview, and some lasted close to 90 minutes. I listened to the participants and guided the conversation in a way to cover the concepts and topics I wanted to address, and there were times where I asked more direct questions which could also start a conversation. Interviews were structured so that participants were asked about what they thought of the natural environment, the Vanua, and changes they had experienced in their lifetime (and how they responded). No mention of climate change was made until the very end of interviews, when I asked participants if they had heard of it, and if so what they had heard. I did not mention climate change until the end based on personal experience

and conversations with key informants in NGO interviews that if a participant knows I am researching climate change, they may connect that to potential funding for the village. This was also based on their previous experience with research frequently connected to an NGO or aid agency baseline study prior to a project, and this association may lead to answers participants think a funding source would want to hear.

Most interviews were 45-60 minutes, although if the participant was clearly uninterested (e.g. had been told by an elder to participate but did not seem willing/interested) I would cut the interview short. All interviews were recorded, and if portions required translation (e.g. after a question the participant had a long answer in Fijian and either M was not present or replied with a concise statement, such as "He agrees.") I brought them to my language teacher (who also worked as a translator) in Suva to translate.

There were two parts of the interviews that did not flow as openly or conversationally: a hypothetical scenario exercise and an evaluation of potential village development/climate change adaptation projects. I used these hypothetical scenarios and projects to understand people's perceptions of efficacy (in what situations did they perceive themselves as helpless versus able to respond to extreme events). I also asked them to learn how and what aspects of daily life were valued and what elements of community projects were perceived as feasible and why. For example, projects where the village had to contribute cash were less favourably received than those where they contributed labour, and projects related to land or income generation were prioritised over daily conveniences such as redoing village walkways. I presented a list of hypothetical extreme events which were developed based on interviews with the elders, background reading and discussions with several University of the South Pacific research staff experienced in iTaukei research. I asked participants how they as a household and as a village would react to and any solutions for each of the scenarios. The list of hypothetical projects was developed from pilot interviews and informal conversations around what people had expressed as issues in the village and elements of other village-scale projects in the area. See Appendix A for interview topics/schedule I used as a guide and the list of hypothetical extreme scenarios and development projects. This question and the hypothetical scenarios were piloted with four different participants of different ages/genders Although this portion of the interview flowed differently to other portions, with patience and long periods of silence on my part participants were generally very thoughtful and provided a variety of answers.

I also interviewed seven government and NGO representatives. These semi-structured interviews were conducted with practitioners from NGOs (UN-Habitat in Suva) and SPREP in Samoa, the university sector (PACE-SD programme at USP), as well as government representatives (Lami Town Council,

Ministry of Agriculture and iTaukei Affairs Board). Participants were selected based on involvement with climate change adaptation projects that had taken place in Fiji at the community level. They were asked questions about the project they were involved with, what they perceived as barriers and opportunities for their project and climate change adaptation in Fiji in general.

All interview and questionnaire participants referenced in this thesis were randomly assigned pseudonyms (based on first names from Fiji's men's and women's international and professional rugby teams) and are identified by these and their age group in the text. For interview participants I ensured that their pseudonym did not match their real name. For a list of pseudonyms, age groups and method see Appendix B.

3.4.4. Observation

I had the opportunity to attend several village, district and Vanua meetings during my time in Toga. I also attended a meeting at Lomanikoro (The Province of Rewa's chiefly seat) and Toga's unveiling ceremony of new tractors financed in a joint Toga-government scheme as an income opportunity for the district. I spent two days in Vutia at the Rewa Provincial Council meeting presided over by the high Chief of Rewa, and was invited to address the high Chief and other Chiefly delegates about my research in April 2014. These formal interactions at different scales provided insight into how important the hierarchy is for daily life.

My host family had a small shop window at the back of their house and I was able to observe the daily shopping and social interactions that took place there, as well as observed daily life when I attended church and spent time in other people's homes before, during and after interviews. I also spent some time with children at the end of my stay, after requesting them to take me on a tour of the village to take some photographs. Through them I was invited into numerous homes and observed people working in the plantations. When I was with a group of 4-12 children, aged 3-12, I was received into homes more informally than when I was there with M to conduct interviews. However I still observed cultural practices of respect and keeping eyes down. Through this I also took photographs of individuals who requested it and then printed and shared them. Some of those individuals also gave permission for their photos to be used in this thesis. Any other identifying photographs are not used or are modified to conceal identities.

I kept a research journal and made notes everyday I spent in the village, as well as after each interview. These notes and observations informed my questionnaire development and I also coded them with my other data.

3.4.5. Questionnaire

I had developed and adminstered a questionnaire to test how widespread some of the social norms and perceptions I found in my interviews were. I also wanted a more clear picture of household livelihoods and how widespread some practices (e.g raising homes) were that were unavailable from the Bureau of Statistics or other data sources.

There were a total of 129 questionnaire participants, of which 39 were from Muana, 30 in Vunisei and 60 in Navatuyaba (Table 3.4). I had targeted 10% of the adult population in each village, evenly spread between genders and mataqali (clans) for a target of 55, 32 and 33 in Navatuyaba, Vunisei and Muana respectively. I received more responses than anticipated in total, although the spread between the genders and mataqali was not as even as planned.

Table 3.4. Questionnaire Gender Distribution by Village. *More female than male participants were interviewed in Muana and Vunisei than Navatuyaba, however there were 5 questionnaires that did not indicate the gender of the participant.*

	Questionnaire Participants			Total	Total Adult Population
	Male	Female	Unknown		
Muana	16	22	1	39	484
Vunisei	12	16	2	30	464
Navatuyaba	31	27	2	60	784
Total	59	65	5	129	1732

The questionnaire was written in English, piloted in Navatuyaba, then translated into Fijian and back translated in English before being translated a final time (see Appendix C for the English and Fijian questionnaires). I hired nine assistants to administer the questionnaire in Fijian in Toga's three villages. I hosted a training day where all assistants were trained in enumerating the questionnaire and ensured everyone understood each section of the questionnaire. The questionnaires were administered over three days and assistants were paid 50 Fijian Dollars (FJD) each, an amount based on recommendations from village leaders.

The questionnaire had six sections, including basic demographic and livelihood details, experiences with flooding, evaluating erosion control measures, and what behaviours or events are good for the Vanua. I had two sections on the questionnaire that did not produce useable data due to translation issues. The reasons for this are discussed Sections 3.5 and 3.6. The sections were on time preference using the Zimbardo Time Perspective Inventory[11] (Zimbardo and Boyd 1999) and a series of

11. The Zimbardo Time Perspective Inventory has been applied in cross-cultural settings, including Fiji, but relies on accurate and careful translation (Phan 2009; Sircova et al. 2014).

statements developed from interviews and observations to test for patterns and associations via Principal Competent Analysis (pages 240 and 242 in Appendix C).

Open ended questions were used in several sections as I wanted to ensure participants had an opportunity to bring up other issues I had not considered or add to and clarify answers. These answers were translated in Suva prior to my leaving Fiji.

Risk Mapping

The risk mapping portion of the questionnaire teases out incidence and severity perceptions to increase understanding of the nature and variation of risks perceived by participants. This approach was based upon a participatory risk mapping method developed by Smith et al. (2000) and modified by Goulden (2006) to classify and order sources of risk faced by a group of people.

To determine what kinds of issues people in the community were most worried about, I drew from village interviews, observation and informal conversations to create a list of 17 items people felt were threats or challenges within the household or village (Table 3.5). These were things that people talked about frequently in interviews, had mentioned as having large impacts on their lives or were drawn from some of the government/NGOs interviews.

Participants were provided with slips of paper with each of the 17 items written on one. To gauge which of the 17 items impacted individuals/households and the Vanua as well as how serious a threat these were considered to be, participants initially decided whether each of the items was something they felt was a worry or threat for themselves and their household or not. After sorting the items into two piles, they were then asked to choose the five that impacted themselves/household that they felt were the biggest threat and rank those 1 – 5, with 1 being the biggest threat and 5 the least. They were then asked to do the same thinking about threats and challenges for the Vanua.

To determine which items were most often prioritised as larger threats and were experienced more widely, indices of severity and incidence were created following the method of Smith et al. (2000). The severity index was derived from the formula: **Severity = 1+ (r-1)/n-1** where **r** was the rank that each threat received of **n** items (threats) that were ranked by each participant. A severity score was calculated for each of the 17 threats, for each questionnaire response. The mean severity was then calculated for all participants that selected that particular threat. This was done for groups of participants by village and gender, for both the ranking of threats to the household and for the ranking of threats to the Vanua. The incidence index was derived by dividing the total number of people who selected that item

as an issue by the number of participants who answered the question to give the proportion of people who felt the household or Vanua were affected by that threat.

Table 3.5. Threats/Challenges used in the risk perception ranking exercise. *The 17 items village participants were asked to rank according to perceived threat at the household and at the Vanua level. The selection of these items was drawn from interviews with the community, local government and environmental NGOs. Blank spaces were provided to write in additional items that participants felt were not captured by the provided items, however out of 129 questionnaires no one wrote in any additional items.*

Threat/Challenge	Item Source
Toga Island is eroding.	Community interviews; Local Government interviews
Flooding in homes.	Community interviews
Flooding in the plantation.	Community interviews
Rubbish in the drains causing blockages that make flooding worse.	Community interviews
People not participating in village meetings, cleanups, etc.	Community interviews
The price of food has become too high.	Community interviews
There is not enough land to support all the children now when they grow up and want to plant.	Community interviews
Pollution in the Toga River is worse and may affect the *kai*, prawns and fish.	Community interviews
It rains differently at different times of year than it used to.	NGO and Government interviews
Water comes up further with high tide now than it used to.	Community interviews; NGO and Government interviews
Fruits become ripe at different times than they used to (like breadfruit).	NGO and Government interviews
A strong hurricane.	NGO and Government interviews
Toga Island will be too small for everyone to live here in 20 years because of erosion.	Community interviews
Toga Island will be too small for everyone to live here in 20 years because of population growth.	Community interviews
The river is less clean and people could get sick (e.g. skin diseases) from being in the river.	Community interviews
It is hotter now than it used to be.	Community interviews
You/someone in your household losing job/income source	Community interviews

This method is useful for drawing out a snapshot of risk perceptions, however for comparative purposes the severity and incidence values for each threat item and group (gender, village) are averaged which may result in undervaluing the response of certain individuals whose experiences were different. Additionally, this method does not provide detailed data on how individuals are affected by these events or situations. It is useful for teasing out the relative perceived severity and how widespread the experiences of these events or situations are among the population (Smith et al. 2000), and can add to

the more detailed qualitative data about how households and individuals perceive and are impacted by these threats.

3.4.6. Secondary data

Historical meteorological information (rainfall, temperatures, extreme events) was obtained from the Fijian Meteorological Service to compare changes in climate variability with the experiences reported by research participants. The differences and/or similarities between the perceived climate history and that of the 'official' meteorological record assisted with triangulation of reported climate trends and changes.

I also drew on ethnographic records (e.g. Geddes 1945; Sahlins 1962; Nayacakalou 1975; Ravuvu 1983; Toren 1990; Biturogoiwasa 2001; Nabobo-baba 2006) and collected articles and viewed video clips from local newscasts about climate change from the local newspapers (Fiji Sun and Fiji Times) for context to aid my data interpretation. The ethnographies provided valuable depth, and I returned to them throughout my fieldwork and writing up. The local newspaper articles and news clips provided context on how climate change and climate change adaptation was being discussed nationally, and gave an understanding of how people in Toga are exposed to ideas of climate change coming from outside the village.

3.5. Data Analysis

Qualitative data

My interviews were transcribed and entered into NVivo 10, along with my field notes and observations. Although my interview questions were guided by my own understandings, based on my experiences (as a female American PhD student from a UK university) and theoretical readings, I attempted to stay open to other areas of interest and relevance. I did this by revisiting my field notes and earlier interviews to inform future interviews and data analysis during fieldwork, as well as prior to questionnaire development. I coded my interviews and field notes using a thematic approach, where codes are based on theorised and emerging themes (Bryman 2012). I started coding by reading through and making notes of concepts, themes or portions of text of interest. I also coded the open-ended portions of the questionnaire. My coding process was iterative, and although I used NVivo 10, I printed out interviews and read them multiple times, then returning to NVivo to code digitally. After initial coding, I grouped codes hierarchically and reread the data. I then returned to the data for a second round of coding, drawing from my other data sources. This portion of the analysis was when I

began to make tentative guesses about the relationships between the data and generate insights to see it in a new light (Coffey and Atkinson 1996).

At this stage I also reflected on the processes of data generation and how to ensure and maintain data validity and reliability. My codes initially came from a mix of theoretical concepts and also from themes that emerged from the data. For example, social capital emerged as an important concept as social relationships and exchanges became a major coding group in my data. Thematic analysis can potentially underemphasise the context of the data with a focus on theoretical themes, therefore upon re-reading the data I grounded the data in the context. Having the Vanua as both an emerging theme and analytical concept assisted in grounding the data in its context.

Quantitative data

I used Excel and SPSS to analyse quantitative data. I conducted initial data analysis in Excel which was primarily exploratory and descriptive. This initial exploration allowed me to become familiar with the data and begin to identify patterns or relationships of potential interest for more formal inquiry. These more formal exploration and data inquiries were based on my research questions and conceptual framework as well as the themes emerging from my qualitative data. The quantitative data from the questionnaire and the meteorological data were used to triangulate my qualitative data.

Statistical techniques were matched to the data type and analytical query. Excel was used for the descriptive statistics and the risk mapping analysis, and I used Excel package (XLSTAT) for the time series analysis of meteorological data to identify trends. I used SPSS for the statistical tests of relationships between demographics (gender, age, village) and other criteria such as agreement with how to maintain *sautu* in the Vanua (see Section 4.2 and Chapter 7).

3.6. Research Ethics and Reflection

3.6.1. Ethical considerations and reflection

I was given ethical clearance in October 2013 by the UEA International Development Research Ethics Committee (Appendix D). I followed a principle of gathering informed consent, presenting myself and my research as openly as possible. I approached my research strategically, balancing needs for flexibility and grounding in the context while also representing my data and interpretations openly, a vital criteria for qualitative research (Mason 2002). Researchers are responsible for producing quality research (Mason 2002), and this is a responsibility not only to UEA and the School of International Development at UEA, the field of climate change research, and all those who have assisted me, but

also importantly as a moral responsibility to those whose words and actions from my data to analyse, reflect and generalise appropriately.

I had brought consent and information forms, but was told that it was insulting to keep asking individuals to sign since the chief had agreed to the research and therefore the village itself had agreed and my asking again could be perceived as doubting the chief's word. I recorded interviews and did obtain verbal consent prior to turning on the recorder. As I had to assume consent, I was sensitive to the participant and if they appeared hesitant or unwilling I would cut the interview short with a reference to having enough information for the day or something neutral that would explain the interview ending early. I was also sensitive to the fact that other people were often present and could influence how open participants felt they could be. If there was any allusion to friction or discomfort I modified some of the topics I covered. For example, I did not ask about household decision-making with a young woman watched by her mother-in-law who would nod or not at her answers. I also ended this interview early.

I had initially not planned on identifying the villages, however a discussion with village leaders revealed that they wanted the villages to be identified and casually asking several former participants their views I decided to identify the villages but maintain anonymity for individual participants. The leaders wanted the villages to be named in the hopes that "someone would learn about their problems and want to help" (paraphrased from field notes), and also as recognition of the time they had spent with me.

I wanted to feedback results, so I stopped data collection in April. This was because I offered to do something as a way to give back and Toga's leaders asked me to produce a report detailing current issues (and success) that they could use to support funding requests, such as erosion control measures (see Appendix E for the report). I also wanted to review my data and have a chance to cover any gaps. The report was based primarily on the questionnaire and some preliminary analysis of my observations and some interviews. I circulated a draft copy to leaders in each village and received comments back after several days. There were not many comments and I do not know if that was due to scheduling as they only had the drafts for 4-5 days or because the report is written in English. I left both hard and digital copies of the report with Toga's leaders. I also did feedback sessions with preliminary results and answered questions at each of the churches and for all of Navatuyaba at the end of April/beginning of May 2014. I also provided a cash gift (300 FJD) at the end of my stay to Toga. I did not provide any food or compensation to participants, as I was advised it would not be appropriate and that a final gift to the Vanua would be more appropriate as it would go into Toga's fund which is used for improvements and developments in Toga.

I obtained a research permit from the Fijian government which requires me to submit a final copy of the complete thesis which will be housed with the Ministry of Education.

3.6.2. Reflections on positionality and research process

I approached this research from a particular position based on my gender, education, nationality and experiences, and made efforts to provide participants opportunities to question me, provide feedback, and bring up other issues I had not considered. I reflected on the influence my own position, that of my research assistant (as a female resident of Navatuyaba), and the methods of data collection could have had on the generated data and my interpretation of it. This reflexivity is important for analysis as it identifies my own role in the generation and interpretation data (Mason 2002).

I used longer interviews and my presence in the village to establish rapport to overcome hesitancy to approach an outsider and stranger. Being a woman who looks young (I was often assumed to be 10-15 years younger than I was!) provided some opportunities as people felt more comfortable speaking to me, however I think that it also meant that sometimes older participants (especially male) were more hesitant and I did my best to observe appropriate respect behaviours such as avoiding eye contact, head placement and sitting off centre from them. My male partner was in Fiji for the first three months of my fieldwork and came to the village several times with me. Letting people meet him made myself more acceptable to many participants, as a single woman past her early 20's would have raised many questions (although I was questioned about why we did not have children almost daily!).

My familiarity with Pacific Islands was also beneficial in breaking the ice and establishing legitimacy for some participants. Some participants, such as several in the villages and more so with the NGO/ government participants, felt protective of the Pacific and Fiji. The Pacific Islands are frequently romanticised in popular discourse, advertising and even sometimes in research (Barnett and Campbell 2010; Farbotko and Lazrus 2012; Lazrus 2012). One of my NGO participants confessed to thinking of me as more legitimate rather than someone who "just wanted a holiday in the Pacific" (paraphrased from interview notes) after knowing I was not new to working or living in Pacific Islands and understood the importance of patience, flexibility and traditional culture, and a sense of what ideas of respect and hierarchy look like in the region.

Although I took Fijian classes and learned as much of the language as I could to prepare for fieldwork, it was inevitable in this short time that I would not learn enough language to conduct interviews or converse casually as much as I would have preferred. This did limit my social interactions, especially at casual social events and when observing meetings since English was only spoken with me if there was

no other Fijian-speaker around (excepting interviews). However, my basic language knowledge was also a source of amusement when I made a mistake. For example, I was teased for several weeks by everyone in the village after I had mixed up the word for 'Friday' with 'uncircumcised male'. Joking and teasing are social interactions that indicate a level of comfort and acceptance (e.g. Arno 1993), and I took it as a positive sign that people accepted me enough to joke and tease.

3.6.3. Limitations

There were some issues and limitations I encountered related to translation and relying on research assistants. There were issues with the back and final translation into Fijian of the questionnaire as my initial translator was unable to complete the work at the last minute and my research assistant translated the questionnaire which I checked with another translator. The issues with questionnaire translation meant that two sections of the questionnaire data were not suitable for use in the analysis. Additionally, I checked each questionnaire and those where answers were all similar (e.g. answering "yes" to *all* questions, even contradictory ones) or gave me reason to doubt the reliability of the data, were not included in analysis. I did take some questionnaires back to the enumerators for clarification. I was not present for the questionnaire administration as my presence would have distracted the participants. The training did emphasise the need to inform participants about the research and that participation was voluntary. Many of the research assistants were young people and students in the village, which meant that potential questionnaire participants could feel more comfortable refusing young people rather than older people or an outsider with guest status. I was told that there sometimes are opportunities for people to work for NGOs or aid organisations with basic data collection, and providing this training and experience for these enumerators could assist them with getting these jobs in the future.

Additionally, participants may not have been as open with me as with someone 'from' Toga. There can be difficulties with "talking straight" (Farrelly 2011) based on hierarchy (Section 4.2), but also due to a desire to present a positive picture for an outsider. Topics, such as tensions within the village or mataqali were not often discussed with me, and only were shared after spending time together and rapport building. Some of this could have been mitigated by increased familiarity, either via language or a longer fieldwork period. Discussing things that could be conevied of as negative or criticisms of the village, leaders or Vanuea are not shared with "outsiders", and while I did establish rapport and relationships, I still felt that my status was more like a guest (albeit one that was becoming more familiar and moving away from that status slowly over time). It is also potentially likely that many of the interview and questionnaire participants are the ones more likely to attend and participate in community events. I recognised many faces of interview participants at Navatuyaba village meetings,

but as the adult population was a little over 500 and meetings usually only had no more than 60 people (upper estimate) there likely are viewpoints and experiences I did not access which could have provided another dimension to this research.

3.7. Conclusion

In this chapter I described my research process, approach and methodology and how those developed over the course of this research project. I introduced the case study site and detailed my methods and analytical approach.The following six pages are images from around Toga. I also reflected on the research process, ethical considerations and limitations of my research. In the next chapter I elaborate on Fiji's context, including the climate and biophysical setting and changes and the cultural context and iTaukei social structure.

3.8. Scenes from Toga

Figure 3.3. Scenes from around Toga. (*a) kai freshly collected prior to depuration overnight in a bucket; (b) a drainage ditch in Navatuyaba, freshly cleaned; (c) cooking kai to prepare for a village event. In the background there is a large pile of kai shells from years of harvesting, a common site next to many homes. All photos: C. SHELTON*

Figure 3.4. Navatuyaba village hall and questionnaire enumerator training preparation. *(a) Navatuyaba Village Hall with village water tank, most meetings and formal business take place upstairs on the 1st floor; (b) preparing for enumerator training in the ground floor of the Catholic church, with food prepared by the Church women's group.*

Figure 3.5. Village scenes. *(a) An external oven, many homes have these attached or nearby and used collected firewood for cooking; (b) fishing nets drying outside a raised home.*

Figure 3.6. River scenes. *(a) bank undercutting and palm trees collapsing into the Toga River south of Navatuyaba; (b) the cement brick factory at the north end of Toga Island with its small boat used for dredging aggregate.*

Figure 3.7. Root crops in Toga. *Field of cassava (top) and taro (bottom) in Toga.*

Figure 3.8. More Pictures of Toga. *From top right to left: (a) a tabua (whale's tooth) being presented to the Minister for Agriculture at a December 2013 ceremony unveiling a new tractor in a joint Toga-Government small business for the district; (b) women preparing pandanus to be dried and woven into mats; (c) young men grinding dried kava to prepare for drinking.*

Chapter 4. The research context: Fiji's natural environment, climate and culture

This chapter introduces the national context of Fiji and the local case study site, Toga. Toga is located just to the northeast of Suva, near the city of Nausori in the Rewa River delta. The naturally high climatic variability, frequent flooding, erosion and accretion of land in the Delta, as well as a colonial government that focused on preserving its own understanding of Fijian culture has created a unique environment in which to examine understandings of change and potential adaptation actions. The following section (4.1) describes the biophysical context of Fiji and the case study area, including flooding and erosion regimes in the lower reaches of the Delta where the field site is located and current and projected climate. The cultural context (4.2) describes social structure, including the iTaukei clan system as well as the hierarchy and the concept of Vanua.

4.1. Biophysical Context

Fiji is a made of up over 300 islands in the South Pacific (Figure 3.1). Most islands are high volcanic islands with some atolls, mostly located in the southwest. The largest two islands (Viti Levu and Vanua Levu) make up 87% of Fiji's land area (SOPAC no date). The main island of Viti Levu has diverse habitats, including coastal mangroves, flood plains and highland jungles. The majority of the population (over 70%) lives on the main island of Viti Levu, and most communities are located in the coastal zone (Feresi et al. 2000). Coastal resources are important as a food source for many of Fiji's rural villages, with coastal communities consuming from 25 kg up to 113 kg fish per person per year (Bell et al. 2009). 85% of land is communally owned by iTaukei who make up most of the rural population and more than half of the total population of 837,000 (Fiji Bureau of Statistics 2012).

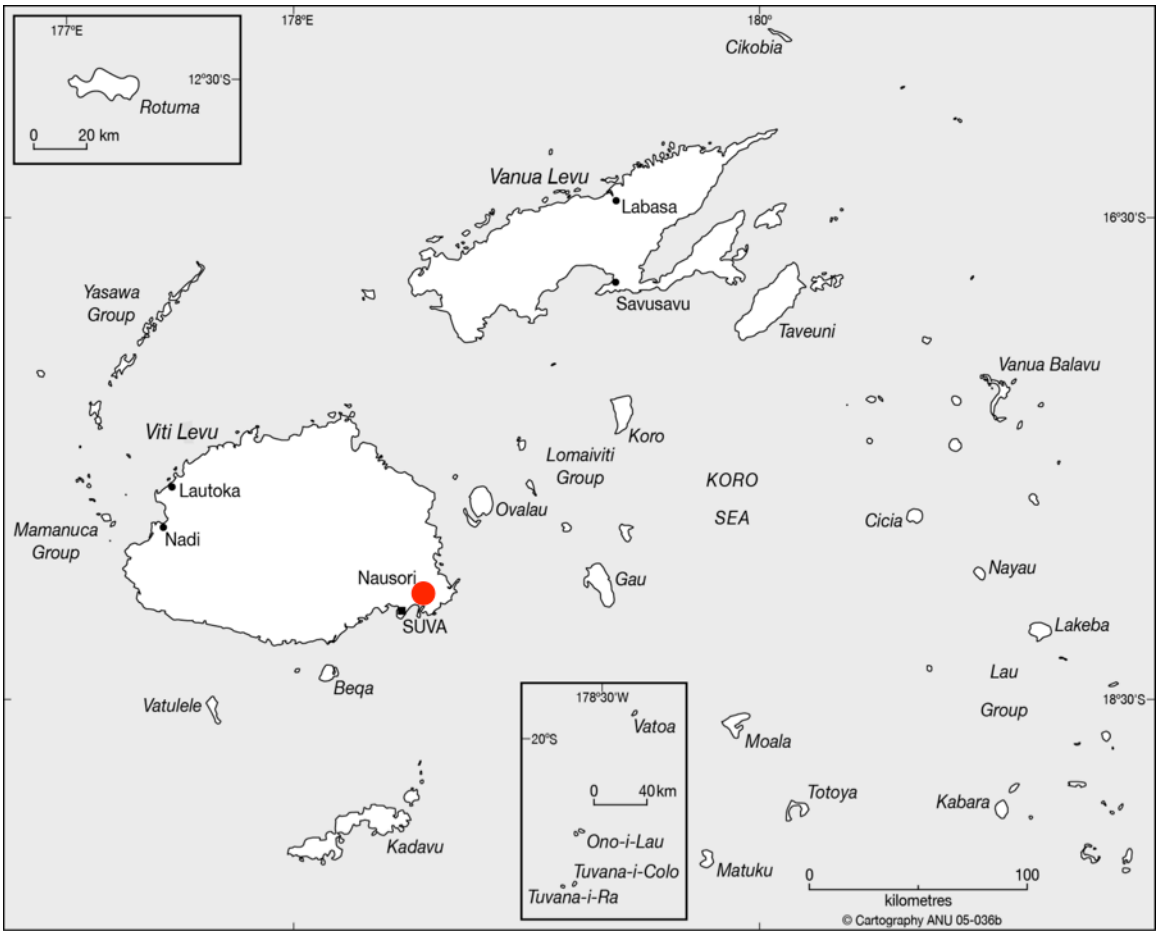

Figure 4.1. Map of Fiji. *The red dote is the case study site location.*

4.1.1. Fiji's Current Climate

The three main drivers of climate in the Pacific are the Inter-tropical Convergence Zone (ITCZ) the South Pacific Convergence Zone (SPCZ) and the El Niño Southern-Oscillation (ENSO) (Christensen et al. 2013). Both these convergence zones are areas of high rainfall that move north-south seasonally and are influenced by changes in winds and sea surface temperatures. Positive and negative ENSO phases (El Niño and La Niña) result in fluctuations in sea surface temperature, rainfall and winds. These fluctuations are strongly associated with droughts or much higher rainfall and can significantly affect the climate year-to-year, resulting in high levels of natural variability in Fiji (Figure 4.2; Feresi et al. 2000; Australian Bureau of Meteorology and CSIRO 2014; SPREP No date). Fiji's air and sea surface temperatures, rainfall, storms and sea levels vary significantly inter-annually.

Although Fiji experiences high levels of natural variability, temperatures have been increasing since 1942 (Feresi et al. 2000). Records show increases in both maximum and minimum temperature, and in the increase in the number of very warm days and the decrease in annual cool nights (Table 4.1; Australian Bureau of Meteorology and CSIRO 2014). In the Suva area, these trends are more

pronounced than in other areas of Fiji, and there were more pronounced changes in nighttime than in daytime temperatures (Australian Bureau of Meteorology and CSIRO 2014)[12].

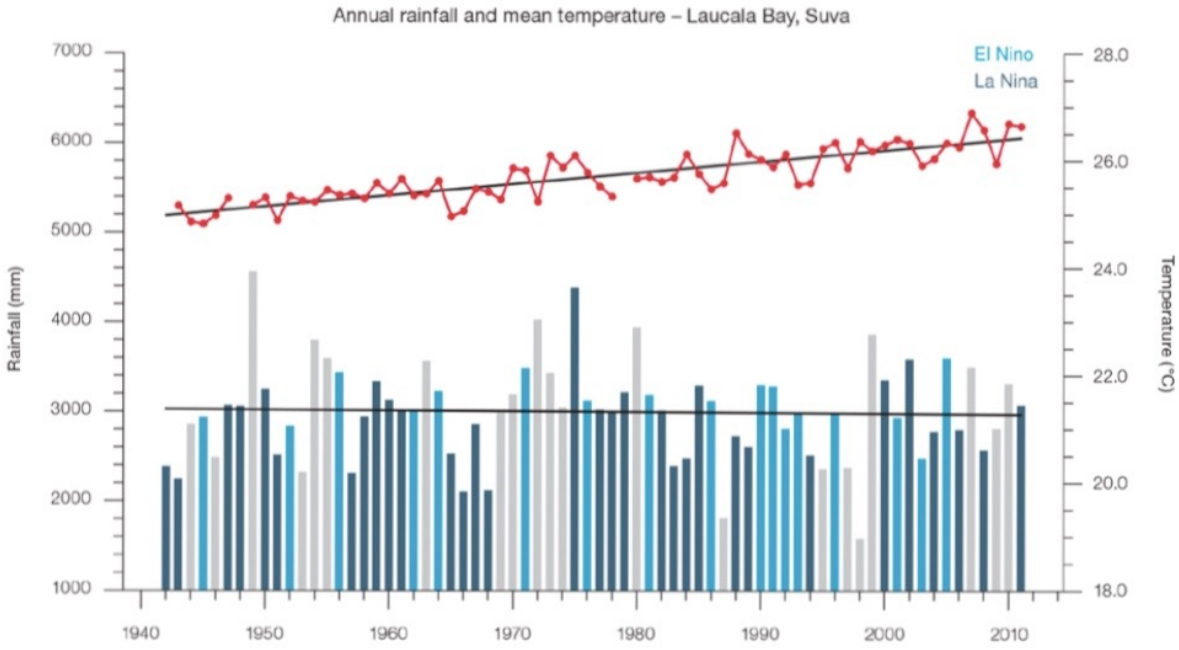

Figure 4.2. Annual Rainfall and Mean Temperature at Laucala Bay, Suva, 1952 - 2011. *Observed annual average values of mean air temperature (red dots in line) and total rainfall (bars) in Suva. The dark blue bars indicate an El Niño year, the light blue a La Niña, and the grey bars indicate a neutral year. SOURCE: Australian Bureau of Meteorology and CSIRO 2014.*

4.1.2. Rainfall

Average annual rainfall in the Rewa River watershed is approximately 3500 mm, with a range of 2000 mm to 5000 mm falling in the lower and upper elevations of the watershed, respectively (WMO and GWP 2004). November-April is the wet season and is also the season for tropical cyclones. The dry season, May-October, is cooler as the southeast Trade Winds increase over these months. The data in Figure 4.2, collected approximately 20 km from the field site, provide a picture of the variability in temperature and rainfall, including responses to ENSO phases of the area's rainfall and temperature for the last 60 years. Average air temperatures have been rising over the last 60 years, which coincides with anthropogenic climate change and increased urban development close to the temperature site in Laucala Bay, Suva.

12. One thing to note with the larger increase in temperature near Suva is that the area surrounding the observation site has changed since 1942. In previous years the site was more exposed to the cool southeasterly trade winds, however it now has more trees (blocking the winds) and large buildings (reflecting heat) nearby. Additionally a large mangrove to the west of the site has been cleared and buildings constructed (Australian Bureau of Meteorology and CSIRO 2014).

Table 4.1. Annual trends in air temperature and rainfall extremes in Suva and Nadi 1942 – 2011. Values for trends significant at 5% are in bold, 95% confidence intervals in parentheses. SOURCE: Australian Bureau of Meteorology and CSIRO 2014

	Suva	Nadi
TEMPERATURE		
Warm Days (days/decade)	**4.19** (+1.32, +7.58)	1.46 (-.030, +3.15)
Warm Nights (days/decade)	**7.87** (+5.83, +10.62)	**5.97** (+2.88, +9.30)
Cool Days (days/decade)	**-4.18** (-6.76, -1.60)	**-3.10** (-5.01, -1.37)
Cool Nights (days/decade)	**-11.81** (-13.51, -10.08)	**-6.01** (-9.43, -3.14)
RAINFALL		
Rain Days ≥ 1mm (days/decade)	1.1 (-2.05, +3.82)	-1.45 (-5.13, +2.36)
Very Wet Day rainfall (mm/decade)	-16.02 (-65.20, +31.87)	7.17 (-25.63, +40.12)
Consecutive Dry Days (days/decade)	-0.36 (-0.78, +0.05)	0.31 (-1.58, +2.24)
Max 1-day rainfall (mm/decade)	2.33 (-3.23, +7.36)	-2.91 (-10.19, +3.83)

- Warm Days: Number of days with maximum temperature greater than the 90th percentile for the base period 1971 – 2000
- Warm Nights: number of days with minimum temperature greater than the 90th percentile for the base period 1971 – 2000
- Cool Days: Number of days with maximum temperature less than the 10th percentile for the base period 1971 – 2000
- Cool Nights: Number of days with minimum temperature less than the 10th percentile for the base period 1971 – 2000
- Rain Days ≥ 1mm: Annual count of days where rainfall is greater or equal to 1mm
- Very Wet Day rainfall: Amount of rain in a year where daily rainfall is greater than the 95th percentile for the reference period 1971 – 2000
- Consecutive Dry Days: maximum number of consecutive days in a year with rainfall less than 1mm
- Max 1-day rainfall: Annual Maximum 1-day rainfall

4.1.3. Sea level and tropical cyclones

In addition to increasing annual air temperatures, there are also large interannual sea level fluctuations (+/- 0.25 m), an average of 1.28 cyclones per year, and inundation and storm surge during cyclones (Feresi et al. 2000). However, there are not enough storm data to examine if a trend is emerging in recent years and nationally there does not appear to be a significant change in rainfall between 1942-2011 (Australian Bureau of Meteorology and CSIRO 2014). Storms can vary in impact from mild to severe, with Hurricane Bebe in 1972 and Kina in 1993 causing millions of Fijian Dollars (FJD) in damage and several deaths (Kuleshov et al. 2013). Storm impacts can be very localised, depending on cyclone track and speed, and those that have caused significant damage to the Rewa River watershed have occurred during the El Niño phase of ENSO (Australian Bureau of Meteorology and CSIRO 2014).

4.1.4. Climate Change Projections

Climate change projections for Fiji indicate warming, including average air and sea surface temperatures and the frequency of extremely hot days, sea level rise, increased frequency and intensity of extreme rainfall events and ocean acidification with high confidence until 2100 (Christensen et al. 2013; Australian Bureau of Meteorology and CSIRO 2014; Nurse et al. 2014). However, model results for other projected impacts vary in their direction and magnitude. Global models indicate increased rainfall along the equator in the Pacific and warming faster than higher latitudes in the Pacific (Christiansen et al. 2013). In modelling specific to Fiji, there is uncertainty as to whether there will be more, less, or if rainfall will remain similar to current patterns (Australian Bureau of Meteorology and CSIRO 2014).

These impacts will vary in their temporal and spatial scales, and will likely be cumulative in their impacts on human systems (e.g. two years of low rainfall and severe storms and increased air temperatures will likely result in more severe impacts on human systems). There currently is work on downscaling global climate models to increase accuracy over smaller areas (Christensen et al. 2013), especially areas with islands and geographic features that may create weather patterns not picked up by the larger grid size of global climate models (e.g. orographic rain effects or land- and sea-based differences in temperature changes). One of these efforts is the Pacific Climate Futures, a program[13] initiated and refined by the Pacific Climate Change Science Program and the Pacific-Australia Climate Change Science and Adaptation Planning Science Program which draws on projections used in the IPCC's Fourth and Fifth Assessment reports (Whetton et al. 2012). Some of these include dynamically downscaled global climate models to a finer scale for use in Pacific Island States (Clarke et al. 2011; Whetton et al. 2012)

There may be potentially positive opportunities due to climate change as well. For example, in several decades the water may become saline enough for mangrove growth close to the study site, which can provide erosion control. Although there will likely be negative consequences for current aquatic species, new fisheries like mud crab may become locally available. However, planning for changes is difficult as although there is high agreement in climate models about future temperature increases, changes in rainfall are much less certain (Australian Bureau of Meteorology and CSIRO 2014).

13. Pacific Climate Futures is also an online tool available at: https://www.pacificclimatefutures.net

4.1.5. Flooding and Erosion in the Rewa Delta

The Rewa River is Fiji's longest river, draining approximately one third of Viti Levu. The southeast of Viti Levu is one of the rainiest parts of Fiji, and the steep upper reaches of the Rewa River watershed receive average annual rainfall of up to 5000 mm (WMO and GWP 2004). In the southern parts of the Rewa River watershed, the delta, flooding regimes have provided fertile soil. However, as population increases (total population of the Rewa watershed was just under 200,000 in the mid 1990s; WMO and GWP 2004), flooding impacts more people as development, especially in areas of historical flood channels, increases (Tamata et al. 2012). The development in the watershed includes increased clearing of land for commercial farms as well as urbanisation close to Nausori (just upstream of the field site).

The lower and middle reaches of the watershed are relatively flat and extensively cultivated. The upper reaches are increasingly steep and soil erodibility is high (WMO and GWP 2004). Some areas of grazing grasslands in the upper reaches are classed as severely eroded, and increasing amounts of high value commercial ginger crops are grown on free draining slopes in the upper reaches (*ibid*).

Up until the 1960s the Colonial Sugar Refining Company dredged the river for navigation (the refinery was in Nausori), and the government has periodically dredged the Rewa River to address erosion and flooding issues of downstream communities. A dredging project for flood mitigation was proposed and an environmental impact statement completed and the first phase of dredging (near the mouth of the Rewa) was completed in 2010 (Government of Fiji 2010; Tamata et al. 2010). A small scale concrete block factory at the northern edge of the field site was dredging for aggregate during fieldwork, but only on a small scale. Most communities have drainage schemes, including the case study site, which involve a series of ditches dug throughout the village leading to the river.

Although flooding and associated soil erosion and accretion occur regularly in the Rewa Delta, the most severe and damaging flood events are typically associated with tropical cyclonic storms[14] (Kostaschuk et al. 2001). Table 4.2 below lists all the hurricanes over a 20-year period that resulted in overbank flooding in the Rewa River watershed. The Navolau Gauging Station is about 30 km upstream from Toga, and overbank flooding occurs there when peak discharge reaches 2000 m^3s^1. From 1970-1997 there were a total of 57 overbank flood events at Navolau, and 15 of these were related to tropical cyclone (hurricane) storm systems (Kostaschuk et al. 2001). The two highlighted

14. Although the Fiji Meterological Service, and the geographic location of Fiji, uses the term cyclone, the term used in the field site to refer to tropical cyclonic storms was hurricane and that is what will be used throughout this thesis, except when referring to tropical storms as cyclonic events.

hurricanes, Bebe and Kina, are the storms most commonly referred to in field site interviews as highest impact storms, and also have the highest peak discharge amounts.

Kina was also one of the most expensive storms to hit Fiji, the cost of the storm in the Rewa watershed alone was USD 50 million (JICA 1997). Flooding due to tropical cyclones is impacted by different ENSO phases, as more intense storms often occur during El Niño, and these storms bring more intense flooding than non-cyclonic storms (Kostaschuk et al. 2001). Aid and assistance during and post-event is provided by the government, church organisations and external aid agencies (e.g. Red Cross), and the National Disaster Management Office is tasked with preparing and coordinating responses. People have also developed numerous methods to respond to and recover from these events based on traditional practices and social structures, described in Section 5.2 in Chapter 5.

Table 4.2. Hurricanes that have caused overbank floods at Navolau in the Rewa River watershed 1970-1997. *The two storms highlighted are the two that were most frequently reported as having a severe impact on Toga.*

Hurricane	Storm Duration (dd/mm/yy)	Peak Discharge (m^3s^{-1})	Flood Duration (days)
Priscilla	14/12/70 - 18/12/70	2003	1
Bebe	19/10/72 - 06/11/72	6711	3
Lottie	05/12/73 - 12/12/73	2304	2
Tina	24/04/74 - 28/04/74	3100	1
Val	29/01/75 - 05/02/75	2806	2
Wally	01/04/80 - 06/04/80	4218	2
Hettie	27/01/82 - 30/01/82	3311	2
Oscar	28/02/83 - 02/03/83	4533	3
Nigel	19/01/85 - 20/01/85	2734	1
Gavin	04/03/85 - 07/03/85	3960	2
Sina	24/11/90 - 30/11/30	2117	1
Joni	06/12/92 - 13/12/92	3581	2
Kina	26/12/92 - 05/01/92	6923	2
Gavin	04/03/97 - 11/03/97	3927	1
June	03/05/97 - 05/05/97	4015	3

Storm duration is the total time the storm was in Fijian waters

Peak discharge refers to the daily total discharge caused by the hurricane

Flood duration is the time period that flow exceeded bankfull stage (full channel and overtop banks).

Navolau Gauging Station is just downstream of the confluence of the Wainimala (one of the main tributaries to the Rewa) and Rewa rivers and drains 1960 km^2. The station is approximately 30km upstream from Toga.

SOURCE: Kostaschuk et al. 2001; Data from Fiji Meteorological Service

4.2. Historical and Cultural Context

This section introduces Fiji's the historical origins of land tenure, and modern political uncertainty. It also examines iTuakei hierarchical social structure, starting with the village. It also describes the concept of Vanua as it refers to land/organisational area as well as referring to a relationship with the natural and spiritual world.

4.2.1. Colonial History and Land Tenure

Fiji's colonial history strongly influenced today's land tenure and how it relates to the iTuakei clan system. The first British colonial governor's efforts to "protect" indigenous Fijians from land grabs and preserve his understanding of their traditional culture has been said to have contributed to Fiji's recent ethnic tensions and current land tenure system (e.g. Lal 1992). Land tenure is formally regulated today by the Native Land Trust Board[15]. The Native Lands Commission was created in 1880 to register iTaukei lands and record hereditary rights to those lands, and works with the Native Land Trust Board whose role is to administer and manage leases and use of classified iTuakei lands. The roots of the Native Lands Commision originate in early British Colonial administrators, notably Gordon and subsequent colonial administrators spent some time learning about iTaukei culture and working to ensure that the majority of land in Fiji would continue to belong to iTaukei to promote preservation of the "Fijian way of life" (Nayacakalou 1975). However most of this early understanding of iTaukei descent groups in land ownership was based on patterns in the Bau area of Viti Levu. There were also a numerous number of relationships based on matrilineal kinship as well as ties that may have extended to the paternal and maternal grandmothers and beyond and historically descent groups have always branched off or combined based on population changes (Nayacakalou 1975)[16]. Despite this, these initial colonial investigations informed understandings that became accepted in official circles and further reinforced as decisions and resolutions were based on these understandings. The Native Land Trust Board (NLTB) was created to administer iTaukei land on behalf of iTaukei, recording the names of all the yavusa, mataqali and families in each village which then determined access to land held by the NLTB. The NLTB efforts divided Fiji into provinces and districts along political arrangements as they existed at that time, which brought both greater stability as well as rigidity in terms of land access, the creation of new villages and prioritising membership in the paternal mataqali (*ibid*; Tuwere 2002). To

15. The topic of land tenure and rights in Fiji is complicated and connected to some recent ethnic tensions and political instability, e.g. Overton 1987; Ward 1995.

16. See Tuwere (2002) and Nayacakalou (1975), *Chapter 2: The Structural Basis of Leadership* for further discussion of these dynamics and impacts on family groups, land ownership and leadership.

have access or rights to the land administered by the NLTB an iTaukei individual needs to be registered at birth with their father's mataqali. The discussion of Vanua below highlights the importance of land to iTaukei identity, combined with the requirement of formal registered membership in order to access the majority of land, reinforces the importance of land in mataqali membership.

Post-independence, Land Tenure and Political Uncertainty

Fiji gained independence from the United Kingdom in 1970 and experienced rapid population growth, movement to urban centres and economic shifts as sugar production declined in value and tourism became the country's main income source (Lal 1992:216). For over 40 years (until 1987) the Indo-Fijian population grew rapidly and controlled a large portion of the commercial sector (Tuwere 2002:16). However, the first two decades of independence and rapid change started to highlight some of the issues with the previous decades of ethnic tensions and land tenure, which surfaced and led to two coups in 1987 (May and September) and Fiji's removal from the Commonwealth of Nations (until 2001). There were two more coups, one in 2000 and another in 2006. Fiji was again suspended from the Commonwealth of Nations from 2006-2014 for the most recent coup. The leader of the 2006 coup, Frank Bainimarama, was Commander of the Armed Forces and declared himself Prime Minister from 2006 - 2014. He repealed the constitution in 2009 and introduced another in 2013. Bainimarama stepped down from the military in 2014 in order to run the Fiji's first election in almost a decade and was voted Prime Minister in September 2014. During the last 15 years of political uncertainty and changing global markets, the price of goods, especially imported food and other goods (e.g. kerosene), has increased by 5 - 100% (UNICEF 2011).

4.2.2. Social Structure

For most iTaukei, belonging to a group in the social relationship is paramount to identity and understanding of the world (Nayacakalou 1975; Tuwere 2002:69). Fijian social structure is hierarchical, with all iTaukei occupying a place within that hierarchy (Nayacakalou 1975). The basic social units are the patrilineal social groupings *tokatoka*, *mataqali, yavusa, vanua* and *matanitu* ('a' in Figure 4.3). Overlaying these are the government categories of Province and District, introduced for administrative purposes (see 'b' in Fig. 2.2). However, some Districts can also be a single Vanua, and a Province will have more than one Vanua. The three *matanitu* of Fiji are Bau, Rewa and Kubuna. The allegiance of the nine tikina (district) leaders in Rewa is to the Roko Tui Dreketi (the Burebasaga chiefly title) and to her (the current Roko Tui Dreketi is female) Vunivalu, or war chief (Nolet 2016). The structure of Toga is depicted in (c) in Fig. 2.2. It should also be noted that one can refer to a Vanua, such as the Vanua of Toga, as a distinct hierarchical unit, but the Vanua concept also encompasses all elements of the social

hierarchy such as chiefdoms. The Vanua therefore also incorporates additional elements such as the matanitu, ancestral connections and ceremonial obligations to chiefs higher in the hierarchy (e.g. the Roko Tui Dreketi, the Burebasaga chiefly title). Although it represents a distinct unit in the following figure, the boundaries of what is considered the Vanua do not stop with the physical boundaries of the land area of Toga's island.

Fijian villages are communal with cultural and traditional social structures providing a framework for decision-making over communal resources. Fiji's rural population is organised into 187 *tikina* across 14 districts, with 4-12 villages in each *tikina* with populations of 100-500 per village (Dumaru 2010). Villages usually have several mataqali, which are sub-clan groups (also sometimes referred to as clans). In additional to being the land owning social units, mataqali are also the relevant unit of organisation for matters above the household level (Ravuvu 1987). Each mataqali has a headman, and a village headman (*turaga ni koro*) is chosen from these (Ravuvu 1987; Mcnamara and Limalevu 2011), although the codification of lineages via the Native Lands Commission has restricted the former flexibility local areas had over selection of chiefs (Nayacakalou 1975:40).

One example of a tradition of communal resource management is the *tabu*, where a moratorium is placed on an area or species (e.g. certain fish or a part of the coast). This is done for ceremonial reasons, such as a death (e.g. 100 days after the death of a chief) or in response to declining harvests from an area.

Village governance is divided along three lines: *Vanua* (people, sea, land, culture), *lotu* (church), and *matanitu* (state; Dumaru 2010). The balance of power between *Vanua, lotu,* and *matanitu* can vary between villages. Although these types of governance are sometimes considered separate, others have argued they are "one and the same in the eyes of the Fijian" (Nabobo-Baba 2006:71). Additionally, each mataqali has traditional roles in each iTaukei village. These can vary village to village, but generally there is a chiefly, spokesperson/speaker, warrior, craftsperson, fishing and shaman mataqali. Today, members of a warrior mataqali do not act as warriors in the traditional sense (e.g. physically fighting in battles), however there still are ceremonial and culturally important obligations and roles each mataqali fulfils.Village matters are often decided at regular village meetings, often chaired by the *turaga ni koro*. Seating place within the village meeting house indicates relative prestige (Toren 1990). Village leaders and male head of household sit near the front and in prominent places (and often have greater influence in decision-making), while women and youth representatives sit near the back and are allowed to speak (Dumaru 2010). Discussed at the meetings are issues such as agricultural or fisheries management, local infrastructure and other current or future village project activities (Dumaru 2010).

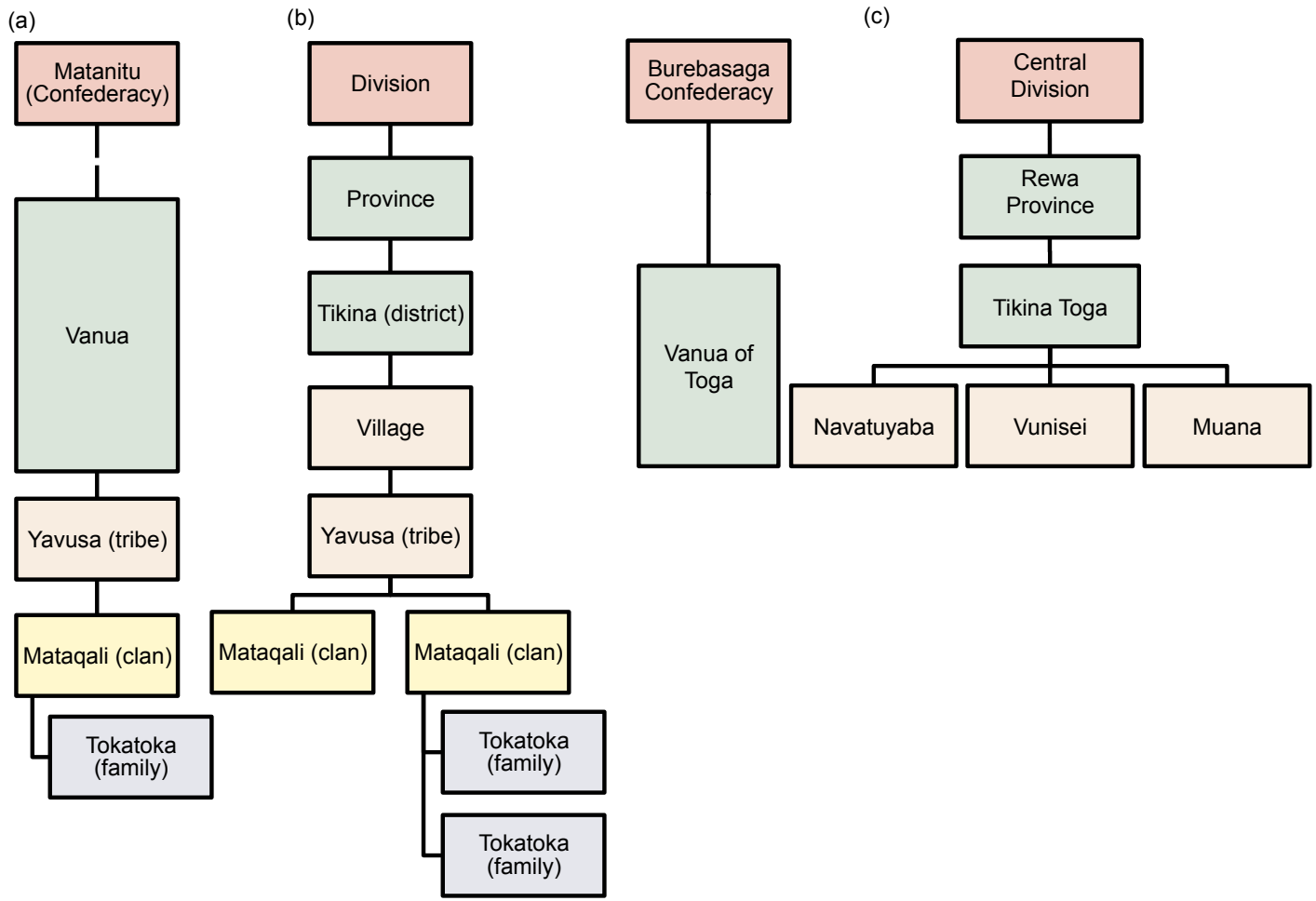

Figure 4.3. Kinship-based iTaukei social hierarchy. *The left column (a) is (generally) the traditional social groupings and the right column (b) includes elements of government (i.e. the Division, Province and Tikina/district). The village is an organisational level with strong associations with traditional iTuakei governance, however as some Vanua can be made up of several villages, it is included in the right side. Not all Vanua equate to a district, however in Toga the Vanua and the district are the same geographic area, which consists of three villages. There are multiple tokatoka and mataqali that can make up a yavusa, although sometimes a Vanua may only have one yavusa. Additionally, a village may consist of one or more yavusa, and a Vanua may be made up of one or more villages. The village-level as a social organisational level is not included here as it has elements of this traditional hierarchical framework, but also more recent formal governance (e.g. the position of the village headman and the district representative who act as mediator between formal modern government and traditional iTaukei governance and hierarchy). In different regions of Fiji these terms may be applied slightly differently (e.g. Ravuvu 1987; Tanner 2007). (c) are the traditional and overlaid government terms for social groupings in my case study site. The Vanua at this site is made up of three villages, and the TIkina and Vanua are the same geographic area (i.e. the island of Toga).*

Village governance is based both on traditional hierarchical structures, the chiefly system, and more recently created positions, such as the *turaga ni koro*. The *turaga ni koro* acts a liaison between the government and the village to organise village activities, such as village meetings, aiding in enforcement of government regulations (e.g. digging pits for rubbish disposal), and organising village cleanups. Religion also is an important component of life in Fiji, with rural Fijians predominantly Christian and church leaders and committees playing active roles in village life (Ravuva 1987; Sano 2008; Dumaru 2010). The church's importance in village life cannot be underestimated, and in fact the church[17] has been cited as the primary source of change in what is considered important for iTaukei (Nabobo-baba 2006:71).

Fiji's first social anthropologist, R. R.Nayacakalou, argues that iTaukei both should and should not be considered a homogenous cultural and social group (Nayacakalou 1975). He argues that social hierarchical divisions and subdivisions are neither autonomous nor separate, and that each step in the hierarchy is a focal point for its different parts including at the highest level. This does not imply that there is harmony and smooth functioning between the different levels, because in reality there are different ideals and aspirations as well as recent social, political and economic change highlighting differences between older "traditional" and more modern ways of doing things (Nayacakalou 1975).

4.2.3. The Vanua and Behaviour

As discussed in Chapter 2, Section 2.5, the Vanua is more than the land and people. Turewe (2002) describes the Vanua as a place where one would wait for certain trees to bloom or for fish to be born and harvested, and while one is waiting one tends to and prepares the land and the environment so that these things can continue to happen. Land can also be transferred to mark important events, such as acts of bravery, friendship, death or marriage. The transfer of these lands tells a specific story of the relationship between people; however the gifted land is not permitted to be sublet or gifted to anyone else, and upon their death it transfers back to the original owners.

In addition to telling stories of past relationships between people, the land of the Vanua also represents the relationship between the people and a founding ancestor, which for many people either was a deity or an ancestor with a relationship to a deity. The Fijian term *i cavuti* is often translated in English as "title", however Tuwere says that a better translation is "the name of the social unit" as he says implied in the term title is a sense of ownership over land. He says instead within the concept of Vanua, "one

17. The church in this sense refers not to a spirituality, but to the bureaucracy of the church and a related ideology bordering on hegemonic (Nabobo-baba 2006).

does not own the land; the land owns him. Man and land are one. He derives his name and therefore his basic constitution as a human being from the *vanua*, which means both turf and people." (2002:49).

Within the village setting, behaviour and rules are determined by what is appropriate for the Vanua: "the *vanua* and, specifically, *na i vakarau vakavanua* (culture), define life as it lived on a day-to-day basis" (Nabobo-baba 2006:72). As mentioned in Section 2.6, at the heart of this concept is a sense of community and belonging, therefore appropriate behaviour within the Vanua means to behave in such a way as to support the community (Ravuvu 1983; Tuwere, 2002:69; Nabobo-baba 2006). Related to this are the spoken word, representing authority, and the heard words, representing the land and people; one of which cannot exist without the other (Tuwere 2002:73). Nabobo-baba (2006:78–79) describes people as the most important aspect of the Vanua: people are not permitted to speak loudly or shout within village boundaries, because there are people in the village and this is therefore done out of concern and respect for them. The ideas of respect, concern and love for other people within the village, and the Vanua, are demonstrated by behaviours that emphasise not intruding on others' space physically or with loud noises, as well as maintaining the social spaces people occupy within the hierarchy (Ravuvu 1983; Nabobo-Baba 2006:80). There are also ideas of ownership and sharing, demonstrated via *kerekere*. The practice of *kerekere*, a system of borrowing and giving involves the exchange of possessions or time within a group (Becker 1995; Nainoca 2011). How these ideas are understood and related to potential adaptation actions are examined in Chapter 6.

Another important concept is *sautu*. *Sautu* is health and wealth, where wellbeing includes physical, spiritual, emotional and psychological health (Ravuvu 1983). Maintaining *sautu* for the Vanua (and for oneself) includes behaving in ways that fit with the Vanua and *"na i vakarau vakavanua* (culture)" (Ravuvu 1983; Nabobo-Baba 2006). The links between *sautu*, the Vanua and potential adaptation actions are explored in detail in Chapter 7.

These kinds of behaviours also emphasise safeguarding and caretaking for the land, as well as relationships within the village. Speaking appropriately, meaning speaking at an appropriate volume and to only those whom you are permitted to speak in certain ways is one example of this, as are periods of silence. Certain kinds of interactions between men and women and between older and younger people are governed by strict rules (e.g. Ravuvu 1983; Nabobo-Baba 2006). Minimal eye contact or looking downwards, keeping one's head below that of whom you are speaking to, speaking softly and speaking kind words/not disagreeing outright are ways that those lower in the hierarchy demonstrate respect for others "higher" than them, as well as for the social spaces and rules that govern them within the Vanua

(e.g. a young man speaking to an older married woman would avert his eyes, look downward and speak very softly).

Other forms of behaviour related to the Vanua and daily interactions include where people sit, how they sit, how they enter a house or building, who they talk to and how they speak to them, and how people move around other people that are sitting (e.g. Nayacakalou 1975; Ravuvu 1987; Toren 1990; Nabobo-baba 2006). The head is a very important part of the body for iTaukei; in a village setting it needs to remain uncovered as it is considered very rude to touch or come to close to the head. At sacred sites, for example at the site of a confederacy's chiefly village, it is considered very rude to even use an umbrella when raining, as this would create a barrier between the head and the sky. This importance of not covering the head and the position of the head is also seen in how people sit and how they move around others that are sitting. The term *tolou* means "excuse me", but only when your head is above somebody else's. When walking around a group of people that are sitting one would hunch their body over and try to make their head as low as possible. Meetings where a chief or another very important person is present and presiding people may even crawl on the ground to keep their head lower than the chief's.

Another way of demonstrating respect is by speaking very softly and looking at the ground rather than looking at the person. This is something especially true when men and women who are not cross cousins are communicating[18]. Upon entering a house, people will keep their back to the wall and immediately move and sit down on the floor next to the door. If invited to, they will move a little bit further in, but only if they are high-ranking or very familiar (and there are no other guests in-house that are higher than them in the hierarchy) will they then move closer to the centre of the room (Ravuvu 1983).

In a more formal setting, for example a Vanua meeting, people will all sit facing the front of the room. At the front is the chief, facing the rest of the room. A chief will very rarely speak in such a meeting, rather their spokesman, the *sau turaga* (which is the traditional role of one of the village mataqalis) will speak on behalf of the chief (Nayacakalou 1975; Nabobo-baba 2006). Even when there is discussion involving different attendants at the meeting the speakers always face the same direction – forward towards the chief and never behind them toward the interlocutor. The order in which people speak is also determined by hierarchy, and typically people start whatever they're going to say with expressions of gratitude, thanking whoever is there for listening and thanking the chief, and any other dignitaries

18. Male and female cross-cousins have a special informal relationship; they often joke and tease one another as opposed to cross-sibling relationships (e.g. brother-sister) where post-puberty relationships are more formal and rigid (Nayacakalou 1975; Ravuvu 1987).

for attending the meeting and listening to what the people have to say (e.g. Nayacakalou 1975; Ravuvu 1983; Nabobo-baba 2006). These behaviours demonstrate the value and importance of social relationships to the Vanua. However there still are tensions and conflict that arise and talking, joking and shaming are important tools for diffusing these tensions and conflict (Arno 1993:98).

4.3. Conclusion

In this chapter I have described ongoing and projected climatic and biophysical changes experienced in Fiji. I have also explored some of the cultural context important for understanding the Vanua and the social context that people may use to understand and interpret the variability and changes in the climate and biophysical systems presented here.

In the next chapter I explore how Toga's residents have experienced and responded to climate and environmental variability, guided and shaped by their cultural context.

Chapter 5. Risk perceptions and responses to climate variability and environmental change

5.1. Introduction

This chapter addresses my first research question: "How is climate variability and environmental change currently understand and responded to at the household and village level?" As perceptions of events can shape how people respond (e.g. Adger et al. 2009), knowing what these responses are alone is not enough; we also need to understand how natural variability and environmental change are perceived. This chapter describes how people respond to natural climatic variability and environmental change, including flooding, changes in rainfall and erosion in Toga.

Toga, as expected of communities in dynamic delta systems, regularly experiences high levels of naturally occurring variability in conjunction with impacts due to changing regional and global land-use and economic development. The previous chapter (Chapter 4) discussed these impacts in detail and this section describes how the people of Toga respond to some of these impacts and variability. There have been studies examining aspects of risk perception and climate change adaptation (e.g. Grothmann and Patt 2005; Whitmarsh 2008; Dow et al. 2013), however many of these are focused on risk specific to climate change. As climate and environmental change are some of the many change drivers affecting Toga, I explore risk perceptions in the context of other perceived threats. As risk perceptions and their associated underlying cultural and social processes operate at individual and collective levels (Rohrmann and Renn 2000) I also examine risk perceptions via participant's prioritisation of threats to the household and the Vanua to capture the context and scale of responses to and perceived risks from a variety of threats.

The following section (5.2) uses data from interviews to explore how people have and are currently responding to environmental change. Section 5.3 introduces a risk mapping exercise based on questionnaire data undertaken in Toga's three villages that explored different ways threats are perceived based on spatial scale and gender. The final section, Section 5.4, discusses the implications and tensions between the variation of risk perceptions and responses due to scale and gender.

5.2. Responding to Climate Variability and Environmental Change in Toga

People in Toga have responded to environmental variability and change for generations (see Section 4.1). When asked about concerns or threats in the natural environment, most interview participants expressed concern due to threats from flooding, erosion, hurricanes, rainfall variability, river water quality, aquatic food source quantity/quality, land availability and/or air temperature changes. Table 5.1 below provides a summary of the kinds of responses to these threats that people engaged in at different scales and timeframes. Some responses to these threats require action at the village- or mataqali-scale, while others require only efforts at the household level. Responses are a mix of proactive and reactive, or only occur during an event.

Some responses are classified as 'pre-event' in the table, but the motivation for doing that action may be due to past experience of a similar event. For example, building up the soil level of a plantation is done in response to flooding. However it is classified below as a 'pre-event' type of response as it may not be done immediately following a flood event, but potentially at some point in the year following an event or when time and resources permit the farmer to hire a tractor and ask for assistance building up their plantation.

There are many more responses that are categorised as post-event (42) than are categorised as during- (28) or pre-event (16). More responses are actions taken by households (36) than at the village level (19). However, many of the responses undertaken at the village-scale include organisation and distribution of aid after a major event like a hurricane or flood or are related to communal spaces and resources. Although some of these responses may not have a majority of households per village involved, the benefits are perceived by interview participants as benefiting everyone. For example, the building and maintenance of drainage ditches is something that is the responsibility of the village headman who organises volunteers to undertake this work. Although not every household volunteers, interview participants perceived that many households benefit from better drainage and lower incidence of flooding due to clean and maintained drainage ditches.

Many of the responses that are classified as being done by 'many' (i.e. 30%-60% of interview participants reported doing this) are actions that are done at the household level. Many of the household level responses are in reaction to a specific event, e.g. raising valuables off the ground or evacuating to the Community Hall during a hurricane. However, there is a connection between some of these responses; evacuating to the Community Hall during a hurricane is possible because the village

Table 5.1. Typology of response actions to environmental change events in Toga. *The Event column contains various events that have or are currently occurring in Toga. The Response column details current and past responses to these events. There is some overlap between responses, especially with responses to flooding. The Pre, During and Post Event column detail when, in relation to the event, these responses are usually undertaken as well as whether it is households (HH) or the village community (Vill.) that implements these responses. The final column contains information on how many people typically engage in these responses, based on interview data. These terms refer to a rough estimate of the number of households engaged in that response based on interviews and informal conversations. 'Few' refers to less than 15% of households, 'some' is 16% to 30%, 'many' to 30%-60%, and 'most' is more than 60% of households.*

Event	Response	Pre-Event		During-Event		Post-Event		Number of people engaged in response
		HH	Vill.	HH	Vill.	HH	Vill.	
Household Flooding	Raise valuable items off the floor/ground level	X						Most
	Raise homes	X						Many
	Build and maintain drainage ditches		X				X	Many
	Evacuate to Village Hall or Catholic Church			X	X			Many
	Clean up inside and around house					X		Most
	Clean up debris from village/communal areas						X	Many
Plantation flooding	Receiving food aid from other villagers			X		X		Some
	Receiving food aid from external sources (e.g. Red Cross)					X	X	Some
	Building up plantion area to reduce low-level floods/increase drainage	X						Some
	Clearing away rotton crops and replanting new seedlings					X		Most
	Getting new seedlings from others in the village					X	X	Some
	Getting new seedlings from external sournces (e.g. Ministry of Agriculture)					X		Some
	Plant fast growing varieties to speed access to food post-flood					X		Many
	Give food aid to other villagers					X	X	Some
Other major flooding (both hurricane and non-hurricane events)	Road access and/or public transportation cease during flooding events, boats and rafts used to ferry people across the river as needed			X	X			Few
	Cooking inside the home (for homes with outdoor ground-level stoves/fires)			X				Some
	Storing up firewood in case will need to cook inside home (for those with external stove/ fireplaces)	X						Some
	Cook food in lovo rather than stove to make last longer					X		Some

Event	Response	Pre-Event		During-Event		Post-Event		Number of people engaged in response
		HH	Vill.	HH	Vill.	HH	Vill.	
Hurricane (other responses same as the flooding)	Hearing about a hurricane or storm approaching, and spreading the word in the community	X	X					Most
	Tying down roof and securing other valuables	X						Most
Erosion	Building up riverbank defenses, via planting trees and/or grasses or hard structures		X		X		X	One village as of May 2014, more planned
	Relocation of village/communal areas due to erosion						X	One village (Navatuyaba in 1960s)
	Dredging of main Rewa River channel to increase flow and reduce erosion/over bank flood events (also a response to flooding).		X		X		X	Last happened in about 2010
	Fill sandbags with dredged material. These can be used to build up riverbank defense, however some sediment may contain heavy metals and other contaminants.	X	X	X	X	X	X	Few
Changes in rainfall variability	Harvesting fruits more continuously througout the year (although rainfall is not the only factor affecting fruit ripening seasonality).			X		X		Many
	Planting alternative taro and cassava varieties that may have more tolerance to drought and/or high soil moisture conditions (also as a response to increased air temperatures).			X		X		Some
Increased turbidity and pollutants in the river	Reduce exposure by ceasing swimming, bathing and generally being in the river.			X		X		Few
Decline in quantity or quality of *kai* and/ or shrimp	Introduce a tabu on the fishing area. The length of the tabu will be decided by the chief/village leaders.				X		X	Infrequent - also done at the death of the chief.
Reduced land availability	Purchase/lease land outside the Vanua for planting and/or building additional family homes.			X		X		Few
Increased daytime and night time air temperatures	Staying indoors/in the shade during the hottest parts of the day.			X		X		Some
	Working on the plantation early in the morning and later in the afternoon and resting during the middle of the day.			X		X		Some
	Building traditional thatch homes (much cooler than newer tin or concrete constructions.			X		X		None

headman organises volunteers who participate in cleaning and maintaining the Community Hall. The majority of the village-scale responses are preventative and are a result of previously experienced impacts on communally-held resources: the river and the land. Examples of this include planting of trees and grasses along the riverbank, a project that required village-level organisation and participation of numerous volunteers.

Responses to flooding and hurricanes are done at both household and village-scale, however the village level responses include preventative measures and post-event responses of organising internally- and externally-sourced food aid. The village may also play a role in some of the household responses by encouraging people to prepare and respond in certain ways, such as cooking food in a traditional lovo[19] oven post-event or facilitating meetings with Ministry of Agriculture representatives to find farmers willing to test alternative crop varieties. The following sections (5.2.1 through 5.2.4) describe the impacts and responses to the events in Table 5.1 in more detail.

5.2.1. Flooding and Hurricanes

According to interview and questionnaire participants annual flooding is a frequent occurrence in low-lying parts of the island, although more severe flooding (i.e. >2 days of standing water resulting in crop loss or property damage) is less common than shorter term flooding (i.e. <1 day of standing water). Flooding is the result of intense rainfall locally or upstream in the watershed and its impacts are highly spatially variable in the community. Participants noted that flooding is due to rainfall pooling in some areas, as well as a high water table and ground saturation. Interview participants reported more incidents of flooding due to non-hurricane rainstorms, however hurricanes often bring higher flood levels. This is due to higher intensity rainfall and the typical direction of hurricane travel, usually along the length of the Rewa River watershed concentrating the river discharge over a shorter period of time (Kostaschuk et al. 2001).

Flooding

In Navatuyaba, the western side of the village (along the Toga River) rarely floods, while homes close to the Catholic Church and several other areas flood regularly. The same is true for plantations, which are flooded more frequently than homes (Table 5.2). Some of these differences could be because most homes are raised at least one metre off the ground (more than 82% of homes in all three villages), although between 41-45% of homes reported some flooding in the previous three years. At least 70%

19. A traditional cooking method where food is wrapped in palm or banana leaves and put among heated rocks, then covered in palm fronds and left to cook.

of all households reported that their plantations had been flooded 1-3 times in the previous three years (although incidence of severe flooding was reported less frequently), while 91% of Toga residents stated they had noticed changes in flooding in recent years.

Floodwaters can rise and recede quickly, depending on the volume of water and rainfall duration. Peoples' lives are impacted the longer the floodwaters remain. Root crops that are the local staple (taro and cassava) begin to rot if they are submerged for more than 3 days. Participants described very bad or severe floods as those where they lost crops or the water came into their homes. Participants also reported that one of the worst impacts immediately after a major flood event is reduced food availability as they are highly dependent on root crops that are destroyed.

Table 5.2. Frequency of plantation and home flooding in the last three years per village. *Data from questionnaires.*

Frequency	% Reporting Plantation Flooding			% Reporting Home Flooding		
	Muana *(n=38)*	**Vunisei** *(n=30)*	**Navatuyaba** *(n=60)*	**Muana** *(n=39)*	**Vunisei** *(n=30)*	**Navatuyaba** *(n=60)*
Never	29	30	23	59	53	55
1-3	45	43	40	36	30	23
4-6	21	10	32	3	17	20
7-10	3	0	5	0	0	2
More than 10	3	17	0	3	0	0

Flood responses depend on the severity of flooding. If people receive warning of a severe flood, via observation of river water turning brown (indicating heavy upstream rainfall) or official warnings from radio or TV, they will prepare by building shelves at approximately head height and placing valuables out of reach of the water. Heavier items, such as refrigerators, may be tied up with ropes and hoisted off the floor. The struts and beams of homes will be used to support the shelves, and if people choose to stay in their homes they may even place small children up on these shelves. Many households reported that they had, or would, go to either the Community Hall or the other buildings (such as Navatuyaba's Catholic Church) made of concrete with the first floor at least 2+ meters above the ground. If people are unable to walk, rafts or small boats are used for transportation. Although most interview participants said they would stay in the village, some reported leaving the village if they had family in an area that would not be as impacted by the flooding.

Drainage ditches have been dug in villages to mitigate flooding. However, interview and questionnaire participants reported that many ditches are clogged with debris, both naturally occurring such as sticks/ leaves and rubbish washed in from surrounding areas and deliberately disposed household rubbish in the ditches. There is a strong perception of the connection between flooding and clogged drainage

ditches. Keeping the drainage ditches clear is one of the tasks involved in the regular village cleanups. However, according to both interview and questionnaire participants the drainage ditches are not being cleaned frequently enough and this exacerbates flooding.

Another action done pre-flooding is to raise the plantation elevation. Interview participants described building up their planting area with extra soil (up to 0.5 metre) to mitigate flood impacts on root crops. This practice is very labour intensive and requires a large amount of additional topsoil and man-hours, and high-intensity rainfall events can lead to soil compaction meaning that this process may need to be done repeatedly. Where the additional soil comes from was not made clear by those participants engaged in this practice.

When plantations are submerged for more than three days crops will be dug up after waters recede, and new seedlings obtained and planted. Depending on how localised the flooding was, these seedlings could be provided by other villagers or church groups. The mataqali is often a primary source for this kind of assistance, however as the mataqali is the land-owning unit it is likely that if an area is flooded most members would have a similar flooding experience. If that is the case then others from the village or district would provide assistance. In the case of widespread disaster (e.g. Hurricane Kina in 1995) the Fijian Government and aid agencies such as the Red Cross provide the bulk of initial food and replanting assistance. After Kina, the government supplied sweet potato seedlings as they mature faster than the traditional taro and cassava crops. People cooked food in a lovo more often post-storm, and interview participants reported that food cooked using traditional methods lasted longer than food cooked in other ways.

If the flood is severe enough to leave large amounts of debris, including animal carcasses and other potential health hazards, the mataqali and/or village will organise cleanup and removal. The government has previously provided assistance with disposing of carcasses, and participants reported that post-flood the smell of the debris and carcasses was one of their strongest memories of past major flood events such as Hurricane Bebe.

Hurricanes

When people know that a strong hurricane is coming, the response is very similar to that of severe flooding (and most severe flood events are associated with hurricanes). In addition to flooding, hurricane impacts also include high winds that can damage structures and take down trees. In addition to typical flood preparation, people also use ropes to tie down the roofs of their homes before going to the evacuation area. A very strong storm can result in much higher flooding than non-hurricane high rainfall events. The impacts of severe hurricanes are less spatially diverse than those of flooding as the

total volume of floodwater (depending on amount and rate of upstream rainfall) can be much higher, especially if floodwater peaks coincide with high tides and particular wind directions. As Toga is in a floodplain, hurricane-associated flooding affects most residents as opposed to the more frequent but less intense rainfall-induced flooding that primarily impacts low-lying areas of the island.

The last major flood events most interview participants recalled were Hurricane Kina (1995), Hurricane Bebe (1972) and Hurricane Lottie (1973). During Hurricane Bebe most people were evacuated off the island and brought by boat across the river to stay in a school until floodwaters receded. Many of those that reported one of these storms as the source of their home's most recent flood event said that otherwise their homes do not flood. Interview participants reported that the Red Cross was the primary provider of food and other assistance in these major hurricanes, although their assistance was not mentioned for other events that were perceived as less severe in terms of damage or recovery time.

Attitudes toward flooding

Although hurricanes can be devastating, flooding due to non-hurricane rains can also occur quickly. The fast-rising floodwaters were sometimes described as frightening events, although people also accepted that these events are part of natural cycles. One interview participant joked about his family diving for cassava and taro the same way they dive for the *kai* in the river when their plantation was underwater for several days. Another interview participant, Litia (female, 45-60), who came from a province close to Rewa and not in a floodplain (Tailevu) and moved to the village after she married, described what it was like when she first experienced a flood in the village:

> *"When the flood is coming all the men's is preparing, putting the things* [up on the shelves]. *Different in Tailevu. No flood there. I came here in [19]85, and then in '86... There was flood, once the water was rising I was crying! Oh! I never see a flood coming into the house. [...] I was looking outside. Watching the flood. I was asking my husband to take me to Tailevu. [...] Once the water goes down, then I comes back. Very scary! But now I'm used to it. But now I love flood! [Laughter] [...] We can do the washing, even the doormats, right outside the house!" Litia (female, 45-60)*

Although Litia had never seen flooding like this until she was a married adult and was frightened enough to return back to her home village, she's now become accustomed enough to joke about doing washing in the doorway. Her house is raised approximately 1 metre from the ground, and the casual way Litia can discuss and joke about these events may be due to the frequency of their occurrence.

People also spoke about these kind of events as part of the natural course of things. For example, when describing going through Hurricane Bebe in 1972 as a child another interview participant, Joni (male, 45-60), said:

"I was afraid, because at that time myself was still young [...] Small boy. So after going through flood and flood and flood we get used to it." Joni (male, 45-60)

When asked about what he thinks about flooding now, Joni replied:

"[laughter] Nature is nature, the nature brings the flood we can't say anything at all to act. Some of the flood go, and I can come, [and do] whatever." Joni (male, 45-60)

There is an understanding that flooding events are naturally occurring and therefore an accepted part of life in Toga that was reflected in many conversations with Toga's residents. This attitude is demonstrated by the adjustments people have made to their homes and plantations and their joking about washing outside the front door or diving for taro as if it were *kai*.

5.2.2. Erosion and Land Availability

Although erosion was mentioned by almost all the Navatuyaba's elders as a primary concern, fewer people had direct experience with erosion than flooding. By direct experience, I refer to having plantation land or land close to their house erode. Toga District and Navatuyaba village have been working for several years to fund and find solutions to mitigate river bank erosion. Navatuyaba was relocated from the Rewa River side of the island to its current location by the government in the 1950s due to erosion. The map in Figure 5.1 shows areas of high erosion, the old Navatuyaba village site and where coconut palms are currently being planted to stabilise the riverbank (next to the falling coconut palms in the photo in Figure 5.1). Currently there are more areas of erosion on the Toga River side than on the Rewa River side of the island. Although small levels of accretion were reported at the very top and bottom of the island, it was not enough to outweigh concerns about erosion.

Unlike responses to flooding, responses to erosion have been coordinated and executed at the community level. There is the riverbank stabilisation project mentioned above and there are plans to plant more trees and vetiver grass (a species commonly used regionally in bank stabilisation projects). This project was initiated by the local community; village and district leaders petitioned the Provincial Government for funding and assistance and coordinated the implementation locally. However, erosion is still reported as a major issue and discussions with some of Navatuyaba's leaders about these initial projects indicated that some felt that more needed to be done.

Erosion is an incremental problem impacting the wider community. Land is valuable in Toga; it is how people earn income, grow food and is an important part of people's identity. Additionally, many people highlighted concerns about a current lack of available land and worries about future land availability. The mataqali are the landowning units, and the head of the mataqali makes the ultimate decision about who is able to utilise which land. However, mataqali land boundaries remain fixed while population

fluctuates. This means that some mataqali may have more land available than they need while others experience shortages, although the situation could be reversed in a generation[20] due to fluctuations of mataqali population size. In addition to land shortages for planting, people also discussed lack of available land for building new homes within the village. The core village area is communal land, owned by the village rather than a mataqali. When the village moved to its current site, one of the mataqali donated the land to the village. Many members of that mataqali currently have homes along the Toga River side of the village, which is also higher elevation land that rarely floods.

Interview participants with plantation land along the river bank understand that erosion is a natural and constant process:

> *"Ever since I know myself, the erosion goes* [on]. *Always." Maciu (male, 45-60)*

Maciu had planted trees along Rewa's riverbank on his own land and also was able to obtain some of the sediment from the last time the Rewa River was dredged to build up the riverbank and said he has not noticed significant erosion since then.

Two other interview participants said they were concerned enough about current and future land availability (as well as frequent household flooding) that they had leased land outside Toga to build homes and were planning on moving from their current houses to the new land. They would return to Toga to attend village events, but the move is primarily motivated by a lack of available land within their mataqali for planting as well as housing and a plantation that regularly floods. This was unusual, and the two households (of the same *tokatoka*) were the only ones who reported doing this.

20. Mataqali land boundaries are technically fixed (see 4.2.1 for land tenure and history), however locally there can be disagreements over exact land boundaries and it can be a contentious issue.

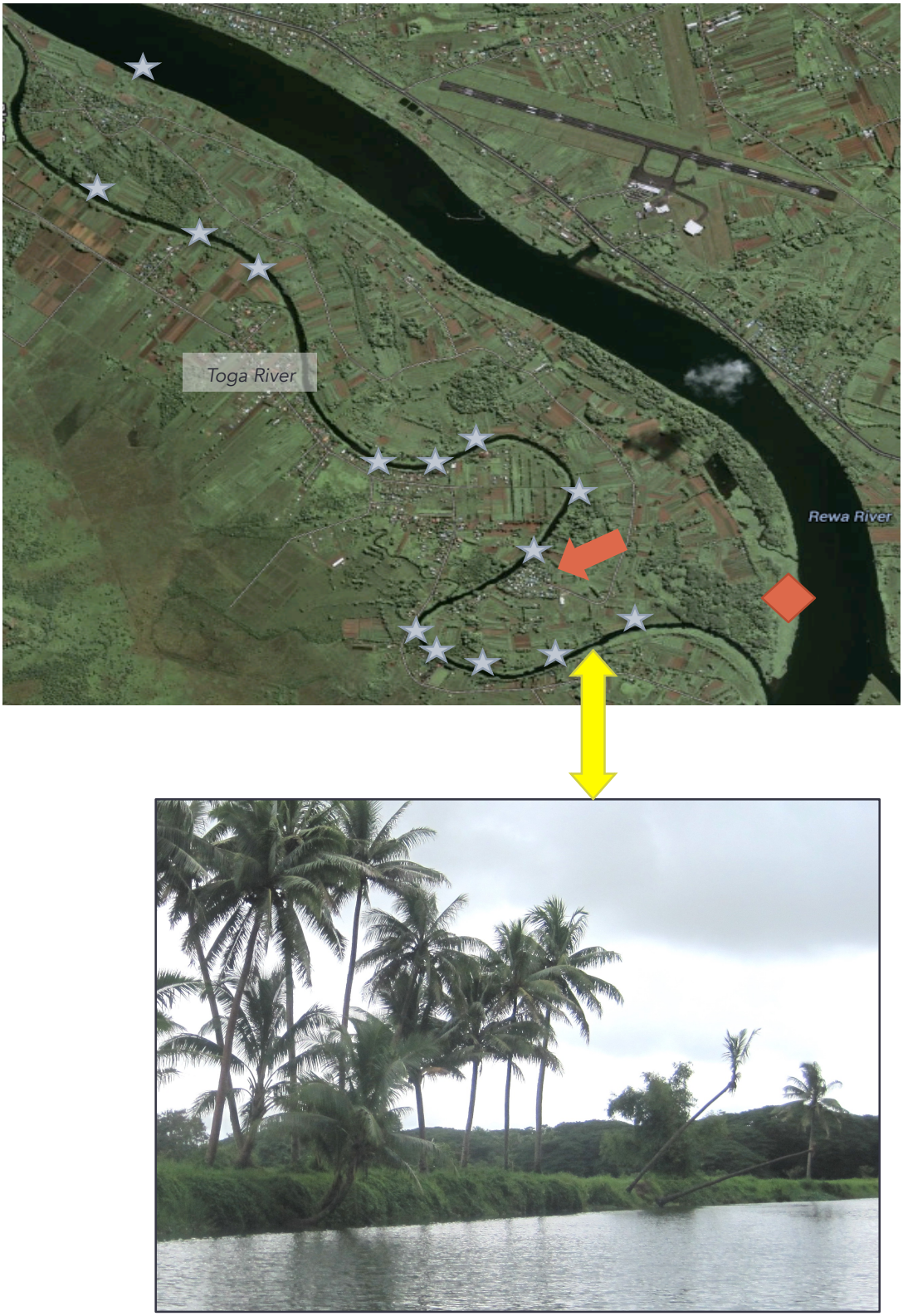

Figure 5.1. Toga Island erosion hotspots and riverbank stabilisation. *The red diamond is the approximate old Navatuyaba village site and the red arrow is the current village site. The yellow arrow is where current bank stabilisation planting is taking place, also showing where coconut palms are being undercut by erosion next to the stabilisation project. The grey stars are areas district leaders indicated are current erosion 'hotspots' while on a boat tour around Toga. MAP: © GoogleMaps 2014; PHOTO: C. Shelton.*

5.2.3. Increased Heat and Rainfall Variability

Responses to increased heat and rainfall variability are nuanced. Although many interview participants reported increased heat, they did not report changing practices based on this. Some of the younger women reported during interviews wanting to wear "less traditional" and cooler clothing, such as singlets and kneelength clothing (as opposed to ankle length skirts), although some also mentioned that this was due to modern style choices as well. In a hypothetical scenario exercise during interviews people's recommendations for heat waves included staying indoors and in the shade during the hottest part of the day and relaxing village rules around clothing so that both men and women could wear singlets and shorter shorts or skirts. One interviewee who expressed concern about declining traditional knowledge for village products such as woven fans said a heat wave could provide impetus for younger women to learn how to weave fans. Several interviewees indicated that the increased heat was a greater problem for people than for their crops.

Increased nighttime temperatures were more frequently reported as being problematic than increased daytime temperatures. Increased heat in the evenings was much more frequently mentioned in interviews, especially as a change from summer seasons in the past. This matches statistical evidence from observations of an increase in almost twice as many reported warm nights than warm days per decade. An increase of 8 warm nights per decade from 1942 - 2011 is reported for the Suva area[21] while the number of warm days/decade has increased by just over 4 over the same time period (Australian Bureau of Meteorology and CSIRO 2014).

The Ministry of Agriculture has been supplying varieties of taro and cassava which are more resilient to different heat, soil moisture and pest/disease conditions. Not everyone in Navatuyaba has planted these different varieties, and in interviews most who reported using them said they used a mix of the traditional and new varieties. This was due to uncertainty around taste of the new varieties and to maintain crop variety in case of a blight outbreak or other event that could destroy crops.

The other seasonal change frequently mentioned was change in rainfall between the dry (southern hemisphere winter) and wet (southern hemisphere summer) seasons. Many people reported more rain during the dry season and an increase in wet season rainfall variability. Some of the day-to-day impacts of increased rainfall in the dry season include some changes in planting practices that require drier soil

21. The increase in warms nights/decade is 7.87 and the trend is significant at 5%. The 95% confidence intervals are +5.83 and +10.62. Warms nights are defined as the number of days with minimum temperature greater than the 90th percentile for the base period 1971–2000 (Australian Bureau of Meteorology and CSIRO 2014).

and women's daily travel patterns, as some women indicated the need to stay closer to home to bring in laundry and therefore not go to market or attend events (e.g. church meetings) too far from home. Additionally, water saturated ground can exacerbate flooding. Some older interview participants described seeing the ground dry out until there were cracks in the soil when they were younger but stated that the ground no longer cracks as it rains more frequently.

Data from the Nausori monitoring station appear to corroborate these statements (Figure 5.2). Although monthly rainfall totals for the wet season appear to be slowly decreasing while there is a slightly steeper increase in dry season monthly rainfall totals, these monthly rainfall total trends are not statistically significant. The climate trend analysis done by Australian Bureau of Meteorology and CSIRO (2014) do not indicate a significant increase in overall monthly rainfall, days with more than 1mm rain or the number of consecutive dry days, however their analysis looked at daily and monthly rainfall totals annually rather than seasonal variation. To determine if there was a statistically significant difference between the reported wet and dry season variations, a Mann-Kendall test was run. The test results indicate a statistically significant increase in the number of wet days (i.e. days with rainfall >0.1mm) during the dry season (p value of 0.000; Figure 5.3), while there was no statistically significant change in the number of rainfall days during the wet season. This aligns with what interview participants reported about changes in the the dry season.

Air temperature and fruit seasonality

Changes in fruit seasonality have been mentioned throughout the Pacific as a potential climate change impact due to changes in air temperature and moisture availability (Lane and Jarvis 2007). These changes, especially related to breadfruit trees, were also mentioned in interviews with local government representatives and external environmental NGOs, as well as some village interviews. However, when asked if this was something that people were concerned about in the village, no one expressed major worries:

> *"Before the dalo* [taro] *was like this, the long one and the cassava too, but now all are small. Maybe its because of the weather that all has changed now. They are not big anymore. ... It* [the traditional Fijian calendar] *has change a lot. Right now the breadfruit bears fruit all the time. That has changed, breadfruit in the past only bears fruit in season but now all the time." Nanise, female 61+*

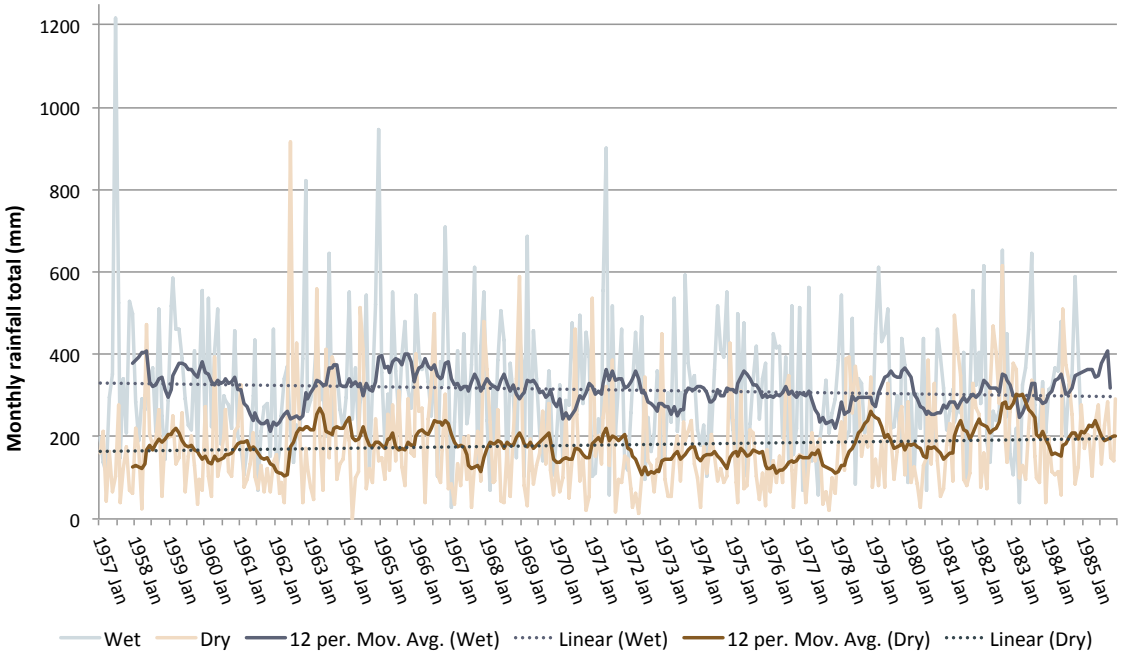

Figure 5.2. Total Monthly Rainfall at Nausori during dry and wet seasons 1957 - 2013. *There is high natural variability in monthly rainfall totals in Fiji. The wet season is November - April (blue) and the dry season (green) from May - October. The dotted lines are linear trend lines while the solid blue and green lines represent a moving average (based on 12 periods). Inter-annual variability between the two seasons is similar, however there does appear to be an overall increase in dry season monthly rainfall totals and a decrease in rainy season monthly rainfall totals. Data from the Fiji Meteorological Service.*

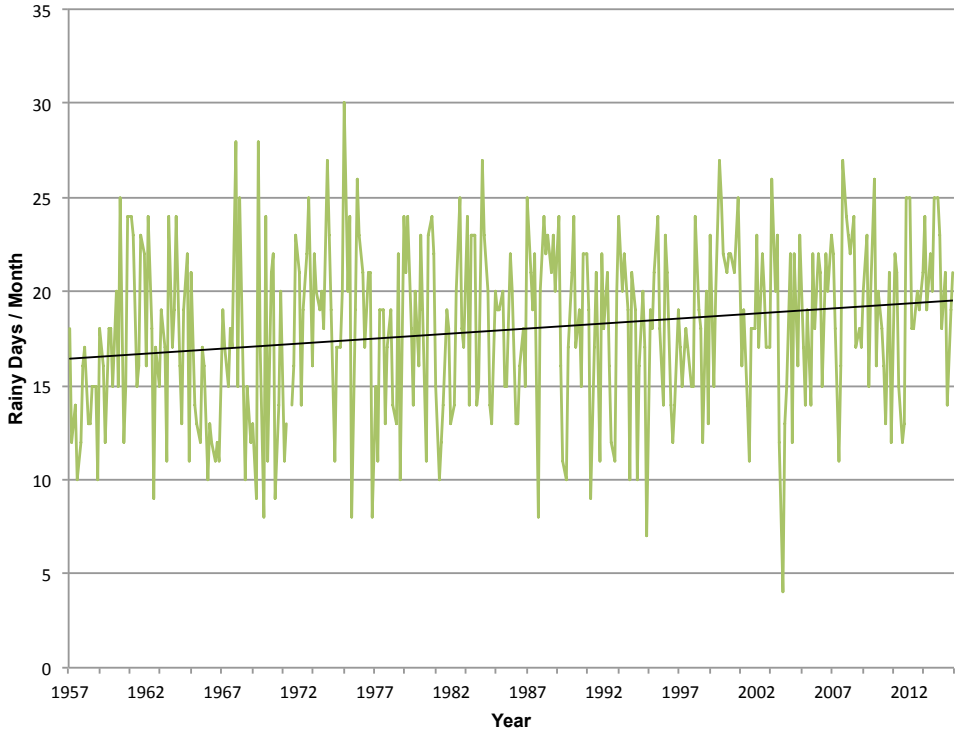

Figure 5.3. Days with Rainfall during the Dry Season, 1957-2013. *Days per month with rainfall greater than 0.1mm during the dry season (Nov-April). A Mann-Kendall test to determine if there was a statistically trend indicated an increase in the number of days with rainfall/month during the dry season (p value: 0.00; Sen's slope: 0.1).*

Other village elders mentioned changes in breadfruit ripening, as well as smaller crops. The only reported change in practice in response to fruit seasonality changes was to take advantage of it and harvest fruits when available. When participants from the district were asked to rank threats (Section 5.3), changes in fruit ripening was prioritised as lower in incidence than many other issues for both households and the Vanua indicating that this as likely not impacted people's ability to provide food.

5.2.4. Rising Sea Level and Changes in River Water Quality

Another impact mentioned primarily by government officials and occasionally in village interviews is rising sea level. This was often mentioned more in the context of increased presence of saltwater species (e.g. certain fish) closer to Toga and was often viewed as a positive thing as these marine fish are desirable to eat and currently people need to travel further to catch. However, people also expressed concerns about rising water levels and several interview participants mentioned that high tides came up higher now than they remembered in the past. Sea level has risen close to 10 cm over the last 50 years, and projections indicate anywhere from a 20 cm to 1 metre rise by 2100 (Australian Bureau of Meteorology and CSIRO 2014).

In addition to potentially exacerbating flooding if high rainfall occurs during higher tides, higher sea level can potentially increase salt water intrusion during tidal intrusion. The Toga and Rewa Rivers provide vital livelihoods and one of the main protein sources. In some studies of Fiji's freshwater fisheries, *kai* make up 85% of harvested organisms (Gehrke et al. 2011). However, *kai* live closer to upper tidal limits and prefer brackish to fresh water, so increased salt water intrusion may induce *kai* to move further upstream (*ibid*). In an assessment of Pacific Island Countries' freshwater fishery resources, *kai* were determined to be highly vulnerable to increased water temperature, and have medium vulnerability to increased salinity, changes in dissolved oxygen and turbidity in disturbed catchments (*ibid*).

The *kai* from Toga are "what Toga is known for" and are part of what the Vanua of Toga has historically prepared and gifted to the Roko Tui Dreketi, the High Chief of Burebasaga Confederacy. One interview participant, Joeli (male, 26-35), when describing what the natural environment meant to him said:

> *"...because we are river people, the natural environment also includes the rivers and all the vegetation that lives in the river, beside the rivers, everywhere. [...] And we also have what we eat, like the* [kai]*, this is all our natural environment..." Joeli (male, 26-35)*

The *kai* and the river are part of people's livelihoods, provide a major protein source and make up an important part of the identity of people from Toga. *Kai* were consistently one of the first things brought up in interviews when people described daily activities and what was important for them in the village. Interview participants reported both increases and decreases in *kai* availability. This could be due to more siltation in the rivers making it easier to harvest *kai*, and increased human population harvesting more *kai* and reducing overall numbers in some areas leading to the perception that *kai* availability is decreased.

Another major factor impacting *kai* health is water quality. Many participants described how river water quality had declined over recent decades. This decline was described as both the water becoming cloudier (increased turbidity) and additional agricultural runoff and other pollutants in the water impacting *kai* growth and flavour. Increased nutrients in the river(s) can positively affect shellfish growth, although other waste products can increase chances of potential harmful algal or bacterial transmissions to humans. The Koronivia Agricultural Research Station (located just upstream on the western side of the Rewa River) was mentioned numerous times during interviews as a source of runoff impacting both river food sources and human health. A more recent report on the *kai* fishery and human health from Muana village also mentions an upstream abattoir and carwash as sources of potential harmful runoff that villagers were concerned about (Waqalevu 2015). Increased skin disease incidence and lesions, especially on children (who often spend more time playing in the water than most adults), were reported by some interview and questionnaire participants. One participant even said he told his whole family not to go into the water at all as he was so concerned about their health.

Increased turbidity is reported in both the Rewa and Toga Rivers. Turbidity occurs when aquatic systems are more disturbed, via increased sediment runoff and changes in water flow. There have been several dredging projects in the Rewa River, and interview participants reported changes in flooding and erosion post-dredging as deeper river channels permitted more space for water flow, reducing over bank flooding. The culvert at the top of the Toga River has severely restricted flow and led to a build up of sediment and aquatic plants (Figure 5.7), impacting people's ability to harvest *kai* and shrimp. The river is shallower making them easier to harvest, but that may also mean that more people are harvesting. As pollutants and toxins build up and are not regularly flushed out these have bioaccumulation potential in *kai* and shrimp. No-one reported noticing any change in human health from eating the *kai* and shrimp, and there was no available water quality data on toxins or faecal bacteria concentrations from the Toga River. The study mentioned above, Waqalevu (2015), did detect *E. coli* bacteria in the Rewa River, although this sample was collected just prior to high tide as water was

flowing back upstream (from the densely populated Suva area). There was no avaliable information on water quality in the Toga River and only limited information on the Rewa River from water quality sampling on three dates in 2009 as part of the Environmental Impact Assessment for the most recent dredging project (Tamata et al. 2010).

5.3. Risk Perceptions and Risk Maps

Risk perceptions are important for understanding responses to environmental change and are shaped by many of the same processes that shape subjective norms and attitudes such as cultural affiliations and social values (Renn 2008). Risk here refers to more than the physical or social source of potential harm, but also the perceived probability and magnitude of an impact (Slovic et al. 2000; Rohrmann and Renn 2000; Renn 2008). Risk perceptions have been shown to be strongly influenced by underlying cultural and social processes (Rohrmann and Renn 2000), and as these processes operate at individual and collective levels I have examined them at the household and Vanua-scale.

In this section, the term "threat" or "challenge" refers to an event or situation that is either undesirable or has uncertain consequences (which are perceived as undesirable). These are currently occurring or potential situations that people expressed worries or concerns about in interviews and informal conversations. The term "risk" was not applied during the fieldwork due to difficulties with translation and my own concern that participants may have a different understanding of the term than my own. The terms "threat", "challenge", or "worries" were used often in conversations, and were used to refer to events or situations that people were concerned about currently, or they were concerned about uncertain and potential negative consequences from that event or situation. The threat mapping exercise captured subjective measures of threat/risk perception (after Smith et al. 2000 and Quinn et al. 2003). Where appropriate, objective measures (e.g. comparing reports of experiences with hurricanes with meteorological records) are used to triangulate information. To determine what, if any, heterogeneity existed in risk perceptions, risks to the household and Vanua-scale were asked about separately, and the data is examined by village and gender (See question 16 in Appendix C for wording of risk perception questions). The next subsection discusses these differences based on household- and Vanua-scale by village and gender.

5.3.1. Household and Vanua Risk Mapping

The following figures are risk maps plotting average severity and incidence index values for the household (Figure 5.4) and the Vanua (Figure 5.4) level by village. The incidence index indicates how frequently that event or situation was viewed as threat for the relevant scale (i.e. household or Vanua).

The severity index relates to how severe an impact that event or situation is perceived to have on the relevant scale (household or Vanua). Items in the upper right-hand corner of the figures (labelled as Q2, quadrant 2) are threats that could be considered immediate in that they have index values indicating high incidence and high severity and therefore more people worry about them and consider them to have greater impact than other threats. Items in the lower left-hand corner are threats that fewer participants worried about and were perceived to have less severe impacts (relative to the other events or situations; Q4, quadrant 4). Those items in the upper-right hand are therefore interpreted here as threats that participants have prioritised based on severity and incidence, while those in the upper left-hand corner (Q1) have lower incidence indices, but high severity indices. This indicates these threats were chosen as threats less frequently, but when they do occur are perceived to have a high impact. Those in the lower right hand corner (Q3) may have (relatively) lower impact on households or the Vanua, but were chosen as threats more than other events.

Legend for threat/challenge items. *The symbols, display names and colours in this legend apply to all risk map figures in this Chapter.*

Symbol	Display Name	Threat/Challenge
■	Erosion	Toga Island is eroding.
○	Flood – Home	Flooding in homes.
✳	Flood – plantation	Flooding in the plantation.
✚	Drainage	Rubbish in the drains causing blockages that make flooding worse.
●	Non-participation	People not participating in village meetings, cleanups, etc.
▲	Food Prices	The price of food has become too high.
□	Lack of Land	There is not enough land to support all the children now when they grow up and want to plant.
▣	River – food	Pollution in the Toga River is worse and may affect the *kai*, prawns and fish.
▬	Rain	It rains differently at different times of year than it used to.
✕	Rising Water	Water comes up further with high tide now than it used to.
◯	Fruit Ripening	Fruits become ripe at different times than they used to (like breadfruit).
✖	Hurricane	A strong hurricane.
△	Future – erosion	Toga Island will be too small for everyone to live here in 20 years because of erosion.
△	Future – pop. growth	Toga Island will be too small for everyone to live here in 20 years because of population growth.
✳	River – sick	The river is less clean and people could get sick (e.g. skin diseases) from being in the river.
◇	Heat	It is hotter now than it used to be.
◆	Lost income/job	You/someone in your household losing job/income source
	M: Muana	V: Vunisei	N: Navatuyaba

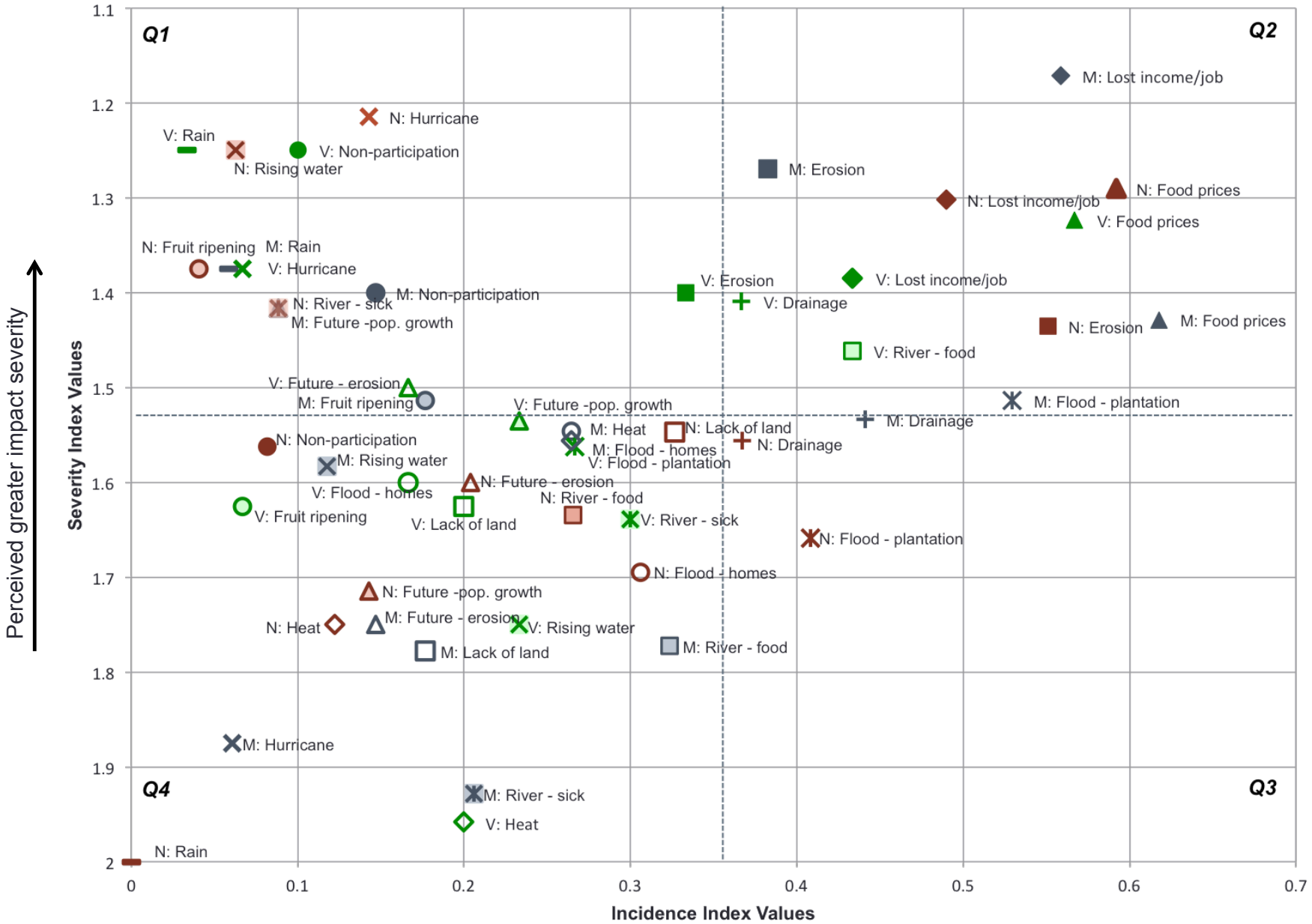

Figure 5.4. Risk Map for Household threats by village. *This figure displays index values for severity and incidence of the threat items for the household by village. The figure is divided into quadrants (Q1 - Q4). The upper right (Q2) is where items with the highest severity and incidence are located (values closer to 1) indicating those items are perceived has being more threatening than the items in the lower left (Q3) which have lower incidence and are less severe (value of severity index closer to 2). Q4 and Q1 have items that either do no occur as often as other or the severity of impact is less that other that are reported as occurring more frequently. The severity index in on an inverse scale, where 2 is a less severe impact and 1 is a more severe impact.*

Household Risk Map

There are some interesting similarities and differences between the household- and Vanua-scale, as well as between Toga's three villages. Unsurprisingly, threats to the household related to day-to-day activities and livelihoods are found clustered in the upper righthand corner (Q2) of Figure 5.4. Food prices have risen by up to 100% over the last 15 years (Miskelly et al. 2011), coinciding with increased number of people engaged in wage labour and decreased reliance on locally produced food (as reported by interview participants). The plantations and river provide income and the majority of people's daily subsistence, however people are eating more purchased food and cash is required for more activities, such as school fees and transportation. As more people engage in earning cash, more cash is required for them to use those structures and systems (e.g. local markets, education), potentially locking them into a monetised system (Ogden 1989). Older participants noted the increasing cash reliance for more modern lifestyles:

> *"That's what life was like when we say it was easy, now there are so much different. Now they are expensive because lots of people are now working." Koila (female, 61+)*

Koila went on to describe only purchasing a few items, such as sugar, kerosene and soap, and growing everything else required on their land when she was younger. She also described owning fewer things in the past and the additional work that has gone into having to wash more clothes and manage the additional possessions that people currently own. Other older interview participants also described eating purchased food as a rare treat several decades ago. Although over 70% of questionnaire participants still eat from the plantation daily and 80% eat food from the river at least once a week, 65% currently eat purchased food daily. So although increased food prices are a threat for many households, impacts on land availability and river water quality are also perceived as threats to food quality and quantity.

Erosion, rubbish in drainage ditches exacerbating flooding, flooding on the plantations and in homes, pollution in the Toga River impacting food resources, and river water making people sick are all items clustered around the centre of the graph. These threats impact people's ability to feed themselves and their family as well as earn income. Most households sell at least some of their crops in the Nausori market, sometimes when they are in need of extra cash for a specific cost (e.g. mataqali obligations for a funeral or wedding) or on a more regular basis. *Kai* and prawns are collected in the river, usually by women, for household consumption to to sell along the Kings Road or in the Nausori or Suva markets. People spend a lot of time in the river, harvesting *kai* and prawns, in addition to eating organisms that are bottom or filter feeders, meaning that pollutants and toxins in the river have the potential to

bioaccumulate in these foods and affect health (Waqalevu 2015). While 81% of participants reported considering pollution in the river negatively impacting aquatic food sources, only 32% considered it one of the five threats they were most worried about.

The 'rising water' water item has lower incidence and severity index values than many other threats. This indicates that although people observe rising water, fewer people have observed it compared to other threats and as water levels rise incrementally the impacts are less easy to observe and are understood to be less severe.

Differences between villages

There are some interesting differences between the three villages. One noticeable difference is with the 'lack of land' item; Muana and Vunisei considered it less of a household-level threat than Navatuyaba. However, Navatuyaba is the largest village and there is limited land within the main village site for building new homes. Participants from Vunisei reported observing erosion less than the other two villages, however Vunisei's location on the Rewa River means there is limited erosion close to the main village site. Interestingly, Navatuyaba rated 'Toga Island will be too small in 20 years due to population growth' with the lowest severity of the three villages, despite rating lack of land as higher severity than the other villages and numerous interviews where concerns over land availability due to population growth were specifically mentioned.

Vanua Risk Map

The risk map of threats to the Vanua differed from the household in that items that were related to land availability and participation in village activities were prioritised as the largest threats (Q2 in Figure 5.4). Erosion, rubbish blocking drains and non-participation are also in Q2 for all three villages, indicating that these items are perceived as the largest threats to the Vanua. Rubbish in the drains and non-participation are linked, as there are village rules regarding rubbish disposal (primarily burning, burial or a combination of those), and when drainage ditches are clogged by rubbish and debris during high rainfall events, interview participants reported that localised flooding is usually much worse. In addition to village rules regarding rubbish disposal, there are also regular village cleanups (see page 86). The drains, village green and village hall are all owned collectively by the village, and their maintenance is the *turaga ni koro's* responsibility in conjunction with village residents. In many interviews, participants reported that fewer people attend these cleanups and more ignore calls for other village maintenance projects (e.g. clearing out drainage ditches).

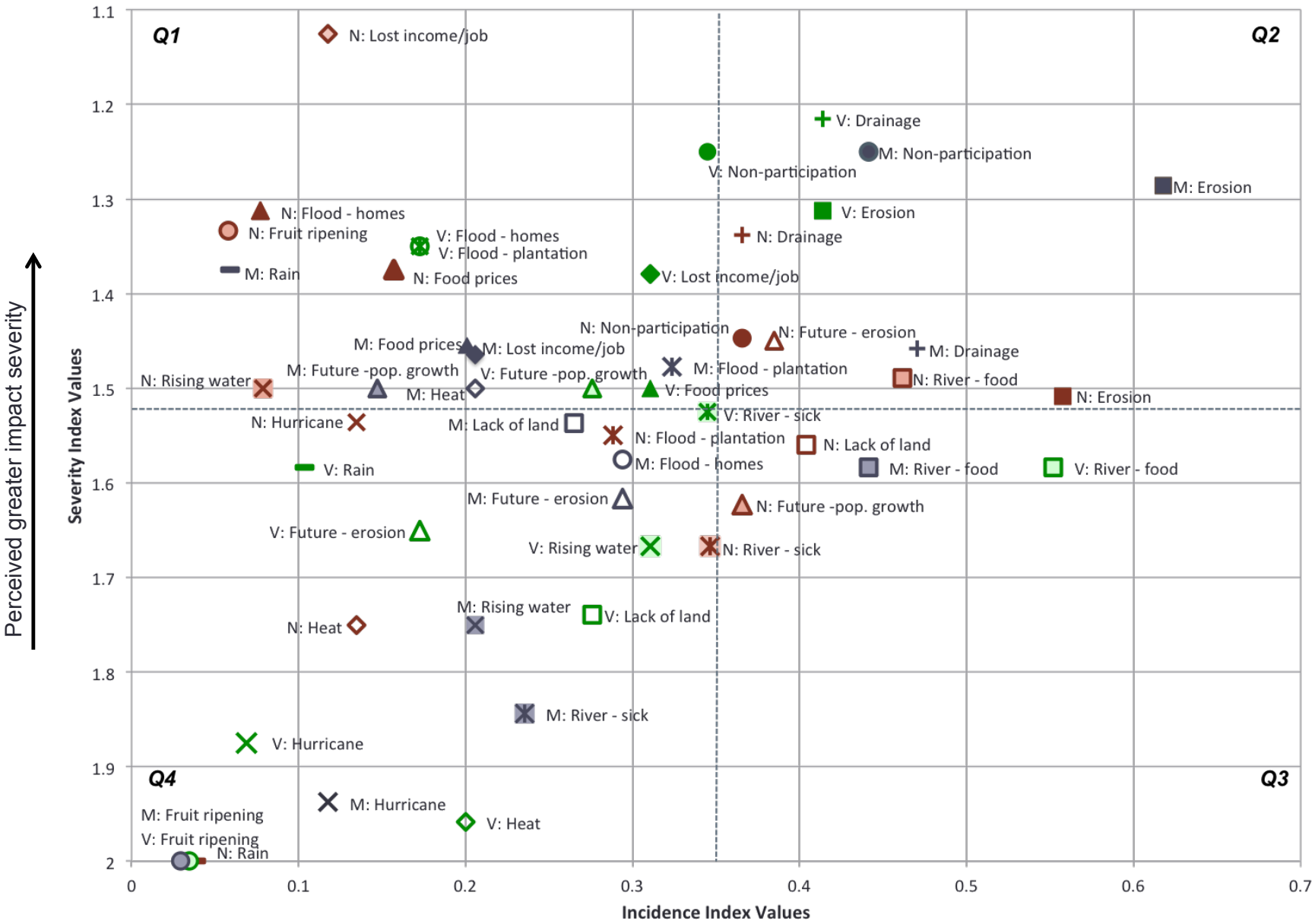

Figure 5.5. Risk Map for Vanua threats, by Village. *This figure displays index values for severity and incidence of the threat items for the household by village. The figure is divided into quadrants (Q1 - Q4). The upper right (Q2) is where items with the highest severity and incidence are located (values closer to 1) indicating those items are perceived has being more threatening than the items in the lower left (Q3) which have lower incidence and are less severe (value of severity index closer to 2). Q4 and Q1 have items that either do no occur as often as other or the severity of impact is less that other that are reported as occurring more frequently. The severity index in on an inverse scale, where 2 is a less severe impact and 1 is a more severe impact.*

Pollution in the Toga River impacting food quality was also prioritised as a frequent and severe threat for the Vanua, and could be considered related to village participation, although upstream users and residents on the other side of the river also dispose of rubbish in the river. Not all rubbish is disposed of in the river on purpose; some is washed into the water during rainfall (Figure 5.6).

Figure 5.6. Rubbish behind a house, falling into Toga River. *Some rubbish is washed into the river during rainfall, however I also witnessed some people throwing carrier bags with diapers and other household waste into the river. Pig pens are also sometimes constructed over the water to carry away the waste. (PHOTO: Shelton 2014)*

In the last three decades, participants reported that the Toga River had been clear most of the time, and is now close to opaque. This is likely due to several changes in the last 15-20 years: the culvert supporting the road off the island, the new Nausori bridge, increased land clearing upstream for commercial crops and changes in dredging practices in the lower reaches of the Rewa River. The culvert has likely contributed the most to changes in flow in the Toga River, as the entrance to the Toga River has shrunk over the last 60 years (Figure 5.7), although the Rewa River has also grown more turbid and shallower as development has increased in the watershed.

One interesting difference to note between the three villages is the prioritisation of the threat of the island being too small in 20 years, either due to population growth or erosion. Navatuyaba rated the threat of erosion higher in the future than Vunisei and Muana, while both Vunisei and Muana both

rated population growth as the larger threat to land availability in the future. All villages rated land availability as a larger threat for the Vanua than for households (including lack of land and threats from population growth and erosion on island size).

Figure 5.7. Aerial shots of Toga. *The top image is an aerial shot from 1947 and the bottom from 2015. Arrows point to the original Nausori Bridge (no longer used in the 2015 image). The circles highlight the changes in the entrance to the Toga River. The road connecting Toga to the main road was built in the 1980s. In the 1947 photo much of this area was under sugarcane production for the Colonial Sugar Refining Company which had a processing mill in Nausori.*
PHOTO: Upper: © Australia National University hdl:1885/49072; Lower: © Google Earth 2015

Comparing Vanua and Household Risk Maps

Figure 5.8 compares average household and Vanua risk perceptions on the same graph (for viewing ease all villages are combined). Differences in severity and incidence index values across scales are interesting, and most of the differences make logical sense. At the household level, rising food prices and losing income are all clustered in Q2, while drainage is also in Q2 for the household. For the Vanua, non-participation, erosion and drainage have severity and incidence index values indicating these are perceived as some of the most impactful and frequent threats.

The grouping of these items in Q2 might be expected; those that are in the upper right hand corner for the household reflect threats that can have immediate and short-term impacts on a household, although these may differ depending on a household's ability to withstand those impacts. The items in Q2 for the Vanua are items which can impact all households in a similar way; non-participation in village activities impacts everyone in the village, issues with drainage that cause flooding impacts those whose homes are flooded, but also anyone who wants to walk through the village as walkways are also flooded.

Erosion is interesting as it is in a similar position at both the household- and Vanua-scale. Erosion was mentioned in a number of interviews as being something people worried about, as well as a current issue the district was attempting to address at the time of my fieldwork. Erosion is also something linked to the 'lack of land' and the two future land availability items (reduced availability due to population growth or erosion). The villages have all grown in terms of population over the last few decades according to participants and Fiji's population has doubled since the 1950s (UNPF 2014). Several interview participants reported concerns for future land availability for their children, and linked those concerns to population growth or erosion, and often to both (see also Section 8.2.4).

An interesting difference is with hurricanes. As discussed above (5.2.1) strong hurricanes are more likely to result in flooding and evacuation for most if not all of Toga, and recovery efforts are often managed at the village or district level. However, although the incidence index value is similar for the household and Vanua, the severity index value indicates that hurricane impacts are perceived as more severe for households than for the Vanua. This could signify that during a hurricane and recovery, efforts in the short-term (e.g. immediate cleanup or food aid) may be sufficient but that in the longer-term (i.e. several months later) households may still feel the impact but perceive that to be an impact on them rather than the Vanua.

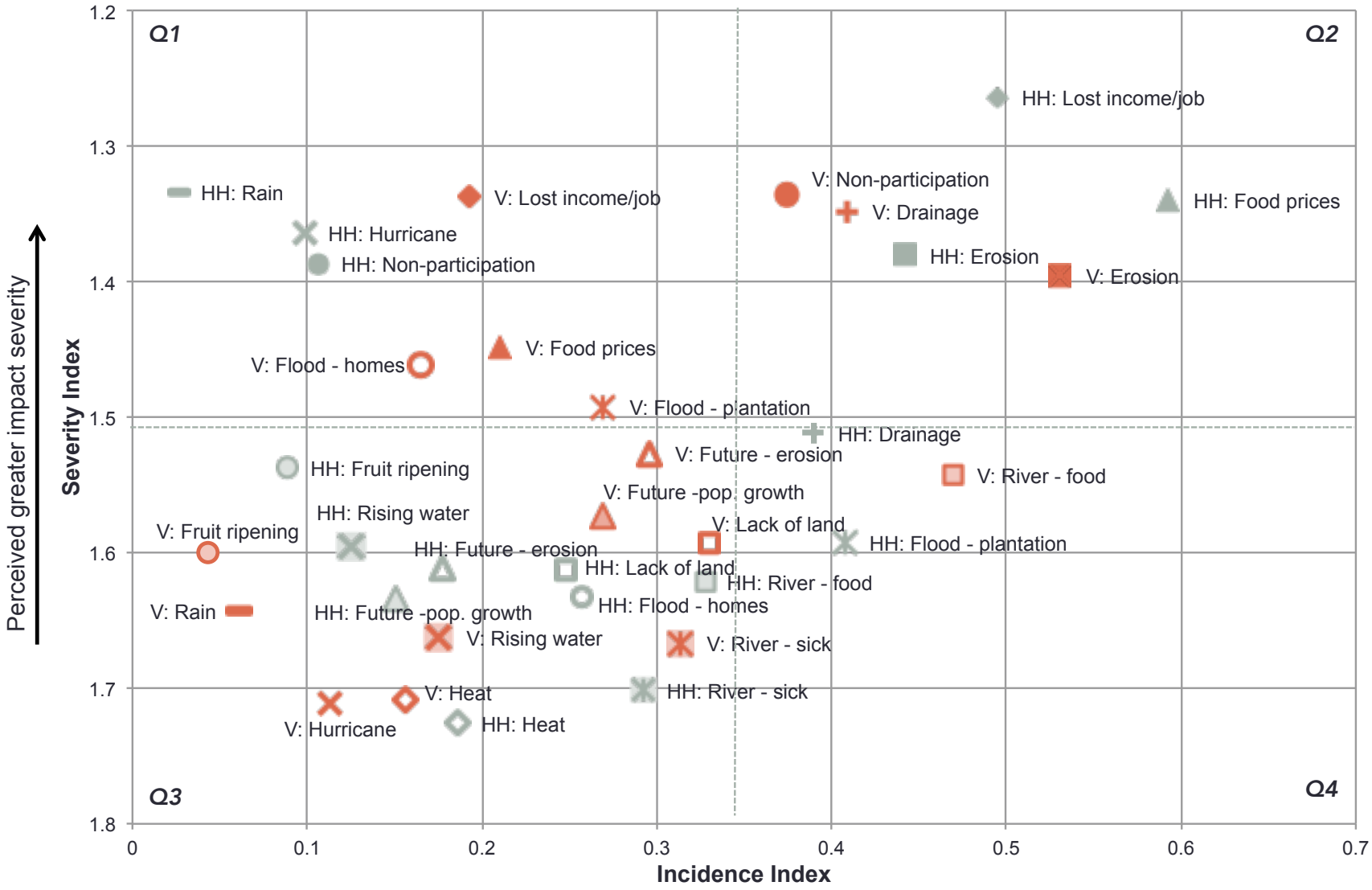

Figure 5.8. Comparing Household and Vanua risk maps for the District. *Household incidence and severity index values are in grey and the orange are those for the Vanua. Orange and (V) indicates threats to the Vanua and grey and (H) are threats to the household. Index values are the mean for all three villages in Toga. The symbols are the same for items at each scale (e.g. a solid triangle for food prices).*

5.3.2. Gendered differences in Risk Perceptions

Household Risk Mapping

When the risk mapping is broken down by gender, there are some interesting differences and similarities. In the household risk maps, the three items clustered in Q2 are food prices, losing income/ job and erosion (Figure 5.9). However drainage had a higher severity index for women than men. Non-participation has very different severity index values for men and women, with the men's index value much higher indicating a perception among questionnaire participants that non-participation has a large negative impact. This could be related to the role men have in attending and speaking up in mataqali and village meetings. Most of the differences in the indices between men and women are in the severity index values, indicating shared perception in the observed occurrence of these events and situations, but different understandings of the impact that they have.

The items that had the biggest difference between men and women were heat and flooding on the plantation, both of which had differences in the severity and incidence index values greater than 0.1. One potential reason for the differences in the index values for heat could be that men are more likely to be outside working on plantations and therefore exposed to high heat, while many of women's traditional activities take place in and around homes, which have varying degrees of heat protection (or exacerbation depending on the house construction). Additionally, traditional women's clothing cover more of the body than men's and formal clothing can also involve an extra layer (potentially of heavy polyester or another non-cooling material), so it could also be that many women experience high heat more frequently and due to that exposure perhaps did not view increased heat as severe a threat as men due to the clothing they wear and time spent near heat sources preparing food.

Familiarity with the plantation and food preparation roles may play a role in the different severity and incidence indices for plantation flooding. Women's severity index values were higher than men's, while men reported observing plantation flooding more often. When there is plantation flooding women prepare the root crop substitutes (such as bread and rice), so it could be that changes in food preparation and time could be why women rate plantation flooding with higher severity. Men are more likely to see low levels of flooding that may not destroy crops but still have an impact on how they work their plantations.

Future limited land availability - both due to erosion and/or population growth - had higher severity index values for women, as did impacts from changing rainfall patterns and hurricanes. Other items rated highly by women were rubbish impacting drainage and pollution in the river making people sick.

This refers to rubbish in the drainage ditches that causes water pooling (and mosquito breeding sites) and also leads to flooding during times of high rainfall. Pollution refers to rubbish and other things that impact water quality, the quality of the Toga River and Rewa Rivers (such as agricultural runoff). Although men, women and children collect shrimp, *kai* and fish from the rivers, it is traditionally a women's activity. For those without access, or at least consistent access to running water, the river is also where laundry and bathing children may take place. During interviews many people reported noticing increases in skin diseases, especially in children. Many children spend a lot of time in the river, playing and cooling off as do some adults. Alluvial floodplains, like Toga, have been found to increase risk of water-borne disease transmission in Fiji (e.g. typhoid; Jenkins et al. 2016)

Another interesting difference is the non-participation index values. Although the index has a low value for both men and women, the severity index value for men were very high and low for women. This indicates that women perceived a lack of participation in village activities less a threat to the household than other threats, such as concerns over future land availability, flooding and erosion.

Vanua Risk Mapping

At the Vanua level, there are again some interesting differences (Figure 5.10). Erosion, food prices, heat and rain demonstrate some interesting differences for both severity and incidence index values between men and women. The women's incidence index for increased food prices was lower than men's, however the severity index was one of the highest reported by women.

Erosion and drainage have similar incidence and severity index values for women, but for men erosion is indicated to be less severe but observed more often. Drainage issues also have a lower severity index value and slightly lower incidence index value for men than women. Another interesting difference is in the 'future - population growth' and 'future - erosion' threats, referring to future land availability in the district based on increased erosion or increased population reducing available land. While the incidence index values are similar for future erosion threats for both men and women, the severity index value is higher for women. The opposite is true for the future–population growth threat; there are higher severity index values and slightly higher incidence index values for men. The incidence index values for the threat due to lack of land for women are slightly higher than for the men, however there is a higher severity index value for the men. As with the household-level risk perceptions discussed above, this could be due to differences in how men and women interact with or perceive the land and land availability.

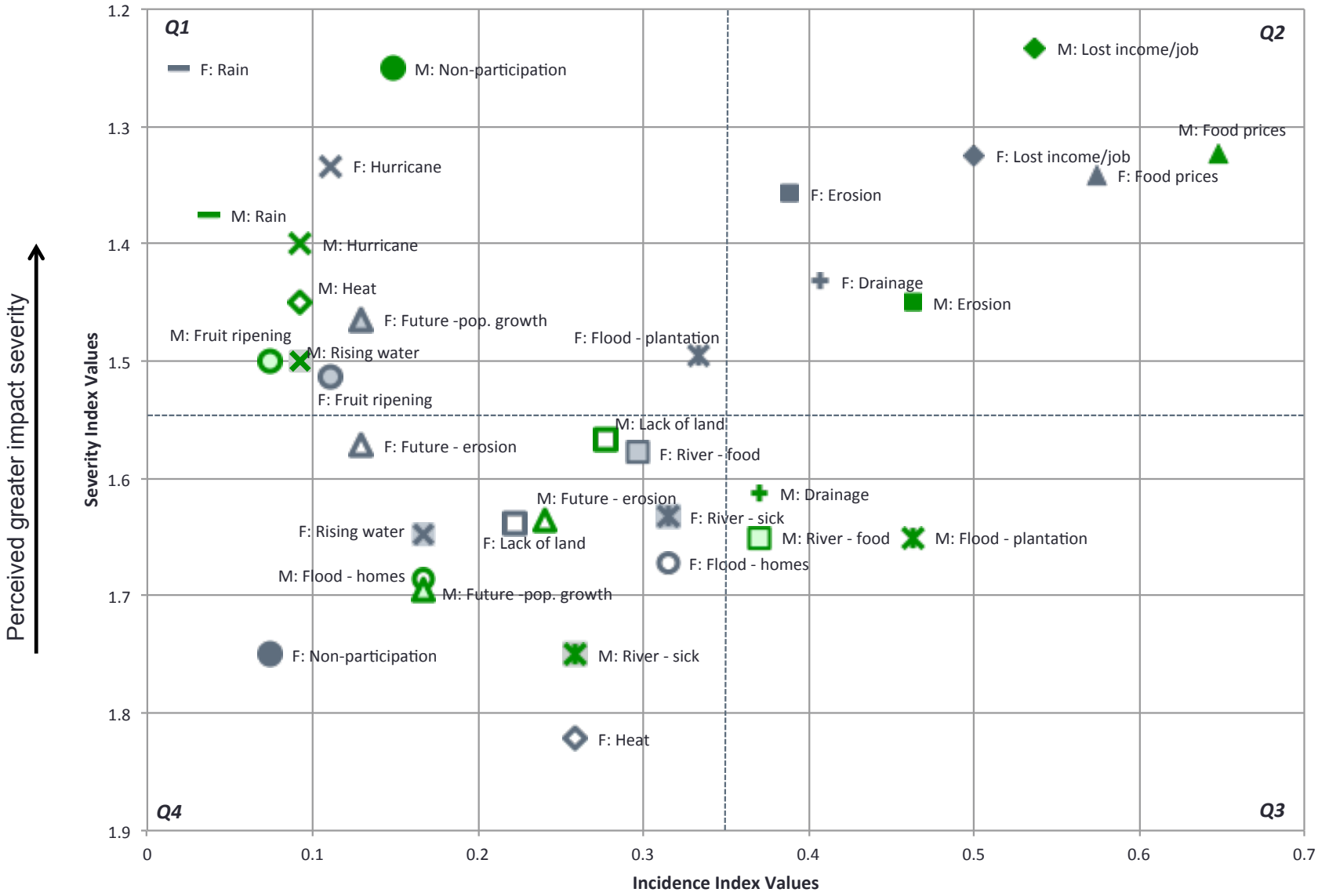

Figure 5.9. Comparing Household Risk Mapping by Gender. *Female incidence and severity index values are in grey and with an (F) and the male (M) are in green. The symbols are the same for items at each scale (e.g. a solid triangle for food prices). Index values are the mean for all three villages in Toga.*

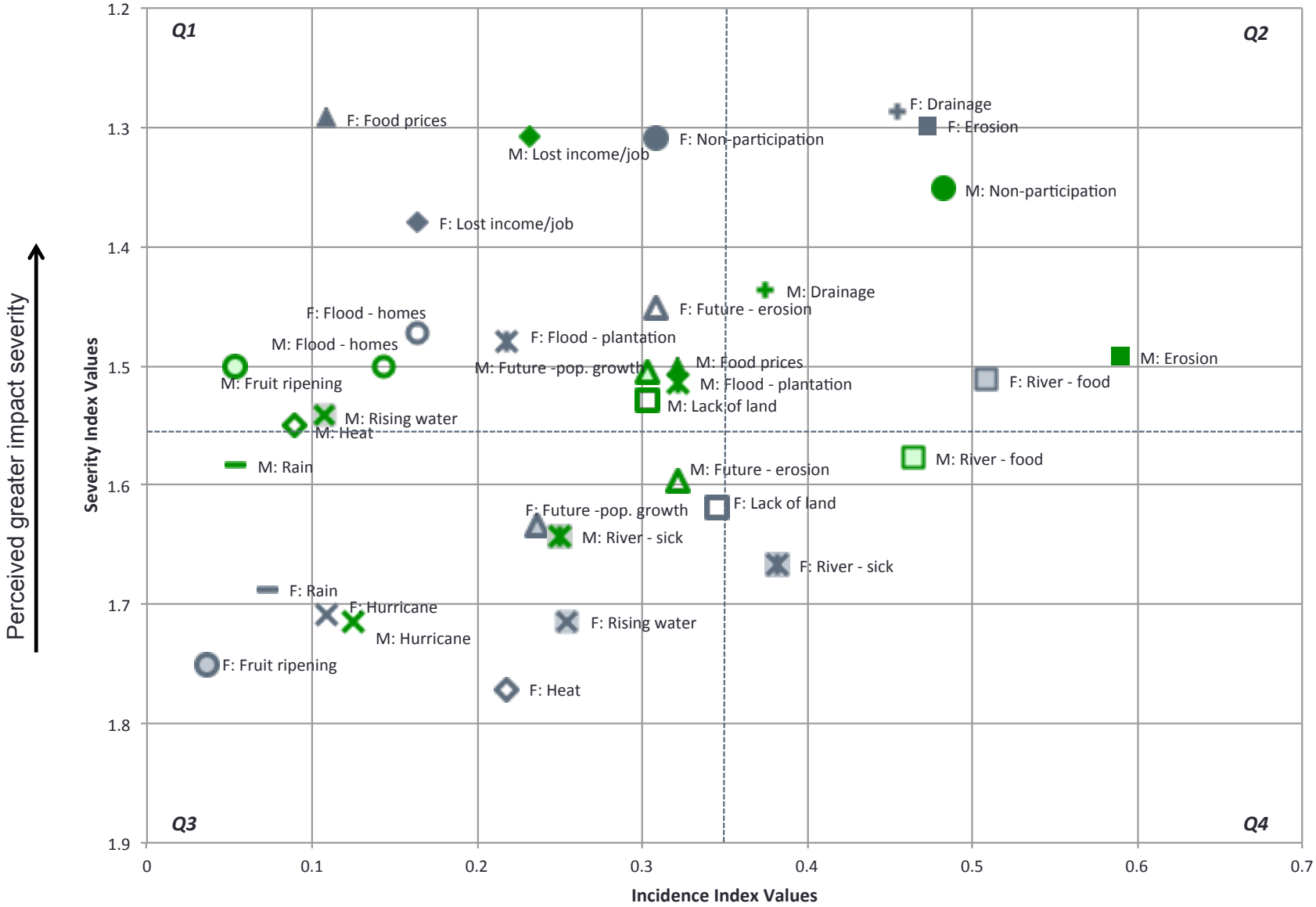

Figure 5.10. Comparing Vanua Risk Mapping by Gender. *Female incidence and severity index values are in grey and with and (F) and the male (M) are in green. The symbols are the same for items at each scale (e.g. a solid triangle for food prices). Index values are the mean for all three villages in Toga.*

Some of these differences may be due to how men and women live in the villages. Women, who collect the food from the river more than men, reported higher severity and incidence index values for pollution in the river impacting the quality of *kai* and shrimp, while men's incidence index value for plantation flooding was higher than women's, as they are more likely to be on the plantation and see more minor levels of flooding there than most women. Again, men's roles working on the plantation also mean they depend on rain for soil moisture, however they also depend upon it to not cause flooding, and men's severity index values for changes in rainfall are higher than women's. However, at the household level (Figure 5.9) the women's severity index value for changes in rainfall is higher than the men's, potentially due to rainfall variability impacts on their daily lives (see Section 5.2.3).

5.3.3. Section Summary

In summary, the severity and incidence indices provide an examination of how people understand the relative impact and frequency of threats at different scales. Interpreting these risk maps provides an understanding of how people understand the impact from and observe the occurrence of different threats. It is important to remember that the severity and reported observation of these different threats on the risk maps is in relation to the other threats, rather than absolute.

In general, at the household level threats perceived as the most serious related to income, food production on plantation land and daily village life. At the Vanua level, threats perceived as most serious related to food production from common property resources, erosion and Vanua functioning. However, many of these threats are interrelated. For example, interview participants described how non-participation in village activities (i.e. cleanups) contributed to a build up of rubbish clogging the drains, which then exacerbated household flooding during high–intensity rainfall events.

5.4. Risk Perceptions, Scale and Adaptive Action

To understand the capacity of households and the Vanua to respond to environmental change we need a better understanding of the subjective elements that influence these responses (e.g. risk perceptions) and how these may vary at different scales (e.g. Adger et al. 2009). This chapter demonstrates how climate variability and environmental change are understood and responded to at the household and the village level. It also begins to introduce the tensions between potential adaptation actions that server the interests of the household (e.g. prioritising income and food production) or the village (e.g. widespread participation in village maintenance activities). During interviews, participants were asked about things that they considered threats or worries for themselves and their households, as well as their mataqali and village. At the household level people repeatedly brought up worrying about their

children and their ability to meet basic household needs, such as food and school fee payments. Issues that people brought up frequently with their mataqali and the village included lack of participation, erosion and flooding (in both homes and on the plantation), as well as concerns about their ability to meet their mataqali, church and village obligations which require time and/or money to prepare and produce (see Section 6.3.2 for more about these obligations). Above I discussed how people are responding to different threats and changes in the biophysical environment, however the biophysical and socio-cultural contexts cannot be discussed without one another in Toga.

Many of the responses to flooding are things that could be done at relatively low cost and at the household level. The actions to address flooding that require village level action, e.g. maintaining drainage ditches, were things that people perceived as currently problematic due to declining participation within the community. The way participants spoke about household level actions, e.g. raising valuables off the ground, raising plantation soil levels, etc., were described as just "how you got on" with all but the most serious kinds of floods. Actions post-flood (especially more severe events) require community-level efforts; organising and distributing food aid, new seedlings and clearing debris and any carcasses are actions that require coordination and assistance at the village or district-level. Actions that can be thought of as more preventative (e.g. maintaining drainage ditches, raising plantation soil level) also require coordination and organisation at the mataqali-, village- or district-scale. The importance of collective action for these community scale and proactive measures demonstrates the importance of collective action for potential adaptation actions. This also demonstrates the tensions between actions that serve the interests of the household versus those that serve the interest of the village and the complex dynamics between these scales.

Actions to address erosion almost always require community level engagement and action, and many require access to resources and institutions outside of the village and the district. In interviews, when asked if people thought there was anything they could do about erosion, most answered that they would speak up in meetings or let their concerns be known to village leaders in other ways. In contrast to how people respond to flood events, most individuals and households have limited control over responses to erosion. Village leaders rely on working with external organisations and institutions to access the financial, technical or material resources to address erosion issues. This difference indicates a potential gap in the capacity of households and the community to adapt and respond to erosion.

Efforts to address erosion rely upon communication from those affected by erosion with the village leaders, and communication between those leaders and government representatives at the provincial level. However, these efforts are only addressing the end result of the erosion, rather than targeting

some of the more remote factors affecting water levels and river flow. Many people within the community recognised that changes in upstream land-use and development, dredging practice in the Rewa River and rainfall variability affect erosion. Although these issues are recognised as potential factors exacerbating erosion (and flooding), there was limited evidence of efforts to address these.

5.5. Conclusion

This chapter explores the way that variability and change are understood and responded to at the household and village level. In general, the most serious threats to the household were related to income, food production on their own plantations and daily village life, while at the Vanua level the most serious threats related to food production from common property resources, erosion and Vanua functioning. The differences in perceived risk at the household and Vanua-scale also reveal interesting tensions between these two scales. Adaptation actions that may benefit the village may also have trade-offs with household adaptations actions. The aspects discussed above are important considerations for planning and executing any community development or climate change adaptation projects. If the entry point for these projects is only at the household or the community scale, the interactions between these two scales may not be considered. The decisions to engage in different kinds of responses to climate variability and environmental change is not based solely on risk perceptions or understandings of why or how these events occur. These responses are nested within existing socio-economic, biophysical and institutional structures, as well as influenced by internal thought processes, feelings, knowledge and values. Therefore, it is necessary to also examine these within the context of the village and culture in which they take place. To do this, the next chapter uses the concept of social capital to explore how collective action and social relationships are understood in Toga and an iTaukei context.

Chapter 6. Shared norms of the Vanua and social capital in adaptation

6.1. Introduction

Response to climate change or environmental change takes place in a social context, so social capital is important for a fuller understanding of how people may and do respond. Actions to respond to climate change may involve collective decisions about resources, as well as actions taken individually and at the household scale. Social capital provides a lens for understanding the relationships that exist within and outside the community. It can also be used to understand how cultural rules and norms shape how social relationships (including power dynamics) are used to manage different resources as well as mobilised to respond to hazardous events.

This chapter explores the generic social capacities that exist within an iTaukei village that enable self-protection and collective action to either avert and/or cope with stressors and hazards using the concept of social capital. This and the following chapter (Chapter 7) address my second research question: "What are the shared norms that characterise the Vanua? What role does social capital and the Vanua play in potential adaptation for households and the village?". Also throughout this and the next chapter, I explore the potential adaptation actions that best serve the interests of the village, or the interests of the households, and how do these compare. Relationships, norms and sanctions are the elements of social capital that are focused upon here while the role of the Vanua in social capital and potential adaptation actions is discussed in Chapter 7. As with any aspect of human behaviour, these occur within a cultural context and include specific rules regarding norms and relationships and expectations about sanctions. What social capital can offer is an understanding of the social rules, norms and relationships that guide current behaviour including responses to shocks and stressors due to environmental variability and change, as well as an understanding about how people mobilise and engage social capital to build a sense of how agency is employed to respond to changes.

The research in this chapter finds that although social capital can be considered "high" in this context, with culturally-based rules and norms and relationships providing a safety net for community members, the strict rules and norms governing exchange behaviour and relationships generally maintain a level of resource distribution in the community, i.e. preventing anyone from falling too far down the poverty line and being hungry or homeless while also placing a potential limit on the amount that people are able to accumulate (or encourage transgressions or secret saving). These relationships provide valuable

support; however maintaining existing norms and rules and relationships limit people's abilities to respond to shocks and changes in the natural environment at the individual or household scale.

As discussed in Section 2.5 cultural schema and models can be used to explain cultural knowledge and behaviour and provide insight into values and understandings of how a system (such as the social fabric of a community) functions. Cultural models are used to identify shared normative and cognitive frameworks that people use to understand social relationships and guide behaviour. In this chapter I use cultural models as a tool to explore how people understand relationships based on kinship or shared identity, as well as village behaviour and respect. When I use the term 'village' in this chapter I am referring to the scale of organisation (see Figure 6.1), as opposed to one of the three villages in Toga. How people engage with these models demonstrates the different ways people use these understandings to access networks and mobilise those to respond to hazards and affect change on a daily and long-term basis.

The research presented in this chapter also finds three cultural models related to social capital and behaviour: 'social relationships', 'being in the village' and 'respect' (Sections 6.3.4, 6.4.2, 6.4.5 respectively). I describe how these cultural models of kinship-based relationships, village behaviour and respect are understood and used in Toga to guide behaviour and exercise agency. These shape the behaviour and experiences of Toga's residents and together are the foundation of the overarching cultural model of the Vanua (discussed in detail in Chapter 7).

This chapter begins with a short discussion of social capital as it is used in this chapter (Section 6.2). Following is a description of the types of social relationships based on kinship, shared identity and exchange that exist in Toga (Section 6.3). Understandings of hierarchy, respect, trust and reciprocity, including the idea of social capital as a public good, free-riding and transgressions are discussed in Section 6.4. These are used to build a cultural models of social relationships within the community, village behaviour and respect and are discussed in relation to collective action in Section 6.5.

6.2. Social Capital

I look at social capital within this chapter in two ways: first by examining different kinds of social capital (i.e bonding, bridging, linking, social norms) and how they play out with specific response actions as identified in the previous chapter; as well as linking an understanding of social capital to potential adaptation actions. I use examples from specific responses to demonstrate the role of these different kinds of social capital in relation to potential adaptation actions. Specific social capacities that are relevant to responding and adapting to a changing climate and environment include the networks

that people access during daily life and exceptional events, as well as the norms that govern behaviour in those relationships, such as sanctions placed on people for not following those norms or adhering to culturally-based expectations of trust and reciprocity.

In this chapter I draw on interview, questionnaire and observational data about the cultural local norms of using the tokatoka, mataqali and village/Vanua and churches. The norms I focus on include *kerekere*, importance and value placed on giving, obligations to the church, family/mataqali and village/Vanua, as well as behavioural sanctions such as gossip, embarrassment and losing face.

6.2.1. Types of Networks: Bridging, Bonding and Linking

Bridging, bonding and linking networks are all present in Toga. Interview and observational data indicate that the most common relationship and networks are bonding, most frequently based on kinship, but there are also some examples of bonding networks based on shared identity (Section 6.3.3). Scale is important when talking about these kinds of relationships. For example, if bonding refers to a network or relationships based on one's perceived in-group, as opposed to bridging relationships with members of groups perceived as being out-group, then one mataqali's relationship to another mataqali within the same Vanua or one iTaukei village's relationship with a non-iTaukei community (an Indo-Fijian village or enclave) could be considered bridging. In this context, people talk about different relationships with different groups based upon their individual position within the hierarchy of those groups, as well as their own group's position within the hierarchy. Within these formal relationships, self-prescribed identity defines the norms of behaviour and communication as well as the expectation of the relationship's format.

The nature of many of the kin-based relationships in Toga are described in Section 4.2. The diagram below (Figure 6.1) demonstrates the social kinship-based hierarchy within the village. Relationships and networks based horizontally on the same level (e.g. within a tokatoka or mataqali) are here considered to be bonding, whereas those that are based between groups at different vertical levels are considered linking relationships due to perceived authority of higher vertical levels (see Section 6.4 for discussion of respect and hierarchy). These linking relationships often follow formal channels, especially publicly, i.e. following formal channels (via the head of the mataqali/tokatoka/relevant social unit in their ability to speak in certain kinds of public fora), however they can also be accessed informally in private (see Section 6.4.3). These linking relationships are also present with external organisations that have authority (e.g. government) or access to resources not present in Toga (e.g. NGOs). People's behaviour often reflects decisions made based on their perceptions of the strength of relationships within and between these groups. For example, some participants described prioritising immediate family needs

and obligations over those of their mataqali, the church, or the village. These are explained in more detail with examples drawn from field data in Section 6.3.2.

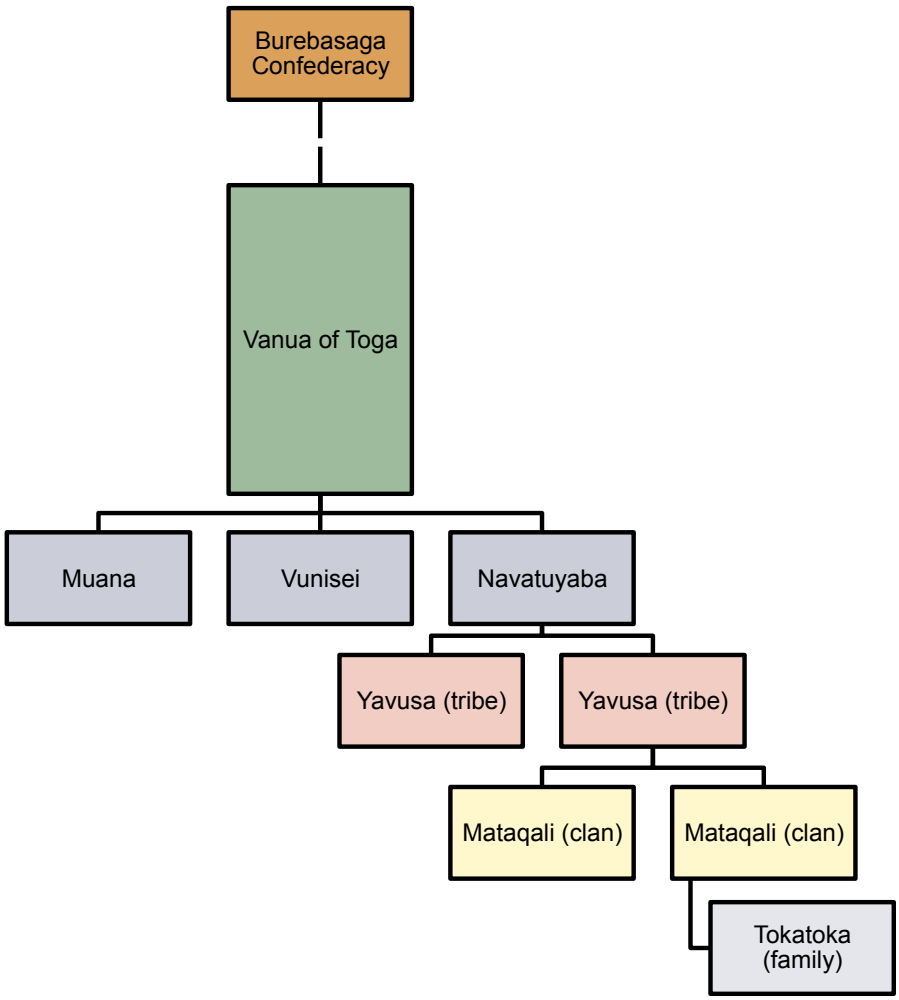

Figure 6.1. Kinship-based iTaukei social hierarchy in Toga. *The village is an organisational level with strong associations with traditional iTuakei governance, and Navatuyaba is the chiefly village in Toga. In Toga the Vanua and the district are the same geographic area, which consists of three villages. There are multiple tokatoka and mataqali that make up the yavusa, and Navatuyaba has two yavusa and at least 10 mataqali (only two are presented here for illustration purposes; see also Figure 4.3).*

6.3. The Village, Mataqali, and Tokatoka: Bridging and Bonding through kinship network

> *"Kinship (veiwekani) is the hub through which social capital transactions take place in an interconnected Fijian society..."* (Nianoca 2011:81)

The data and analysis in this chapter demonstrates that kinship-based relationships are the cornerstone of interactions and social capital in an iTuakei community. Other accounts have also highlighted the importance of kinship-based relationships for community life in iTaukei Fiji (e.g. Nayacakalou 1975; Ravuvu 1983; Toren 1990; Brison 2003; Brison 2007). The horizontal bridging and bonding

relationships of the immediate family, mataqali, yavusa, village and Vanua are social relationships that people draw on in times of need and plenty, making contributions towards other groups in the form of formal and informal exchange (Nainoca 2011). These exchanges involve time and effort (e.g. assisting with building/repairing a home), food and other items of cultural importance (e.g. woven mats) as well as cash. Within each level of the social hierarchy some form of obligatory exchange is common, for example the mataqali requesting mats, food or cash to present at a funeral or wedding as a contribution from that mataqali, or a group of siblings setting up regular cash contributions toward a fund to be used whenever members require support (e.g. school fees or to invest in a member's small business). Navatuyaba also requires adult households to pay an annual contribution to support village activities (a common practices in iTaukei villages; e.g. equipment to maintain village common areas, improvements to the village hall). These kinship-based networks are maintained through these exchanges and can be drawn upon in times of need (Section 6.3.1). However, there are times where the financial or resource requirements to maintain all the exchanges can prevent saving or people feel forced to choose one social grouping over the other (Section 6.3.2). There are also relationships based on shared identity, which can function similarly to kinship relationships (Section 6.3.3). How these relationships are understood and guide behavioural norms is synthesised in the cultural model of 'village social relationships' in Section 6.3.4.

6.3.1. Kinship networks as support

The support that people draw from kinship networks ranges from day-to-day items to larger amounts of food, cash or time that may be requested less frequently. Interview participants overall described the village and their mataqali as a source of support, and the implicit understanding that if they ever needed a roof over their head or were hungry they only had to ask. There were several examples of single incomes supporting upwards of 10 people, and in one case a single income supporting at times more than 20 people. Kinship-based bonding networks (e.g. the tokatoka or mataqali) are frequently the scale at which these exchanges take place. For example, participants reported most frequently borrowing day-to-day items (e.g. sugar, flour) from immediate family members, members of the same mataqali or neighbours. In Navatuyaba, most of the homes are clustered by mataqali so borrowing from neighbours is often, although not always, the same as borrowing from within your mataqali. People also frequently prepare a plate of food and then send it to another family member or neighbour at mealtimes, and I observed this practice numerous times while in the village. People would also frequently come to another's house and ask for small items, such as some eggs, soap or biscuits. This happened with many interviews, with the start delayed while a child was sent to ask for some biscuits or

tea so someone in the household could prepare a drink or snack. While this practice provided an opportunity to build rapport at the start of interviews, it also let me observe the daily household behaviours related to exchange. This frequent exchange of food and other small items was described by several participants as one of the ways in which people demonstrate care and "loving each other". "Loving each other" demonstrated through the sharing of time and possessions and respecting others is a core aspect of behaviour in the village, and taught to children from a very young age (Brison 2007).

Related to this exchange of goods is the iTaukei conceptualisation of possessions. In general the understanding of "ownership" of possessions is more fluid than in most Western contexts. *Kerekere* is one aspect of relative ownership (Nainoca (2011:164); many material goods, such as clothes or household items, circulate between individuals and groups and are considered belonging to many different people (Becker 1995). For example, small items such as clothing or jewellery may be shared and used by different people without asking for consent, and this can also apply to larger and more expensive items. I observed women moving between houses to use electric ovens or charge phones[22]. When I started stay in the village for longer periods of time, my host let me know that they had spread the word to other villagers to not go through and use any of my possessions, as I was not iTaukei and would not understand how things 'worked' in the village.

Related to this understanding of possessions, is the understanding of what makes a wealthy person in the village. Although there was variation in responses, most people described a wealthy person as someone who had a large plantation, was able to grow a lot of food crops, owned many culturally significant items (i.e. mats, whale teeth), and most importantly shared them.

> *" A rich person in this place.... In the Vanua, cannot go other places and ask for something else. [...] Plant his own, and also share with they, what he have with others. If a person have no food, share – give the food to them. That's the Fijian way. In the Fijian culture, you have to share what you have others." Karolina (female, 46-60)*

A wealthy person, as described above, is likely to receive *kerekere* requests; to refuse those requests could result in being scorned and seen as tightfisted or bad spirited (Nainoca 2011). What this practice also ensures is that people can never be completely destitute, as if they ever need food, cash, shelter or other assistance they can *kerekere* to family and mataqali members. There are also instances where people can walk away with possessions at any point in time. For example this occurs among certain family relations such as some cross cousins or an individual whose mother is from the village (Nayacakalou 1978; Nainoca 2011). Humility and generosity are vital for the *kerekere* process; these

22. While I observed this in several homes, one of the homes had a glitch with their electricity meter so had not been charged for electricity for several months, and many others would come and use the electricity to charge things like phones.

values have strong connections to behavioural norms within the village. *Kerekere* is an embodiment of these iTaukei values, as well as strengthening kinship ties and social capital (Nainoca 2011:108).

Multiple ethnographies have documented the practice of *kerekere* and other kinship-based relationships that provide important support networks (e.g. Deane 1921; Roth 1973; Nayacakalou 1978). These relationships and support networks are referred to by some individuals as 'the village' in general. Multiple participants talked about the village acting as a backup they could rely on in situations where they or any family member went to a city or abroad for work and something happened. Many of the responses to environmental change events in the previous chapter are related and due to the support provided in kinship relationships. After a storm or flooding on a plantation, the sharing of food, clothing and shelter (if needed) is done without asking, as well as sharing seedlings or providing other assistance in replanting and recovering a plantation or home if damaged.

6.3.2. Kinship networks as obligation

As described above, the village and the kinship networks within provide an important safety net in terms of support. However, the exchange behaviours and expectations in these relationships can impact a household's ability to provide for their own as they are required to provide time, food or other resources for others if needed. Although the village provides an important backup support network for people moving from the rural to the urban areas, people returning to the village on a short-term basis can impact household ability to provide for all members.

> *"The thing I wish I could change the most, would be income for my family. Because they are between 18 and 23 people who stay with us, it is not enough income. There are mainly 18 people that stay here, but there is another 5 that come sometimes and sometimes they stay in town. But sometimes when that happens there's not much food. And when they can't find work, or they need help, then they come back here to the village." Timi (male, 18-25)*

It was not uncommon in this context to have a single income supporting a large household. However, as described in the quote above, the use of the village as a safety net can have consequences for those remaining in the village when people return. There is potential to share the impact of a sudden increase in household size, such as described by Timi, via practices like *kerekere* so that the burden to care for extra household members is spread among other households or groups (e.g. *kerekere* to other mataqali or church member households).

Frequent exchanges of goods and time are seen as part of the daily social fabric. Based on observation and informal conversation, this level of day-to-day exchange of small household items appeared to operate in two different ways: exchanges based on expectations of reciprocity (balanced reciprocity),

and exchanges where one party felt that they did not receive an in-kind exchange over time even though it was expected in that behaviour. When asked about the exchanges, some participants described them as things that they did most of the time, and would receive something equal in return at some point in the future but were unconcerned with when or what it would be. They were cases where I was told that participants provided food for others, but did not receive any return (generalised reciprocity). Attitudes to this seem to vary, ranging from one interview participant who felt it a point of pride that she never asked to borrow while others came to her, while other participants described planting extra food as they knew some would be stolen. In the case of the participants who planted extra, they said there were members of the mataqali who either through laziness or need did not have food for their families. One interview participant, Litia (female, 46-60) described how some people asked her and her family for food, but others would come and steal from the plantation instead:

> *"That's why my husband told me plant more, some extra. So they that need some can take. Some people they come and ask, 'Can I have some?' 'Oh yeah, go take'. But some no, once you go out there you see, oh no - some minutes ago someone pull plenty cassava" Litia (female, 46-60)*

Although she planted extra food, knowing that people would *kerekere* or steal it, the way she and others referred to 'helping' others via the provision of food or other goods was also sometimes discussed as an obligation:

> *"Because most of the people and our mataqali are working, so they can help the other people. Mostly the ones that are stealing are staying home, they are not working. Those were working have got their own plantation. Already working hard. I think they going to help [...] cause we a family." Litia (female, 46-60)*

These obligations can also be more formal. In the case of funerals, weddings or other events, a mataqali (or village or Vanua depending on the event) will provide food and other items of cultural significance (e.g. woven mats). The mataqali (or relevant group) will then require each household (or relevant subgroup) to contribute specific items. These exchanges were often described as "obligations" by interview participants, and used in the context of their mataqali, the village or their church. During numerous conversations with participants, the financial and emotional toll of these obligations was revealed. For example, one participant, Tomaci (male 46–60), described how he says no to some of the mataqali, village and church commitments. Tomaci described finding it very difficult because saying no to these commitments was not "the Fijian way". However, he said no to these commitments so that he could provide support and food for some of his adult children and their children. He recognised that this represented a cultural shift; he remembered in the past that the mataqali came first, and if the mataqali told you to do something you had to do it and made sure you fulfilled your obligations. He said he was not the only one doing this, a growing number of families are putting the immediate family

first and mataqali and communal values second. Despite refusing some requests, Tomaci stressed that he and his household still provided food for some village functions as well as the annual contribution that Toga makes to the Chief of the Burebasaga Confederacy.

Another participant, Elina (female 36–45), described the difficulty she had balancing different needs. When Elina's mataqali asked her to provide mats, she did not have the time to harvest, dry and weave the pandanus into mats. She still had to provide a mat and therefore had to pay cash, which meant she needed to spend more time in the market selling produce or divert cash from school fees or church contributions. Similar conflicts were experienced by others:

> *"Because money is only available when you are employed, your family, clan and church can't meet the needs and expectations of the Vanua and the church." Josua (male, 46-60)*

As cash is required for food, transportation or school fees, people in Navatuyaba described spending more time in cash-earning activities than in previous generations. This also means that when people become unemployed, they may have difficulty in meeting their obligations and therefore their mataqali or village may not be able to meet the expectations of the Vanua. There are other groups that can step in at these times (such as other villages and also church groups; see Section 6.3.3), however no participant mentioned what would happen if the members of a Vanua were no longer able to support the Vanua.

Choosing between Mataqali, Church and Immediate Family

Questionnaire participants were asked about choices they had to make over the last three years between household expenses, savings, and their ability to fulfil their obligations to their mataqali, village or the church. Although most participants indicated that there have been times where they had been able to fulfil their mataqali and church obligations with no problems, many had also struggled or had to make choices about financial resources over the three-year period (Figure 6.2). Only 13% of participating households said they had no problem being able to fulfil all obligations without any problems over the three years (17 households; 2 in Muana, 3 in Vunisei and 12 in Navatuyaba). Conversely, 21% of respondent households indicated they had never been able to fulfil all mataqali obligations and give to the church without a problem (27 households; 10 each in Muana and Vunisei and 7 in Navatuyaba). Overall, 43% of households reported being unable to save money because of mataqali requests, even if they had also at some point in the last 3 years been able to fulfil obligations with no problem. Not being able to save money to use on smaller repairs or purchases was reported by 87% of households at least one point over the previous three years, indicating that these obligations can act as a preventative mechanism for individual and household savings.

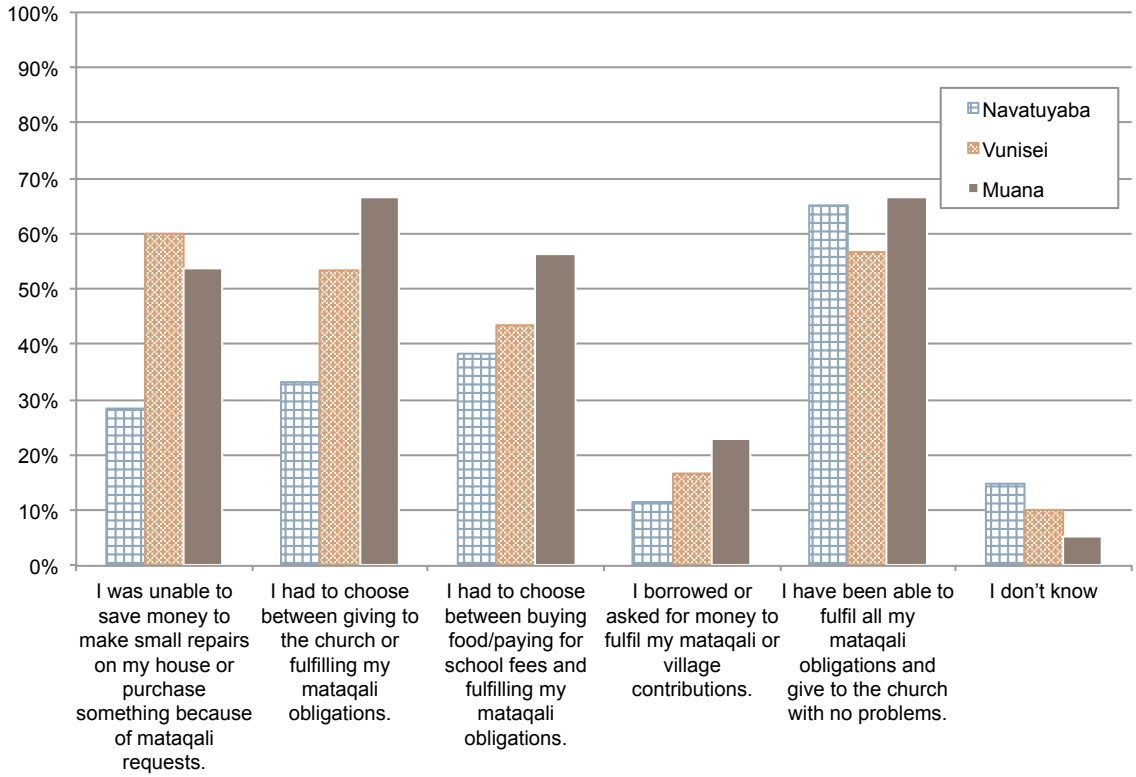

Figure 6.2. Percent of Households per Village that had to choose between household expenses and mataqali, village, church and other obligations in the last 3 years. *(Muana n=39; Vunisei n=30; Navatuyaba n=60)*

These results demonstrate that people's ability to save and meet obligations to the church, their mataqali, food/household payments, and school fees varies over time. Interview participants indicated that sometimes they did not worry very much about money but other times, for example in January when school fees are due, they would worry a lot. Additionally, weddings and funerals can happen at any time, in addition to village obligations in terms of food, mats, kava and other items of cultural importance, which require financial or other resources to acquire or produce. These costs can vary significantly depending on the relationship of the wedding or funeral participants to the mataqali, village or Vanua.

In addition to these kinds of obligatory requests preventing the buildup of savings, social norms around refusing a *kerekere* request can also have consequences for the accumulation of cash or high-value items. Several interview participants mentioned that they, or very close family members, had managed to save a relatively significant amount of money. They had only been able to do so because they had kept it secret, to both avoid *kerekere* requests as well as gossip or being perceived as tightfisted or bad spirited. This same dynamic can also play out with material goods, which can be more difficult to keep secret. There was one instance described to me about a woman in Suva who wanted to buy a

washing machine for her mother who lived in her village. The woman's mother was getting older and washing laundry by hand was becoming more difficult. The woman's mother refused the offer, saying that although it would make her life easier it would also mean that many other women in that village would come and use the washing machine. The woman's mother was concerned that this would lead to higher electricity costs, potentially shorten the lifespan of the washing machine, and increase the number of people hanging around the house using it. This story reveals some of the tensions that people face and how they may choose to navigate thinking about expensive modern goods and social norms related to *kerekere*, ownership and sharing.

6.3.3. Shared Identity Networks

There are other groups within the village not strictly based on kinship that people rely on for support and may request contributions from members. The support from these groups also contributes toward the wellbeing of the Vanua, and they include the churches, as well as church subgroups and groups within the village (for example, a women's group or youth group within a church, or a village youth group and village women's group). Membership in many churches often follows mataqali lines, which makes these groups also kinship-based, however church membership is not defined by mataqali and there can be multiple mataqali represented in different faiths. These groups have different functions and often carry out different kinds of volunteer or charity work. For example, there is a group within Navatuyaba's Methodist Church that prepares meals, brings food and spends time with housebound elderly residents. The Navatuyaba village youth group in the past has organised homework assistance sessions to discourage truancy in younger children. The same group at times will also engage in fund-raising activities that may have other benefits. The Fijian government has mandated that households dig pits for disposing rubbish, and the youth group has offered to dig the pits for a small fee. These groups also serve an additional benefit, especially for women or youth. Such groups each have a representative able to speak at village or district meetings, meaning that although participation in public spaces and meetings is determined by age and gender, the youth or women are still able to speak. Participating in these groups based on shared identity can offer outlets for expressing opinions that may not be possible in their mataqali or village.

Contributions towards these group often happens in a similar fashion to tithing in the church or mataqali contributions, in that it occurs in a public or shared space. Reporting back to the wider group the household, individual, or overall total contributions reinforces the norms of generosity due to the potential for shaming if expectations are not met. Although these norms can encourage absenteeism or shame for people unable to contribute, these norms can also provide a sense of solidarity. Ana (female,

61+), described in an interview how a group of seven older women had gathered together to encourage each other to save money, and each contributed 1 FJD per day, and at the end of the week put 7 FJD together. At the end of the year, they split the total amount saved between themselves. According to Ana the need to contribute in front of peers made saving more likely. Although in this case a group of individuals were able to save some money over a year, the total amount of set aside cash was a fraction of what larger families spent on school fees and purchased items such as kerosene, flour or tinned food in a month.

These relationships can be described as bridging or bonding networks, forming part of the social capital of the village; the difference is dependent on the scale. As shown here, kinship is at the heart of these relationships.

6.3.4. A cultural model of social relationships

This subsection summaries the kinds of social relationships and expectations within the village as the cultural model of 'village social relationships'. Social relationships in the village are often conceptualised in terms of kinship or exchange relationships, and this is a core part of the cultural model of 'village social relationships'. People understand behavioural expectations based on the nature of relationships they have with others. Even if people feel that exchanges are unequal or taken advantage of, they frequently behave in ways that meet expectations of what it means to give or receive, so that they can demonstrate they are taking part in those exchanges, even if it means engaging in a behaviour or providing goods, services or materials that they may not want to. There are examples where people go against these expectations, and they do so with full awareness of potential consequences.

These consequences are not only related to status or reputation: as demonstrated above there is also an emotional toll as people are very aware of what they "should" be doing. The phrase "loving each other" was mentioned very frequently in the interviews, as people used it to describe meeting the expectations of these different kinship and shared identity relationships and the implied exchange of goods, time and resources. Below is Elina's (female, 36-45) response to question about challenges and difficulties within her mataqali. She used the phrase "love one another" to describe how disagreement can be resolved, as well as patience for and respecting the expectations of social relationships.

> *"E: I just hope we have to love one another... Because sometimes we have a disagreement like that, some people don't have money, some people have money. Some function come across, some people can support it and some people cannot. And the disagreement there.*
>
> *Q: So that is a challenge?*

E: Yeah... difficulty... But just... love one another cause function will come again." Elina (female, 36-45)

This cultural model is based entirely on relationships of kinship and shared identity, with relationships that can be considered bonding or bridging. There is a general sense within the model of 'village social relationships' that communal activities "should" take precedence over individual ones, however upon closer inspection there is a hierarchy of relationships based upon kinship whereby people prioritise relationships closer to them rather than those a step or more removed. The immediate family at times can take precedence over the mataqali or the church, and people may make a choice between providing resources or time to these groups and the village. In general, this model is about the expectations of giving (and receiving) time, food, cash or other resources based on the nature of the social relationship. People understand what these expectations are and constantly make choices about whether to behave in a way to meet expectations or not.

6.4. Respect and Reciprocity in behavioural norms

The networks described above based on kinship or shared identity are nested within culturally based understandings of hierarchy frequently discussed by interview and questionnaire participants in terms of respect and reciprocity. Examining how people discuss respect and responsibility when talking about leaders and the mataqali, as well as their own roles in the social structure reveal how trust and reciprocity are enacted to form the basis and reinforce understandings of village and Vanua level hierarchy, as well as the concept of the Vanua itself. In this section I demonstrate that how respect and reciprocity are understood is important for how people interact with social networks and access social capital. The social hierarchy in the village provides a structure for these norms and expectations, much as kinship provided the structure for exchange networks in the previous section. I describes how "the village" is a place where certain behavioural norms are expected, and how many of these norms are related to and embody concepts of respect and reciprocity (Section 6.4.1), culminating in the cultural model of 'being in the village' (Section 6.4.2). Expectations of reciprocity, especially with leaders and within the social hierarchy are discussed in Section 6.4.3, while transgressions, free riding and other contradictions between what people say and what they do in terms of "village" behaviour are described in Section 6.4.4. The final subsection describes the cultural model of 'respect' (Section 6.4.5).

6.4.1. Respect: How to behave in the village

"For the village lifestyle, it is important that we respect one another." Solomoni (male, 46-60)

This subsection discusses the "village" as a physical place but also something that implies certain behavioural norms. Expectations people have about behaviour within the village follow more traditional norms and rules than would be expected of people in a city or urban setting in Fiji, and this subsection describes these rules and how they can be considered a behavioural representation of the iTaukei idea of respect. Rules related to the way people dress, how and whom they speak to, and how they move around were often talked about as being important behaviours for people to do while they were in the village, but they could be more lax with these behaviours if they were in town or a city. I observed people arriving in the village via bus, or getting out of cars, and putting on an extra T-shirt (if it was a woman who had her shoulders exposed) or a sulu over shorts (both men and women). Many interview participants said that some rules, especially those around appropriate clothing, did not have to be followed as strictly in town, but people would be told to cover up in the village. These rules applied to being in any iTaukei village. Many of the older residents I talked to also mentioned telling younger people to put on appropriate clothing when in the village.

Other elements of village behaviour include moving aside when older people coming down the pathway, avoiding eye contact or overly familiar behaviour with people in groups that are either higher in the hierarchy or that are respected. Respect for the top of the head, exhibited by not wearing a hat, covering the head, or touching someone else's head are also important elements of village behaviour. The category of behaviour associated with being "in the village" means that when people come to the village there is a set of rules they (should) ascribe to in order to behave respectfully. These rules were described by interview participants and are similar to what other researchers have observed and experienced (e.g. Biturogoiwasa 2001; Brison 2007).

Belonging

I observed similar behaviours embodying 'respect' exhibited at different scales within the Navatuyaba's village hierarchy. For example, speaking up in certain public fora is only permitted by certain individuals. These individuals are often the leaders of the subgroups making up that meeting, e.g. the leaders of the mataqali speaking up in a Vanua meeting while non-leaders listen and potentially feedback to their mataqali leader afterward (in private). Interview participants described how this also operates in a similar way the mataqali level. Mataqali are patrilineal and have strong associations with a certain place (i.e. a village or Vanua). At mataqali meetings decisions are made about land distribution, contributions for weddings and funerals, and other matters. Depending on the mataqali, this process may or may not be openly deliberative or participatory. Some of these decisions are very important, but the behavioural norms around speaking up and gender, social hierarchy, and whether someone

"belongs" are reinforced by gossip or looks, or the perception that these (may) occur. This concern was voiced to me more frequently by women married into and living with their husbands' mataqali. The following exchange with Litia (female, 46-60) was typical of conversations I had with other women who married into the Navatuyaba:

> *"Q: Do you talk in village meetings?*
>
> *L: No!*
>
> *Q: Is that because you are not from here or because you don't want to?*
>
> *L: No, I just feel ashamed of saying something... I just heard them talking. I just listening to everybody talking. And [...] if I suggest something, they'll ignore it. I just listen to them, what they meeting about.*
>
> *Q: If you were living in your old village, would it be different?*
>
> *L: Yeah! I will talk. If something wrong I will tell it so, straightaway.*
>
> *Q: Ok, so it is because this isn't your village?*
>
> *L: Yeah, I got... cause it's my village, my mataqali I talk straight. But here... Here just listen.*
>
> *Q: Even if you live here for 40 years, it's never your village?*
>
> *L: [laughter] Its my village now! But I can't... I'm not used to... I can't talk like I, I ashamed to. I just listen." Litia (female, 46-60)*

The sense of embarrassment at speaking up seemed to diminish as people got older; elderly people are more respected and seen to have more of a right to speak publicly (i.e. starting at 50 or 60 years of age). The hesitation to speak up in the village of mataqali meeting could potentially have consequences for access to land and resources, as plantation land access is determined within the mataqali.

Participation

Another important aspect of how to respect the village is participation. Participation is understood to mean being present, even if there are no other interactions (e.g. attending a village meal and chatting with those serving but not assisting with the serving or cleaning up). However, it can also refer to speaking up in an appropriate context, participating in village cleanups and other group activities.

> *"We should participate communally as we all belong to a village." Ela (female, 36-45)*

The idea of participating communally, meaning participation in communal village activities, is also an important part of the ideal village behaviour. Participating in these communal activities not only benefits individuals, for example having cleaner and easier walkway access, it also benefits the village as a whole which then reflects positively on all members of that village. These norms also contribute to

collective action and social capital, as they reinforce ideas of working collectively to benefit a common goal (e.g. cleaner walkways making it easier to move around the village).

> *"It is important that we participate in the village meetings so that we know what is expected of us to be doing and not be saying too much if we do not partake in the activities that the village dishes out." Talicia (female, 18-25)*

Many people notice and keep track of who does and does not participate in these communal activities. Participation also imbues the right to comment on village matters by those who do participate; participation is another division between an in-group and out-group, conveying certain rights or privileges (e.g. the right to comment on village matters, in a culturally appropriate context such as one's home or mataqali). Participation in these activities is a way to assert one's membership in the village community, as well as accrue social capital by demonstrating that you are willing to share your time and effort with others and the community as a whole.

6.4.2. A cultural model of 'being in the village'

> *"Since we are staying within the village, it is important that we follow the rules of the village, thus, we can then protect all the features around us." Jarryd (male, 46-60)*

The village here is a place that people are from, that they are in and therefore following the rules. Especially those rules concerning communal physical and social resources which result in the protection of those resources and enable the functioning of the village as a community. Within the model of 'being in the village' are important expectations about the idea of reciprocity in terms of sharing and giving.

> *" A lot of the people are so proud that they are earning more than others that they neglect the activities that require their effort in them. But since they are staying within the village boundaries, it is their duty to be more dutiful to the activities in the village." Elisheva (female, 26-35)*

Although this quote seems to imply a sense of jealousy, this individual and others that discuss these issues seem to allude more toward frustration with people not following expectations of giving resources and time within the village, rather than jealousy that some people may have more.

Physically being within the village comes with expectations about behaviour within the place. These expectations centre around behaviours that demonstrate respect (as described here and related to reciprocity as understood in the iTaukei context, see Section 6.4.3 below) and contribute to the communal functioning of the village as a whole, rather than behaviours that are perceived to benefit an individual. This cultural model ensures that those in the physical space of the village understand behavioural expectations governing themselves and social relationships.

6.4.3. Reciprocity

All of the behaviours and rules described above are described as ways that people demonstrate their respect, or sometimes described as just "respect". However, embedded in the understanding of respect is an expectation of reciprocity:

> *"When we respect those in charge, we will automatically respect other people and the things around us as well." Viliame (male, 46-60)*
>
> *"When you respect your leaders and the elders, you can take care of everything because you have been taught that the leaders are your lord here on earth." Luisa (female, 36-45)*
>
> *"Respect of leaders is important because when you respect the leaders, good things happen to your families." Talicia (female, 26-35)*

Respecting leaders and the social hierarchy is an integral part of village behaviour, and cannot be easily separated from the kinds of behaviours that demonstrate respect for other aspects of the social and physical environment. Respecting leaders in the social hierarchy also includes reciprocity: if your behaviour is respectful, elements of the physical and social environment will in turn provide benefits for you and your family.

Navigating linking networks and power asymmetries

A brief glance at how some people discuss leadership and the rules around who is/is not allowed to speak in public spaces could lead to an initial assumption that concepts of respect and reciprocity flow unidirectionally from the top down. When asked about appropriate village behaviour, and what people can do to make the Vanua and the village a good place, listening and obeying leaders is frequently one of the first things mentioned:

> *"It is a law in the village to respect the elders so that no one is out of line when it comes to their superiors." Laisa (female, 18-25*)
>
> *"Elders should be respected because they know the solution to our problem and looking after our resources." (Gender not indicated, 36-45)*

This opens consideration about how people within the village discuss responsibility and reciprocity in terms of village and Vanua leadership. Although people mention more or less doing what they are told by leader or elder and it is one of the things that "a good kai viti does[23]", people also discuss the responsibility of the leader in terms of time, effort and care for those lower in the social hierarchy.In a quick canvas of opinion, such as when I first arrived in the village and in early interviews and informal conversations, people provided responses fitting with expectations of village behaviour. This can result

23. *kai viti* mean an indigenous Fijian person.

in assuming people do not question or challenge leaders on their decisions. However, when leaders do not behave according to the social norms — that is they make decisions that people feel have negative impacts on communal resources, they do not participate or provide enough for events (e.g. attending and giving at funerals), or do not attend and participate in village and Vanua meetings - interview participants described how people notice, discuss and can lose trust in their leaders.

Frustrations with leadership can also lead to a sense of helplessness. Members of several mataqali mentioned in interviews being concerned about issues within their own mataqali relating to leadership and how decisions are made.

> *"I think one of the [...], the challenges [for our mataqali] is the changing leadership of our mataqali. Cause different people have different perspectives, so what we are afraid of is that, when there is a change, when our chiefs or our turaga ni mataqali [head of the mataqali] dies then there is change, in what decision they can make. It will be best for us...or it will change. [...] But when, when this head of mataqali, like when someone is head of mataqali and he wants to have a big share of the land. And then the others get what is left over." Elena (female, 18-25)*

Although in the above example, the young woman felt limited in what she could do about issues related to land distribution in her mataqali, discussions with members of different mataqali shed more light on potential fluidity in choosing leaders. If an eldest son had moved out of country or far away from the village, then a cousin, uncle or other family member could be proposed as the new mataqali leader. In the situations described to me, there is a negotiation and discussion process when this happens within the mataqali prior to confirming leadership. Similar situations can also arise at the village or Vanua level. Although no one mentioned the possibility of ousting a leader while they were in power, how well people perceived the previous leader's contribution toward the community could influence discussions and negotiations in choosing the next leader.

Decline in trust does not necessarily discourage people from looking after social and physical resources.

> *"We should look after the resources because our leaders and elders will benefit from it even though most of them don't care about the people" Sera (female, 26-35)*
>
> *"We should look after the river and the Vanua because they are our source of income, these things most of the leaders aren't careful with." Saviera (female, 36-45)*

For example, the chief would be the one to institute a moratorium on harvesting *kai*. Even if there is a level of disillusionment or lack of trust in leadership, the placing of a *tabu* on a shared resource like *kai* is a cultural tradition that people trust and therefore follow. Additionally, these physical resources are part of the Vanua, and therefore part of everyone's identity and their care and sustainability reflects upon all members of the Vanua.

The association between respect, culture and traditional practices, and physical resources, was made by many research participants. The questionnaire participant below describes how he sees that there has been a decline in respect, and associates that with the idea that iTaukei culture is disappearing and resources are not being cared for.

> *"Nowadays there's no respect, our culture is slowly disappearing and we don't look after the resources." Jope (male, 61+)*

This comment echoes a sentiment I heard many times in interviews and demonstrates the interconnected nature of respect for cultural practices and associated responsibility for caring for resources, with the implication that you cannot have one without the other. Declining respect means that resources cannot be properly looked after for future generations.

Although widespread, these concerns were not fully shared and many interview and questionnaire participants reported being content with and trusting leaders.

> *"Leaders are very important, they are chosen because they have good leadership skills for the Vanua and manage the resource around us well." Joseva (male, 18-25)*

It could be that the people who expressed concerns to me had stronger opinions or specific experiences, or it could be that some of those individuals felt more comfortable discussing "internal" issues, and some were people I talked to in depth several times. Understanding these views in terms of disillusionment or mistrust in leadership is important for thinking about social capital in this context. Making assumptions that people are content to listen and follow leaders can place higher levels of social capital in the hands of these leaders. However, while people may be publicly observing behavioural norms around following leaders, they may be engaging in private efforts to address issues that they feel leaders are not addressing. These efforts (illustrated with examples in the next paragraph) rely on building or maintaining relationships and exercising agency while also observing behavioural norms, which demonstrates that people are drawing on social relationships to proactively respond to changes or issues.

Assuming a more passive top-down system at the village level also does not take into account the importance of trust and reciprocity in "respectful" behaviour. There is a hierarchy of trust and reciprocity, with the Vanua as a whole at the apex of this hierarchy. While leaders and the social hierarchy are very important components of the Vanua (further discussed in Chapter 7), when people feel that there is an issue within the Vanua and leaders are not addressing it they can also work to address it themselves by influencing decisions or finding ways to express their views while conforming to behavioural norms. Although leaders do make final decisions on many issues, those lower in the

hierarchy are not passive participants and influence decisions without resorting to unacceptable public confrontations (thus conforming to expected behavioural norms). Such people will approach leaders in private, ask others to speak on their behalf, or even work slowly behind the scenes to try and effect change. For example, an interview participant described how a group of young men wanted to modify Navatuyaba's governance structure; they found the previous structure placed too much burden on the village headman and did not accomplish what it had the potential to accomplish. However, these men were all in their early 20s and could not publicly propose a change. They quietly introduced their ideas to leaders of different levels within Navatuyaba's hierarchy, and worked with those leaders to create a proposal that the leaders made to the chief and the village after three years of discussion and negotiation. These proposals were then accepted and were beginning to be implemented during my fieldwork. There are also examples of women who had married into the mataqali and were not the comfortable speaking in mataqali meetings, who then either asked their husbands, mother-in-law, or sisters-in-law to bring up issues and discussion points on their behalf. These examples demonstrate how people use their understandings of behavioural norms and draw on social relationships to express agency.

Linking Relationships

External organisations and institutions, such as the government, NGOs and national/international faith-based institutions outside their traditional social hierarchy have provided assistance during and after extreme events. While the Toga-based relationships discussed thus far in this chapter enable people to meet most of their needs, interview participants described instances where external organisations have provided valuable assistance with evacuation, food aid and sometimes with recovery. After large-scale disasters (e.g. Hurricane Kina in 1995) the government and NGOs (e.g. the Red Cross) have been instrumental in aiding large scale evacuation from the island as well as post-disaster food aid and medical services. I was unable to find enough information comparing the outcomes of government and NGO assistance for Toga versus other communities impacted similarly in large-scale events such as Hurricane Kina to determine what role, if any, relationships with external organisations may have played in aid disbursement or during recovery. It may be that personal relationships played no role in the aid disbursement, but that information was not available.

Relationships with different government departments are visible not only after dramatic and large-scale events such as a hurricane. Other relationships with the government are maintained by government representatives from various departments attending regular district meetings. For example, the Ministry of Agriculture sends a representative to the district meetings, and many interview participants described

interacting with and getting support from the Ministry of Agriculture. These frequently took the form of cropping advice or obtaining new varieties of taro and cassava bred to be heat or water stress resistant (Section 5.2.3). Although some interview participants mentioned planting a mix of old and new varieties due to taste preference or concern that the new varieties would not work long-term, the fact that a number of interview participants reported they and others were willing to try out different varieties and work with the Ministry of Agriculture demonstrates a degree of trust in the Ministry. The Ministry of Agriculture also provides assistance post-disaster, providing seedlings for replanting. Interview participants spoke about the Ministry of Agriculture as a helpful resource they could access, but not that they felt obliged to utilise. This relationship is one that provides aid in times of need (e.g. post-emergency), but also one that can increase resilience as Toga's farmers can access new information and crop varieties designed to assist with environmental variability (e.g.flooding, heat). As discussed above, participation is an important way to demonstrate care and attention for a social relationship, and participation includes attending all relevant functions even if one does not have much to say. The representatives from the Ministry of Agriculture that attend these meetings, even if they are not very vocal, are demonstrating that they, on behalf of their department, respect and care for the Ministry's relationship with the people of Toga.

6.4.4. Free-Riding, Contradictions and Transgressions

As explained above, the exchange networks and support (as well as obligations) that people regularly engage in are constantly reinforced and supported by cultural norms and behaviours. Many of these norms and behaviours are culturally-based and not necessarily based on individually-held contacts and networks, but rather by a group and therefore can be considered publicly held resources. However, as these are publicly held resources there also the potential for people to either abuse or free ride. As these are publicly held, instances of free-riding or transgressing can impact the ability of all to mobilise these, impacting collective action if too much free-riding or too many transgressions erode the quality or quantity of these exchange and support networks. This subsection discusses instances of free riding or behavioural transgressions and contradictions.

Free-Riding

As mentioned in previous sections, people pay attention to who shows up at village meetings, cleanups or other events for village land/resources. These include maintaining the drainage ditches, cleaning the village hall, grass trimming and maintaining the area around one's house. When asked about things they felt were issues within the village a number of interview participants mentioned people who only

showed up at the village hall when there was something being given away but that did not put in time or effort in participating in communal activities.

Interview participants were presented with a series of hypothetical village development projects and asked what they thought about these projects. One of these was a small aquaculture project: an onshore tilapia fishpond. Although many said that this project would be good for Navatuyaba as it had the potential to generate funds, there were also a number of participants who expressed serious concerns. These concerns were primarily around land availability and more frequently about the management of the fishpond. Several interview participants said that if the fishpond belonged to the village people would come during the night and take the fish to eat for themselves. They would take the fish because they would see it as their own as the pond belonged to the village, but they would do so at night when they couldn't be seen because they would also understand that this was something they should not be doing. Several participants mentioned that this would be better managed by individuals on their own land or in a very public place where everyone could observe the pond.

> *"Yeah,* [if] *it belongs to the community then they'll take it because they say it belongs to us." Viviana (female, 61+)*

More older participants expressed concern than younger about the management of the fish pond, specifically about the selection of the management team, and Viviana was one of participants who explained why the management could be an issue:

> *"[The management]... would be a big problem if it was given to the village to manage. Because you have to trust the person to do it. Because so many of these other people, they will go fishing in the night. And kids there, going to throw things into the fish, into the water. [...] May be better to give the fish pond to one or two mataqali to manage - they give it to the village, they have to pick the right person to manage it. Because the fish pond... [...] It is a lot of work, and a big commitment." Viviana (female, 61+)*

The concerns raised above about the management of the hypothetical fishpond are likely based on experience and observation of other projects and communally owned resources or spaces. Village drainage systems are communally owned and managed, and therefore a public and village owned resource. The reference above to kids throwing things in the fishpond water is likely based on people's observation of children throwing things into drainage ditches and the river. Many interview participants mentioned seeing children throw rubbish away, either with small items or a bag of household rubbish that they were told to dispose of (whether they were told to dispose of the rubbish in the river or not is unknown, however some participants speculated that they were). As described in the previous chapter (Section 5.2) rubbish in the drainage system can exacerbate flooding and many interviewees and

questionnaire participants in Navatuyaba, Vunisei and Muana described it as an issue of serious concern.

Contradictions

In addition to some of the free riding that occurs, there are some interesting contradictions that came out some of the interviews regarding "appropriate" village behaviour. It is considered respectful for women to have their shoulders and legs to the ankle covered while in the village. Newer clothing styles, including vests/singlets and shorts/short trousers are becoming more common in the villages. Although these are considered more fashionable, cooler and more comfortable than the traditional clothing, younger women reported being told to change their clothes by older women. Some of the same younger women in interviews described how dressing appropriately is an important part of being in the village as well as being "a good kai viti". When asked if they follow these rules, many of the younger women later said that although they knew what the rules were, they did not always follow them, such as Losalini (female, 18-25 years old):

> *"L: Like most of the time when we are asked to wear sulus and all, I don't agree with, yeah I just get tired of wearing it.*
>
> *Q: What do you do, just not wear it?*
>
> *L: No, I still wear it. Like vest and all, sometimes the old ladies tell us not to wear the vest it shows our body and all, but I always wear it. Times have changed [...], don't you think?"*

In addition to reflecting generational differences and appropriate behaviour, this could potentially be seen as a 'safer' expression of rebellion or nonconformity. The young women who told me that they did not change clothing when told to were also young women (such as Losalini above) who were described to me by older Navatuyaba residents as respectful and "good kai viti" because they followed other village behavioural norms and rules. There appears to be a hierarchy in which aspects of village behaviour and cultural rules and norms are more important to abide by than others, which is discussed in detail in Chapter 7.

Transgressions

Historically those that broke village rules, including stealing or not participating, could be punished (including corporally). However, interview participants reported a formal rule of law that applies to all Fijian citizens that no longer permits this punishment. Although no participant mentioned specifically when this change took place, the 1997 Consitituion included changes to Fiji's Bill of Rights which were also modified in the 2013 Constitution (Citizens' Constitutional Forum 2014:46). Although these legal changes took place in 1997 and 2013, it is also unclear if and when different interpretations or

enforcement began. While this has likely had positive impacts, for example preventing punishment or ostracisation based on personal vendettas or against more marginalised groups or individuals, it also has the potential to increase certain kinds of free riding. If people perceive a low benefit from participating in certain village activities, but are still able to access some benefits there is little incentive other than social pressures to participate. For some individuals or households the social pressure does not appear to be enough to induce them to participate, based on the comments made during interviews and observed participation and attendance at village meetings and events. Those that choose not to participate or attend village activities may be able to spend more time in earning activities, and may also choose not to contribute resources to church, mataqali or village activities and needs. These individuals and households may be able to acquire more cash savings or other resources, while still being able to rely on the village norms and rules of sharing and gifting especially during times of crisis or need. These individuals or households may have higher adaptive capacity, however it may come at a cost of lower adaptive capacity for the village or Vanua (as others support them when they need without receiving as much in return).

These individuals could also be choosing to not engage with social norms around exchange or respect behaviours, potentially reflecting a different cultural model of norms and behaviour or perhaps they share a similar model but interpret it differently and do not feel the same motivation to abide by those behavioural norms. For example, toward the end of my time in the village several individuals made *kerekere* requests to me, such as "*kerekere*, I like your phone" or "*kerekere*, I like your bag"[24]. When these requests were made the individuals did so out of hearing of my hosts and others that would likely have deemed these requests inappropriate due to my pseudo-guest status. While these requests may have reflected a shift in how I was viewed (i.e. as more of an 'insider'), when I asked an iTaukei friend in Suva I was told that these requests were made in this way as the individuals 'knew' they were rude. This example demonstrates that individuals are aware of the norms associated with the Vanua, however can also make choices about when and how to abide by these norms.

6.4.5. Cultural Model of Respect

> *"It is a norm for Fijians to respect each other so that we are blessed in return. When one respects people around them, they will in turn respect their environment and look after it accordingly." Epeli (male, 26-35)*

At the heart of the cultural model of respect are the ideas of reciprocity and hierarchy as discussed throughout Section 6.4. The 'respect' model is based on an understanding of mutual expectations of

24. I did not give my phone away with this request, however I did give away most of the clothing and many other materials I had brought with me, some to these *kerekere* requests and the rest at the end of fieldwork.

behaviour, which can initially seem to imply only bottom-up responsibilities, but in fact includes responsibilities and expectations for everyone at each place within the social hierarchy.

This reciprocity is not limited to exchange between individuals or groups, it encompasses a much broader understanding; when people behave in a respectful way, it means they are looking after their social and physical environment, which in turn will look after them.

"Respect your elders and the land will respect you." Naomi (female, 26-35)

People lower in the social hierarchy have a responsibility to respect their elders and leaders by listening to and participating in the social structures their elders and leaders represent. However leaders and elders have responsibility to also participate and listen to those lower than them in the social hierarchy and make decisions that safeguard the social and physical environment for current and future generations. The 'respect' model is different than the model of 'social relationships in the village' in that respect is closely related to one's own position within the social hierarchy, and encompasses a broader set of behaviours related not just to norms around intra-human interactions but also around interactions with the biophysical and wider social environment.

6.5. Relationships, respect and the village

The three cultural models presented in this chapter ('village social relationships', 'being in the village' and 'respect') are used by Toga's residents to guide behaviour and shape expectations for social interactions. These cultural models describe the norms and expectations for behaviour within social relationships and when these relationships and interactions should take place physically within the village. These three cultural models describe the generic social capacities that exist within this community. The relationships and norms enable collective action and self-protection in the face of stressors and hazards. For example, placing a *tabu* on *kai* is a collective action only made possible with an understanding of the social relationships and hierarchy which are especially important within the village and people's respect for these. How reciprocity and respect are understood in terms of the village is important for understanding how people access and mobilise social capital. Self-protection is possible due to the social safety net provided by expectations of reciprocity and generosity, as well as respect for these norms and traditions within the village. However self-protection and collective action can be compromised through free riding or transgressions which permit some individuals or households from taking advantage of the benefits of the support networks without "paying in". As social capital is a public good, as argued in Section 6.4.4, collective action and self-protection can break down when behaviour does not adhere to the these cultural models. There can also be costs associated

with behaviour that does follow these expectations; existing inequalities or vulnerabilities within the community may not be addressed and can be exacerbated by obligations and behaving appropriately and respectfully (i.e. giving when not able to). However, although community adaptive capacity may not be high in this situation, existing norms and behaviours also mean that there is a limit to vulnerability (as long as the community is able to provide this support network for members).

Respect and reciprocity also refer to relationships with non-humans, e.g. land and water. Care and effort in maintaining that relationship (e.g. keeping your land rubbish free) mean reciprocation from the recipient of that care. This conceptualisation of the relationship, involving trust and reciprocity, also applies to how people consider the hierarchy and social structures within the village. The relationship with the social structure and hierarchy within the village is reciprocal, and based on expectations of exchange in terms of time, food, financial resources and participation.

The three cultural models presented here are closely interconnected. The cultural model of 'social relationships' describes the expectations and norms of behaviour within bonding and bridging relationships. This understanding is especially important when people are physically within the village. The location of these expectations and norms within the physical space of the village is important as this is the space where decisions about collective action, community development and resource management are made. The cultural models of 'social relationships' and of 'being in the village' are both based upon the cultural model of respect. This understanding of respect underpins and guides the norms of behaviour for social relationships and being within the village. It also includes a wider set of expectations around behaviours related to interactions with a biophysical and wider social environment. Broadening this understanding leads to thinking about respect as one of the main cultural models making up the indigenous concept of the Vanua. These three models together shape the overarching cultural model of the Vanua (discussed in detail in Chapter 7). The Vanua can be considered one of the main drivers of behaviour in terms of collective action and resource management at the local level in Toga.

6.6. Conclusion

This chapter demonstrates that although there are a large number of social interactions and obligations, including informal exchanges of time, food and other material goods which indicate high social capital, as demonstrated above these are not always beneficial for everyone in Toga. The cultural models of 'village social relationships', 'being in the village' and 'respect' demonstrate the importance of behavioural norms and expectations. These models also demonstrate how this high degree of connectedness and sharing can have negative consequences for some behaviours associated with

coping or hazard response (e.g. having some savings to cover stress time). Although social relationships function as important support networks, there are expectations that these behaviours will be reciprocated. This would appear to reduce the need for individually-held savings, however free riding and transgressions can induce people to save secretly or prioritise their immediate family. Additionally some households are unable to balance their immediate needs with church, mataqali, village and Vanua obligations, contributing toward potential transgressions, emotional turmoil or withdrawal from community activities. These behaviours take place within the wider conceptual understanding of the Vanua, which builds on the cultural models presented here to a wider iTuakei worldview with important implications for potential adaptation actions, which is discussed in the following chapter.

Chapter 7. *Sautu* in the Vanua and Adaptation

7.1. Introduction

Vanua refers not only to the land but also to the people, the social rules governing interactions between people, and connections between people and between people and the land. The concept of Vanua is a core concept for iTaukei in Fiji (Ravuvu 1987; Farrelly 2011; Nainoca 2011). Living life according to the Vanua*, va'a vanua*[25]*,* "requires that an individual encourages and maintains social harmony and social solidarity." (Ferrelly 2011:824), which places social relationships at the heart of iTuakei life. Chapter 6 demonstrated how vital these relationships are and how social capital in this context is a public good. The trust and expected reciprocity that individuals have in the Vanua (and associated rules and norms) are reproduced and reinforced through actions conducted by individuals with the collective (i.e. Vanua) in mind. In addition to addressing the second research question about characterising the shared norms of the Vanua, this chapter also contributes toward the third research question, "What are the potential adaptation actions that best serve the interests of the village? What are the potential adaptation actions that best serve the interests of the households? How do these compare?".

This chapter builds on the previous to elaborate the idea that the Vanua is an important social (bonding) relationship between individuals, other levels of social organisation (e.g. mataqali, village) and the natural environment. The Vanua can be thought of in three different ways: the physical land and resources on it (as well as food it produces), a link between the physical world and traditional cosmology including ancestors and the spiritual world; and all the rules, norms and relationships that make up the hierarchy of people that live on and with the land (Ravuvu 1987; Tuwere 2002). The Vanua is a collective concept, including all the people as well as the other elements described above. Although adhering to behaviours and norms and behaving *va'avanua* is something that is done by individuals, it is done with the collective, the Vanua, in mind. The next section introduces the idea of maintaining *sautu* in the Vanua (7.2). *Sautu* is a holistic well-being, and the priority of behaviours engaged in to promote *sautu* in the Vanua reveals how people understand and use the Vanua to guide interactions and decisions for individual and collective resources. The following section discusses the Vanua as a bonding relationship (7.3) and then this and the cultural models from Chapter Six are used to build a cultural model of the Vanua. The final section (7.4) discusses implications for this cultural model on social capital, behaviour and potential adaptation action.

25. Loosely translated it means " the way of the Vanua".

7.2. Maintaining *Sautu* in the Vanua

As demonstrated in Chapter 6 and Section 4.2, identity in iTaukei villages is strongly tied to the village and traditional culture, and observation of Vanua is important for experiencing *sautu* (Ravuvu 1987). *Sautu* is health and wealth, where wellbeing includes physical, spiritual, emotional and psychological health. Although wealth includes material things, more importantly wealth includes a diversity of strong relationships and social networks (Nabobo-Baba 2006). *Sautu* can be thought of as incorporating natural and social elements, highlighting how important it is to consider both local, culturally-based world views as well as thinking about intra-human and human-nature relationships.

To understand the importance of the Vanua and how it is operationalised day-to-day and longer term Toga's residents were asked what, for them, are the most important things for maintaining *sautu* in the Vanua. There were seven items drawn from interviews and informal conversations in the village and these concerned adherence to traditional norms (participating, dressing appropriately in the village), health of the natural environment and other elements considered important for the community (e.g. economic opportunities). Questionnaire participants were asked to rank these seven items from most to least important. Respecting elders and leaders was ranked the most important, with keeping the land and the river clean and healthy closely following (Table 7.1).

Table 7.1. Maintaining *sautu* in the Vanua. *These seven items came from interviews and informal conversations about what the Vanua means to people and how people maintain sautu within the Vanua. Questionnaire participants (n=125) ranked the items from 1-7 in the questionnaire, with 1 being the most important and 7 the least.*

Overall Rank	Action/Behaviour to maintain sautu in the Vanua
1	Respecting elders and leaders.
2	Keep the land (plantations, trees, soil) free from rubbish and pollution, producing good food.
3	Keep the river and river resources (water, *kai*, prawns) clean and free from rubbish and pollution.
4	Participating in meetings, cleanups and other mataqali, village, and Vanua activities.
5	Jobs and economic opportunities.
6	Infrastructure (e.g. roads, footpaths) that makes access to church, town, schools, etc. easier and safe.
7	The way people dress.

Respect for others and listening to elders and community leaders is an important part of village life in the strongly communal environment of an iTaukei village, as demonstrated in the 'respect' cultural model (Section 6.4.5). Some aspects of the Vanua are evident in the rankings; the top four items reflect

respect for elders and leaders and the cultural institutions they represent, as well as respect for the land and river resources that make up the physical parts of the Vanua. Participation in village activities is one of the main ways in which people are able to demonstrate their respect for these cultural institutions as well as care for communally held land and river resources, also as demonstrated in the 'respect' and 'being in the village' (Section 6.4.2) cultural models.

Differences by Gender

When these ranking scores for items that maintain *sautu* are broken down by gender and age however, there are some interesting differences that mirror differences observed in the perceptions of threat severity and incidence from Chapter 5 (Table 7.2). Both men and women ranked "respecting elders and leaders" as the most important, however for women the next most important was "participating in village life" while "keeping the land clean" was second for men. In fact for men, "participation" was the second least important item, with "jobs/economic opportunities" and "infrastructure" ranked above. More men than women work in the plantations and a traditional man's role is to provide food (or the cash resources to purchase food), and while both men and women harvest food from the river it historically was and currently still is more of a woman's responsibility.

Changes in the clothing that people wear, and the comments made about clothing during interviews, were almost entirely focused on women's clothing. Discussion of what people, especially women, wore in the village frequently came up when talking to people about the Vanua and what it meant to maintain *sautu* in the Vanua. However, it is interesting that although this is something that people talked about frequently, it was ranked as least important overall by men, and as the second least important item by women. As discussed on page 145, this is a very visible demonstration of adherence to, or a rebellion against, village norms and often brought up in interviews but when placed in context with other norms and behaviours it was less important. It is interesting that women ranked village participation more highly (second as opposed to fourth) than men. Although women do not speak as often in village meetings and other more formal public fora, they are active in organising and participating in many other events and groups (e.g. church, etc.) around the villages.

Table 7.2. Testing for gendered, village and age group differences in mean ranking scores of the seven *sautu* items. *The mean score value (where 1 is least and 7 most important), rank order and p-value for gendered, village and age group differences are displayed below. A Mann-Whitney test was run to determine statistical significance of differences in male and female ranking and one-way ANOVA were used to determined statistical significance of differences in mean rankings between the three villages and between five age groups. Differences between the means for the"land", "river" and "participation" items were statistically significant for gender, while differences between the means for the "river" item were statistically significant between the villages, and differences between the means for the "land" item were statistically significant between age groups. Statistical significance at p<0.05.*

Item	Difference by Gender					Difference by Village							Difference by Age Group									
	Mean Rank Value		p-value	Rank Order		Mean Rank Value			p-value	Rank Order			Mean Rank Value					p-value	Rank Order by Age Group				
	F	M		F	M	Mua.	Vun.	Nav.		Mua.	Vun.	Nav.	18-25	26-35	36-45	46-60	61+		18-25	26-35	36-45	46-60	61+
Respecting elders and leaders.	6.02	5.59	0.202	1	1	5.66	6.07	5.83	0.616	1	1	1	5.58	6.13	5.71	6.04	5.55	0.676	1	1	1	1	1
Keep the land (plantations, trees, soil) free from rubbish and pollution, producing good food.	3.78	4.79	0.005**	4	2	4.68	4.34	4.03	0.231	3	2	2	4.11	3.32	5.12	4.41	4.89	0.002**	2	6	2	2	2
Keep the river and river resources (water, *kai*, prawns) clean and free from rubbish and pollution.	3.89	4.48	0.047**	3	3	4.74	3.97	3.88	0.050**	2	4	3	3.96	4.00	4.19	1.36	4.55	0.854	3	3	3	3	3
Participating in meetings, cleanups and other mataqali, village, and Vanua activities.	4.25	3.23	0.003**	2	6	3.58	4.17	3.71	0.406	4	3	4	3.54	4.32	3.64	3.64	3.33	0.446	6	2	4	5	5
Jobs and economic opportunities.	3.55	3.34	0.441	5	5	3.24	3.55	3.57	0.694	5	6	5	3.11	3.42	3.39	3.68	3.78	0.854	7	4	5	4	4
Infrastructure (e.g. roads, footpaths) that makes access to church, town, schools, etc. easier and safe.	3.17	3.59	0.178	7	4	3.34	2.97	3.52	0.333	6	5	6	3.88	3.32	3.39	2.91	3.00	0.327	4	7	6	7	6
The way people dress.	3.36	2.91	0.287	6	7	2.82	2.86	3.41	0.274	7	7	7	3.81	3.35	2.61	2.95	2.89	0.217	5	5	7	6	7

*** indicates significant at p <0.05.*

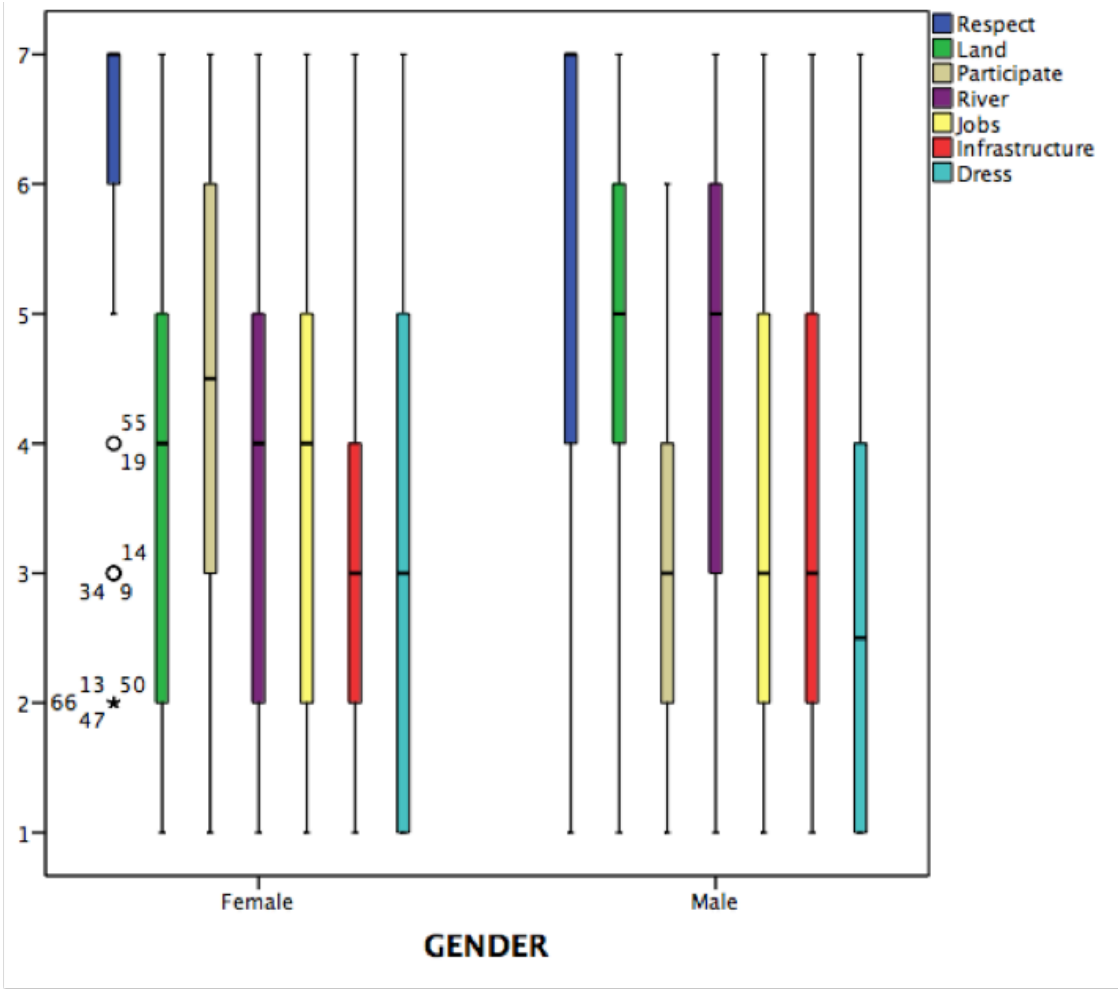

Figure 7.1. Items for maintaining *sautu* in the Vanua, mean ranking by gender. *Women: n=64; Men: n=56. Along the y-axis, 7 indicates an item that is considered most important for maintaining sautu in the Vanua while 1 is the least important. The black line in the middle of the coloured bar is the median value. The whiskers (black lines) indicate the minimum and maximum values, while the boxes indicate the spread of the first and third quartiles. Outliers are indicated by the circles or stars (circles indicate the difference between the outlier and the minimum/maximum values is 1.5 times the difference between the 1st and 3rd quartiles, while this differences is more than three times for the stars). The length of the whiskers and the coloured bars demonstrated the level of agreement about the ranking of that item in relation to the others, e.g. women consistently ranked "respect" as one the three most important items (with the exception of the 10 outliers).*

Although the initial ranking in Table 7.2 provides an overview of the ranking priorities and some gendered-differences, the degree of agreement and difference was not easily apparent. Figure 7.1 highlights some of the differences in how men and women ranked the seven items. There is strong agreement between the two genders with the ranking of the "respecting your elders" and the "jobs/ economic opportunities" item. However, the following two items, "participation in village activities/ meetings" and "keeping the land free from rubbish" demonstrate the greatest difference in the means between the two genders. To determine if there was any statistical significance to these differences, independent sample t-tests were run. Three items had statistically significant differences between how

men and women ranked them: taking care of the land, taking care of the river, and participation in village activities (p-values of 0.005, 0.047 and 0.003 respectively; Table 7.2).

Women ranked "keeping the land" as the fourth most important item while it was the second most important for men. It is interesting that the "participation" item was second from last for men while this item was the second most important for women. As discussed above, participating in certain kinds of village or group activities is a way to demonstrate respect. It is also a behavioural expectation for being in the village. As behaving along cultural norms is vital to maintaining *sautu* in the Vanua, this indicates that respecting elders and participating in village activities are closely linked. As the physical resources (i.e. land and river) are also vital components of the Vanua, I assumed that these four items would be the highest ranked. While this is true for women, it is interesting that for men infrastructure and economic opportunities were rated as more important for maintaining *sautu* than participation. Some of this difference may be due to the different gender roles within the village; more men are likely to have jobs outside of the home or bring food to markets therefore access to economic opportunities is highly dependent on ease and cost of infrastructure. These results are consistent with the differences in risk perceptions between men and women in Section 5.3.2 and gender-based behavioural norms shaping experiences. Interviews and observation indicated that men can feel pressure to fulfil this role, which could explain why they rank jobs/economic opportunities and infrastructure higher than women. Although these items are ranked differently by gender they also begin to demonstrate general agreement of what is important for the Vanua.

Differences by Village

There is general agreement in the mean ranking of the seven items between the three villages with the exception of the importance of the "river" item (Figure 7.2 and Table 7.2). Although there are some differences between the three village rankings, the only item with a statistically significant difference in mean ranking is the "river" item ($p=0.05$; Table 7.2). Interestingly, the same proportion of questionnaire participants from both Vunisei and Muana (89%) eat food from the river at least once per week (this proportion is 81% for Navatuyaba). However 21% of participants from Navatuyaba and 29% of participants from Vunisei eat from the river every day compared to 44% from Muana. Just under a third of participants from Muana and Navatuyaba (27% and 30% respectively) have at least some income from the river, while only 7% of Vunisei questionnaire participants do so meaning they are less dependent on the river for income than the the other two villages. Further comparison between the three villages and the "river" item revealed that Muana and Navatuyaba had means that were statistically significant in their difference from one another. This is interesting, as questionnaire

participants from both these villages rely on river resources for income more than those from Vunisei, while Navatuyaba relies less on the river for food resources. The "land " item is also ranked lower by Muana (third as opposed to second), however has a lower mean value for Navatuyaba's participants compared to Muana and Vunisei.

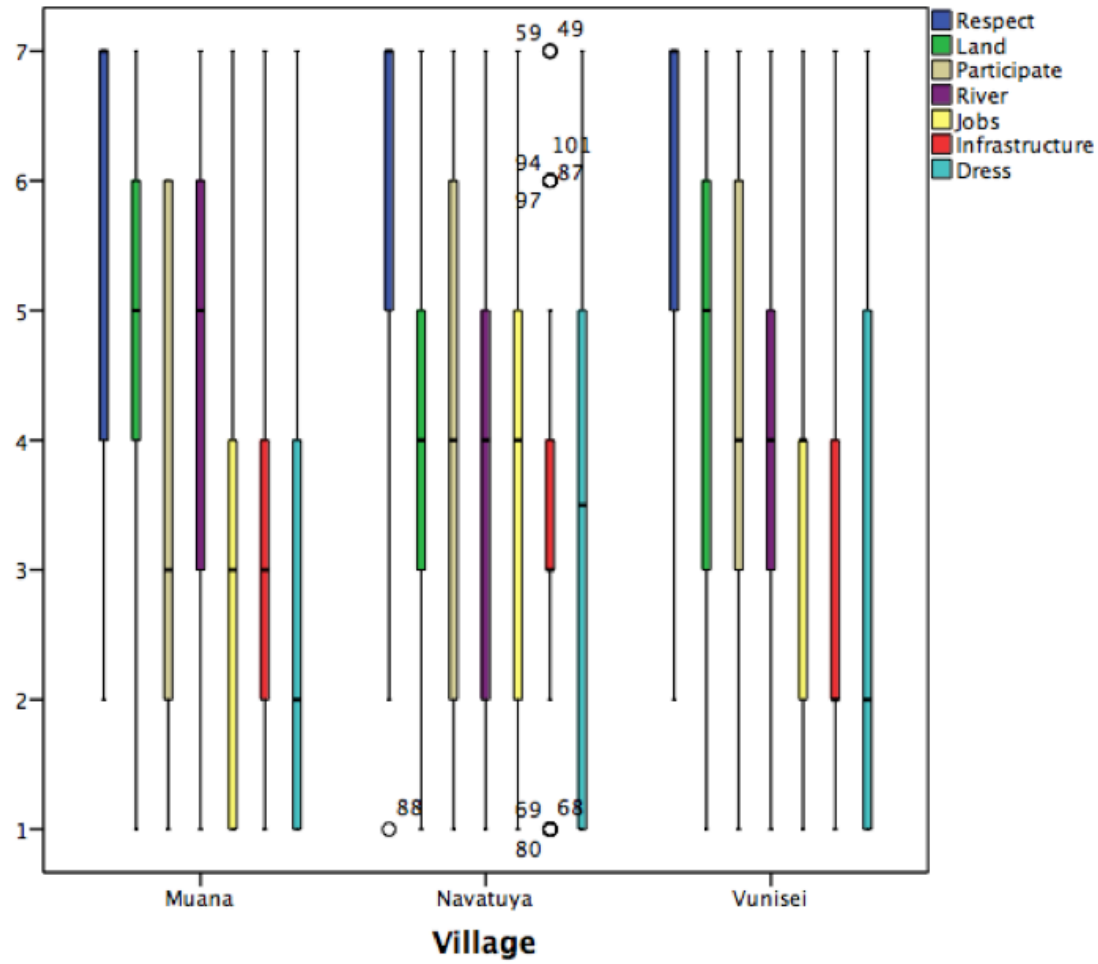

Figure 7.2. Items for maintaining *sautu* in the Vanua, mean ranking by village. *Muana: n=38; Navatuyaba: n=58; Vunisei: n=29. Along the y-axis, 7 indicates an item that is considered most important for maintaining sautu in the Vanua while 1 is the least important. The black line in the middle of the coloured bar is the median value. The whiskers (black lines) indicate the minimum and maximum values, while the boxes indicate the spread of the first and third quartiles. Outliers are indicated by the circles (circles indicate the difference between the outlier and the minimum/maximum values is 1.5 times the difference between the 1st and 3rd quartiles). The length of the whiskers and the coloured bars demonstrated the level of agreement about the ranking of that item in relation to the others, e.g. no one in any village ranked "respect" as the least important item (with the exception of 1 outlier in Navatuyaba).*

There was strong agreement between the villages on the importance of respect for the the Vanua, as well as how people dress being considered the least important of these items for all villages. Access to and reliance on resources could influence what is valued, as Vunisei relies less on the river for income compared to the other two villages and this could be one reason for the statistically significant difference in item ranking. Although there were some differences between the three villages, like the

gendered differences explored above, this agreement demonstrates a strong shared understanding of the elements that are important for maintaining *sautu* in the Vanua.

Differences by Age

There was some difference when examining the rankings by age group. The "land" item was the only item with a statistically significant difference (Table 7.2). This is interesting as it seems due to one age group ranking the "land" item very differently to the other groups. 26-35 year olds ranked the "land" item as the second to least important while all other age groups ranked it second most important. They also ranked "participation" as second most important while the other age groups ranked it fourth, fifth or sixth. This could be due to something about the way this age group interacts with or understands the Vanua, as sample size was similar to other age groups.

Table 7.3. Ranking difference by younger (<35) and older (36+) age groups. *The five age groups were combined into "Young" 18-35, and "Old" is 36+ age groups. A Mann-Whitney test indicates statistical different in rank order for the "land" and "dress" item.Young n=61; Old n=62*

Item	Rank Order		p-value
	36 and older	35 and younger	
Respecting elders and leaders.	1	1	0.677
Keep the land (plantations, trees, soil) free from rubbish and pollution, producing good food.	2	4	0.022**
Keep the river and river resources (water, *kai*, prawns) clean and free from rubbish and pollution.	3	2	0.520
Participating in meetings, cleanups and other mataqali, village, and Vanua activities.	4	7	0.850
Jobs and economic opportunities.	4	3	0.516
Infrastructure (e.g. roads, footpaths) that makes access to church, town, schools, etc. easier and safe.	6	5	0.443
The way people dress.	7	6	0.005**

*** indicates significant at p <0.05.*

Age is one of the defining characteristics of place in the social hierarchy, with different abilities to speak in various fora more common after the age of 35 and up. To determine whether there were any patterns in how people perceived as 'young people' (i.e. under 35) and older people understood the Vanua, the age groups were combined into two groups: those up to 35, and those 36 and older. There are interesting differences in the way the older and younger group ranked certain activities. For example participation is ranked last for the younger group while it is ranked fourth (along with jobs and economic opportunities) for the older group (Table 7.3; Figure 7.3). It is also interesting that the younger group ranked jobs and economic opportunities higher than the "land" item. This could be due to limited land availability impacting younger people more than older or younger people feeling more

pressure or perceiving more opportunities from external income sources as opposed to the plantation. Although the younger and older age groups ranked the "dressing" item similarly, a Mann-Whitney test indicates statistically significant difference; Figure 6.3 also shows that younger people seem to have ranked the "dressing" item as more important more frequently than the older group did. This could be due to the fact that younger people are more likely to be told to cover up or change their clothing, and in numerous interviews both young and old people said that the young people were more likely to be concerned with fashion and also more likely to dress in a way that the elders could disapprove of.

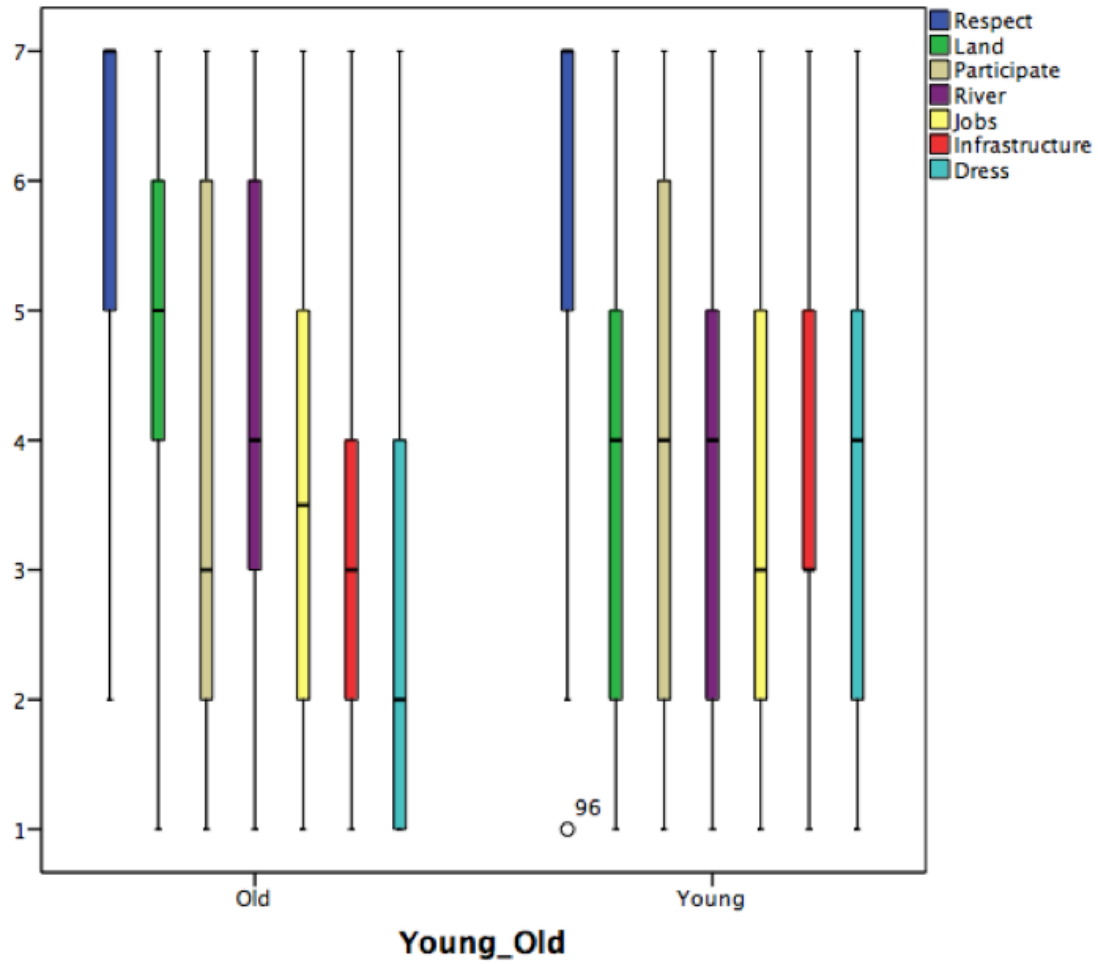

Figure 7.3. Items for maintaining *sautu* in the Vanua mean ranking by age group. *Young (16-35) n=61;Old (36+) n=62. Along the y-axis, 7 indicates an item that is considered most important for maintaining sautu in the Vanua while 1 is the least important. The black line in the middle of the coloured bar is the median value. The whiskers (black lines) indicate the minimum and maximum values, while the boxes indicate the spread of the first and third quartiles. Outliers are indicated by the circles (circles indicate the difference between the outlier and the minimum/maximum values is 1.5 times the difference between the 1st and 3rd quartiles). The length of the whiskers and the coloured bars demonstrated the level of agreement about the ranking of that item in relation to the others, e.g. no one ranked "respect" as the least important item (with the exception of 1 'Young' outlier).*

Summary

This section illustrated some of the similarities and variations in understanding of what actions are required for maintaining *sautu* in the Vanua based on age, gender and village. The high prioritisation of the 'respecting elders and leaders' by all ages, genders and villages is consistent with the 'respect' cultural model from Section 6.4.5. Some of the ranking differences of other items suggest that personal experiences, such as those of women and men shaped by behavioural norms, may influence how *sautu* in the Vanua is understood. There were differences between men and women, as well as young and old groups which may be due to expectations or experience. However, this was not always the case as demonstrated by Vunisei's lower dependence on the river for income while ranking the river similarly to Navatuyaba.

Patterns of agreement and different interpretations of the Vanua are emerging, and the next section will elaborate on this and discuss how the relationship between people and the Vanua is conceptualised.

7.3. "*So everything about Toga can be about myself*": A cultural model of the Vanua

The previous chapter highlighted the importance of the social relationships based on exchange, respect and behavioural expectations which are also inherently linked to the biophysical and social resources of the mataqali, village and Vanua. The previous section discussed specific actions and behaviours that people felt were important for the Vanua, and this section expands on those using data from interviews, observation and questionnaires to discuss how the Vanua can be considered a bonding relationship, between individuals and the Vanua. This section also discusses the cultural model of the 'Vanua', based on the three cultural models from the previous chapter and the understanding of the Vanua from Section 7.2.

Interview and questionnaire participants linked the concept of the Vanua to all the actions that people do to maintain social relationships, including relationships with biophysical resources. People discuss how respecting the Vanua means it will then respect them in return.

> *"The land is owned by the head of the clan and if you respect them, you respect the Vanua and it will respect you." Alifereti (male, 18-25)*

This connects to the idea that the village, and physically being in the village is part of an identity, and the Vanua is also at the core of that identity (Section 4.2). This includes behaving according to the 'being in the village' cultural model (Section 6.4.2). If the Vanua is at the core of one's identity, then anything that person does can reflect back upon the Vanua.

"...when I say my village is from Toga, it means I am from Toga. So everything about Toga can be about myself." Lesi (male, 18-25)

There can be a great deal of social pressure for people to conform to certain behaviours, while also having a positive aspect as individuals are encouraged to succeed in education, work, etc. as that also reflects positively on the Vanua. There are examples of villages and communities raising money and supporting one individual up through tertiary education (via paying for university, providing social support and assistance with housing and food), and then putting a PhD thesis or diploma on the wall of the village hall to demonstrate what the Vanua has achieved.

In addition to being essential for food and livelihoods, the land and river are essential to being part of Tikina Toga for Toga's people. They can express pride in being able to survive using only these resources. An interview participant, Tomaci (male, 46-60), took an old 5 FJD note out of his pocket and waved it around when I asked in about what being wealthy in the village meant. He boasted that he had the same dollar in his pocket for over a month, as he had all he needed from his land and the river so did not need to spend any cash to survive. These ideas are linked with the conceptualisation of what makes a person wealthy in the village, and how that id different that in the 'city' (see Sections 6.3.1 and 8.2.3). This ideas also demonstrate the value placed on the natural environment and its resources, as those are part of the Vanua where as cash is not.

Keeping the river and the land clear and free from rubbish were frequently the second and third actions ranked as most important for maintaining *sautu*. Keeping land and the rivers clean and healthy has implications for subsistence livelihoods, however it goes beyond that as the physical environment is also part of identity:

"I would describe it [a healthy environment] as... well it's life." Joni (male, 46-60)

This conceptualisation of a bonding relationship linked to an identity can also be applied to the relationship of people with the biophysical environment, and is also demonstrated in the risk perceptions to the Vanua in Section 5.3. This element also includes a temporal aspect, whereby part of your role in the Vanua is as a caretaker of the land, river, and other elements for future generations.

" And once you look at the rivers, you just get what you need for the day. [...] Don't take a bundle, don't take a lot of them because you take too much, the people that will be coming after you... you be thinking of tomorrow, be thinking of the next day. Most importantly you be thinking of the next family that be coming there and also feed from the same river. [...] because otherwise you be taking too much and there'll be nothing left." Joeli (male, 26-35)

These decisions about only taking what is required for now that Joeli is discussing are guided by the 'respect' cultural model. Respect also includes thinking of other's needs now and in the future, and is part of the core values in the Vanua:

> *"there is a connection between us that are living, those that have gone, and those* [of] *us are about to come. [...] So the future will be determined by the decisions we make today. [...] And that is the iTaukei worldview." Joeli (male, 26-35)*

People discussed previous and future generations in terms of taking care of and preserving the biophysical environment on their behalf. This was expressed in conversations and interviews as a similar expectation of reciprocity that people had for current residents' behaviour. The treatment of the spiritual aspect of the Vanua, including ancestors and future generations, with the same expectations of respect and reciprocity demonstrates how valued the spiritual and temporal aspects of the Vanua are for Toga.

> *"I think it's important to keep the rituals of the Vanua because we live on it and if we don't preserve it we will face some problems like the growth of problems and there's no harmony." Joji (male, 46-60)*

The cultural model of the 'Vanua' builds upon the models described in the previous chapter: 'social relationships', 'being in the village' and 'respect'. In addition to these, the 'Vanua' cultural model incorporates elements of the future, identity and spirituality, and a shared understanding of behavioural expectations. Respect for the social hierarchy, the biophysical environment and future generations is a core feature of the cultural model of the 'Vanua' which is demonstrated and reproduced through observation of behavioural rules and norms.

Despite the differences in ranking item contributions toward maintaining *sautu* in the Vanua discussed above, the general agreement on the seven items between genders, age groups and the three villages indicates a shared understanding of what behaviours and expectations there are for maintaining *sautu* in the Vanua. Of the seven items discussed above, respect for elders (and the social institutions they represent), participation in village and communal activities and caring for the biophysical environment are arguably central to the Vanua model. As discussed in previous chapters, cash is required by many to meet expectations of giving and caring for communally held resources, therefore jobs, economic opportunities and the infrastructure to access these are vital for participation in the Vanua. This is because fulfilling one's hierarchical role is also essential to maintaining the relationship between an individual and the Vanua. In fact, the relationship between individuals and the Vanua can be considered a bonding relationship; there are norms and rules concerning interactions and expectations

for both individuals and the Vanua which shape behaviour. Additionally (as discussed more in Section 7.4) people draw upon this relationship for support and it has implications for adaptive action.

The cultural model of the 'Vanua' is based on a shared understandings of 'respect', 'social relationships' and 'being in the village' and can be considered an overarching cultural model guiding behaviour and action in Toga. The 'Vanua' cultural model encompasses the behaviours discussed above, as well as the intra-personal relationships and norms discussed in Chapter 6. The following section discusses the relationship between the Vanua, social capital and potential adaptation actions.

7.4. Social Capital, Adaptation and the Vanua

This section builds upon the data presented in this and the previous chapter and discusses the relationship between social capital, potential adaptation actions and the Vanua, answering the second research question ("what are the shared norms that characterise the Vanua? What role does social capital and the Vanua play in potential adaptation for households and the village?") and exploring the tensions between potential adaptation actions that best serve the interests of the village or the interests of the households, and how these compare. Although certain groups or individuals in Toga can be conceived as having more social capital than others, social capital here is generally held by groups that make up the community of Toga. The primary relationship framing social relationships between people, and relationships between people and the physical environment is the relationship between people and the Vanua. The actions and behaviours that people undertake to build and maintain their relationship with the Vanua creates a community in which support exists to ensure people are fed, clothed and housed which also builds their bonding social capital with the Vanua. Meeting these minimum requirements for well-being (i.e. *sautu)* is one aspect of maintaining a good relationship with the Vanua but is not limited to only these. In addition to acting as a vital component of identity, the Vanua provides support in times of crisis or need demonstrating how people draw on their bonding social capital with the Vanua.

This is important for potential adaptation actions as it contributes to the adaptive capacity of Toga. The tradition and history of managing resources as a community builds a base for approaching and addressing issues that will affect individuals and the community. Responding to environmental changes with high uncertainty, such as those due to anthropogenic climate change, is not easy. However, certain aspects of how social capital is operationalised in this context can boost adaptive capacity. Social capital currently supports responses to large-scale disasters, as well as shocks or short-term crises for households. It also provides a baseline of well-being (in terms of food, shelter and some material goods) for those currently living in the villages, as well as providing a safety net for those living in

urban areas/elsewhere. The incorporation of future generations into the Vanua coincides with an understanding that these commonly held resources should be managed in a way to ensure long-term sustainability.

The cultural models presented in these chapters demonstrate the different ways that people understand their social and physical environment via the concept of Vanua. The norms around support and what it means to be part of the community ensure that shelter, clothing, food, cash and other materials will be provided without question in times of need. This also includes working together as a community to recover, e.g. clean communal areas of debris and animal carcasses after a major flooding or hurricane event. Households or mataqali members will assist with building or repairing homes, clearing away rotten crops and replanting post–flood, and assist with other projects such as building up plantation areas to reduce the flooding level and increase drainage.

However, there are instances where obligations based on the norms in the Vanua can impede adaptation. As described in the 'social relationships' and 'respect' cultural models, wealth accumulation to build a buffer in times of job/income loss or recovery after a major flood/hurricane event can have social costs. Those that do save may do so in secret. Although people receive support in return for their gifts and obligations, this is not always perceived to be in-kind and concerns about free riding can discourage people from participating or lead to mistrust in leadership (Section 6.4).

Some of the environmental changes experienced by the community are exacerbated by upstream land-use change and development. The limited linking capital observed with government officials or bridging capital with those upstream communities hinders creation of an open dialogue to address some of Toga's concerns. Other concerns mentioned by community members relate to water quality and runoff from the nearby government-run agricultural research station (see Section 5.2.4). Although interview participants told me these concerns have been raised publicly, it was unclear how far up in government this message was passed. The hierarchical nature of social relationships and rules around who is allowed to speak, and on behalf of whom, can sometimes act as a bottleneck for information or action if individuals at one point in the hierarchy do not "play the role" as expected (see also Section 8.3).

New or uncertain changes, for example sea level rise, may strain existing social capital resources. Current concerns over land availability may become worse with the cumulative impacts of population growth and sea level rise exacerbating erosion. If some families need to produce enough food for their own sustenance, as well as extra to share with family/mataqali, provide gifts to the village/Vanua and church events, and enough to sell for cash, this could induce a strain on these families and households

to meet all these obligations if land becomes more limited. Although other community members may be able to help out and provide assistance, if the majority are in similar circumstances it can be difficult to support oneself and also provide for others. As discussed above, making these kinds of choices can bring embarrassment or shame, as people may feel forced to choose between their deeply held values (e.g. their relationship with the Vanua) and the need to meet day-to-day needs. This also has the potential to reduce the ability of the village to cope if a critical number of households require extra assistance over a period of time, and reveals the tensions between adaptation actions that serve the best interests of the household versus actions that serve the best interests of the village

Social capital can mitigate resource availability or ability to deploy those resources. Individuals, households or the village may recognise the need to respond to environmental change, be willing to undertake action and believe that it is possible, however this occurs within the social context where people are also navigating the cultural models of 'social relationships', 'being in the village', 'respect' and the 'Vanua'. Behaviours associated with these cultural models can provide important sources of support, but a more nuanced understanding of social capital is required in this context as social capital may not be always be a positive characteristic. For example, a family may choose to lease land outside of Toga due to concerns about land availability and their ability to fulfil mataqali, church and village obligations and meet household needs. This family may therefore be able to acquire cash and other resource savings through additional income from the extra land, permitting them to modify their house or farming practices to adjust to flooding, increased temperatures and invest in new heat/water tolerant crop varieties. However, what this hypothetical family may give up is an essential part of their identity and a sense of belonging to a place and family, and being part of a Vanua as they would not physically be present in Toga and their behaviour would not align with expectations in the 'Vanua' cultural model. As the Vanua is a key bonding relationship, separating oneself from the Vanua would represent a significant emotional and spiritual event and would most likely not be a choice that many i'Taukei would make lightly.

7.5. Conclusion

The concept of *sautu* and actions associated with the *sautu* of the Vanua demonstrate how the Vanua is understood as made up of relationships between people, the physical environment and traditional behaviours and the social hierarchy. These understandings are shared between individuals, however there can be differences based on experiences shaped by culturally-based social norms such as gender or age. Maintaining *sautu* within the Vanua and living *va'a vanua* is a conscious and unconscious guide for everyday behaviour. This, and the corresponding cultural model of the 'Vanua' is important for

understanding potential adaptation actions of households in the community; the ability of households and the village to respond to immediate and long-term changes is based on their relationship with the Vanua.

Although the Vanua is at the heart of many behaviours and a guide for collective action, there are other elements that influence adaptation. These can include resource availability and perceived efficacy and can play a role in barriers to and opportunities for potential adaptation actions. The following chapter examines these at the household and village scale in Toga.

Chapter 8. Barriers and Opportunities for Household and Village Adaptation

8.1. Introduction

Access to resources (e.g. financial, knowledge) can be barriers to responding to change (Moser and Ekstrom 2010). Social and institutional factors such as values, perceptions of risk, self and group efficacy and identity can also become barriers to change (Adger et al. 2009; O'Brien 2009; Biesbroek et al. 2013; Ekstrom and Moser 2014). There is a growing body of literature examining barriers to climate change adaptation by different actors and at different scales (e.g. Moser and Ekstrom 2010; Biesbroek et al. 2014; Eisenack et al. 2014; Armah et al. 2015). Much of the literature is focused on connecting specific barriers to specific adaptation actions which can provide an important insight into the feasibility and sustainability of different adaptive actions for different scales (e.g. the household or th village). This chapter address the third research question, "What are the potential adaptation actions that best serve the interests of the village? What are the potential adaptation actions that best serve the interests of the households? How do these compare?". I investigate this potential sources of tension, as well as examine the relationship between the risk perceptions and the Vanua (manifested at the village-level) characterised by the norms and understandings from the preceding chapters on potential adaptation actions.

Thus far in the thesis I have demonstrated that risk perceptions are influenced by worldviews and personal experience and position within the social hierarchy, which are shaped by the cultural context (Section 5.4). Risk perceptions are important for adaptation as action to mitigate or avoid risk is influenced by how a risk or threat is evaluated (Dow et al. 2013) and can act as a barrier or limit to climate change adaptation (Grothmann and Patt 2005). I have also demonstrated the importance of social capital for adaptation at the household and community scale (Section 6.5) as well as the importance of the Vanua for understanding social capital and potential adaptation actions (Section 7.4). However, the Vanua is a vital component of identity and values and mediates resource access which are all social factors that can act as barriers to adaptation.

This chapter applies the Pacific Adaptive Capacity Analysis Framework (PACAF; USP 2012; Warrick et al. 2016) to the data collected for this thesis. Researchers in the Pacific Islands region have long noted a research gap in understandings of adaptive capacity specific to Pacific Island communities (Barnett 2001; Barnett and Campbell 2010; see Section 2.3.4) and the PACAF was developed to address this

gap. Important determinants of adaptive capacity that emerged during data collection and analysis for this thesis included many of the elements and factors from the PACAF (e.g. community diversity and social capital, traditional worldviews). This chapter uses the PACAF to guide my examination of barriers and opportunities for potential adaptation actions and explores the applicability of the PACAF in a non-remote iTaukei community that has not participated in a community climate change adaptation project.

The following section (8.2) examines the seven determinants from the PACAF and their relevance to Toga to examine potential barriers and opportunities for potential household and village adaptation. Section 8.3 discusses potential barriers and opportunities for adaptation and the role of culture and cultural institutions as a primary component shaping opportunities and barriers to adaptation in the iTaukei context. It highlights the embeddedness of culture in adaptation based on the role of culturally-based institutions, values and worldviews in shaping potential adaptation actions at the household and community scale.

8.2. Pacific Island Adaptive Capacity: the seven determinants from the PACAF

The PACAF was developed acknowledging that context is vital to understanding adaptive capacity. This section applies the seven factors of adaptive capacity from the PACAF to Toga. Each of the seven factors has several sub-factors, and some of these factors and sub-factors have also been identified as determinants of adaptive capacity in this thesis as well as other research (e.g. perceived efficacy; Grothmann and Patt 2005). Not all sub-factors from the PACAF are applied, in some cases as my data on a particular sub-factor is limited as data collection was not designed around the PACAF (e.g. limited data on physical health). There are also instances where the sub-factors in the PACAF are not applicable to Toga; I discuss those cases and their implications below. The seven factors of the PACAF are:

1. Human Capital: traditional and modern skills; population health; change agents.
2. Social Capital: community diversity; leadership; collective action strength; support services and networks; governance
3. Belief systems, values and worldviews: traditional and modern/Western values and knowledge; willingness to accept change; perceived efficacy; time orientation; dependence/independence
4. Resources and distribution: access to land, aquatic resources, infrastructure and services, and fresh water

5. Options: access and availability of options for climate change adaptation, monetary livelihoods and food acquisition
6. Information and awareness: access to relevant climate information; ability to process and analyse information; communicated climate risks
7. Previous experience with climate events

The following seven subsections clarify how I understand, apply and evaluate these factors with interview, questionnaire and observational data.

8.2.1. Human Capital

Human capital as defined by the PACAF includes traditional and modern skills derived from local knowledge and/or knowledge external to the community (e.g. via higher education), the physical health and well-being of the community, and the presence of a 'champion(s)' within the community motivating participation in adaptive actions. High levels of both modern and traditional knowledge indicate high adaptive capacity, as do high levels of physical health and well-being, and the presence of one (or more) change agents.

The presence of traditional and modern knowledge (e.g. traditional knowledge on weather forecasting or planting, and modern knowledge such as repairing water or electrical systems) can increase options to respond to climate or environmental change within the community (USP 2012). However, not discussed in the PACAF is the distribution of the sub-factors within the community. For example, how and whom can access knowledge and how it is currently used, or is there differentiated access to health care within the community?

In the case study site, interview participants indicated employing a combination of traditional and modern skills. These include planting calendars and farming techniques, as well as food preparation and some weather forecasting. However, older participants also mentioned how much of their traditional knowledge could be lost if younger people did not start to learn and use it, such as weaving fans and mats, and producing cooler thatch homes rather than modern ones of corrugated aluminium. Traditional calendars for planting were also mentioned as important; however some participants said they could not rely on them any longer as weather patterns had changed. There were also individuals I interviewed that had modern technical knowledge, such as a former Public Works Department employee who knew about riverbank erosion control construction techniques or current employees of financial and technical institutions (e.g. banks and mobile phone company). Additionally, 20% of all questionnaire participants have a trade training certificate or post-secondary education. Table 8.1 demonstrates the uneven spread in education attainment within villages, as well as between villages,

with Navatuyaba and Muana having much higher proportions of questionnaire participants achieving secondary or post-secondary education and training. Educational achievement varied from less than 6 years of formal school to achieving postgraduate degrees. This modern knowledge frequently comes from employment or education outside Toga, and access to higher education and certain kinds of employment (e.g. that requiring specialist training or certificates) seems be more available to certain groups (e.g. some mataqali; Table 8.1).

Table 8.1. Educational achievement by village and mataqali. *Data based on proportion of questionnaire participants that have achieved only none/primary, secondary or post-secondary education. Post-secondary includes certificates for technical knowledge (e.g. electrician) or tertiary education. This demonstrates that educational attainment is not evenly spread within or between Toga's villages. (Navatuyaba n= 58; Muana n=35, Vunisei n=30; not all rows sum to 100% due to some missing values)*

Village	Mataqali	Proportion achieve education level:		
		None or Primary Only	Secondary	Certificate or Tertiary
Navatuyaba	Maraki *	0%	0%	50%
	Nasavuga	0%	50%	50%
	Naivibale	7%	53%	40%
	Naikaso *	20%	40%	40%
	Vuci Nasavuga	25%	50%	25%
	Naicuva	0%	80%	20%
	Natokani	30%	60%	10%
	Nacuruicake	0%	75%	0%
	Nayavuca	67%	33%	0%
	Qaranitokalau	40%	60%	0%
	Nokonoko *	0%	100%	0%
Muana	Nakorokoro	17%	0%	50%
	Natikotiwaca	67%	0%	33%
	Waisousou	8%	50%	33%
	Namadadredre	18%	55%	18%
	Vunivaivai *	33%	50%	17%
	Tacivua	0%	100%	0%
Vunisei	Burotu	0%	75%	25%
	Muanivanua	36%	64%	0%
	Nakausoqo *	50%	50%	0%
	Navokai *	33%	67%	0%
	Vuniivi	20%	80%	0%

** Indicates at least 50% of questionnaire participants from that mataqali were over 45. Older residents were less likely to have attended formal school for as long as younger generations.*

As change agents, some individuals within the chiefly and government hierarchy in Toga have initiated projects within the community, as well as other individuals working within the community as change agents, including young people pushing for new village governance structure, a woman's cooperative working to save money for participants, youth group providing homework help to motivate younger students to stay in school. These individuals, whom I interviewed or was told about in interviews, had specialist knowledge or a university-level education. For example, one woman is one of the more skilled weavers and basket makers and acts in a leadership role in some women's and church groups (e.g the savings group described in Section 6.3.3). While she does not have many years of formal education, she holds a great deal of traditional knowledge and is respected for her abilities. Some of the other individuals are young people, with university degrees and jobs in Suva or Nausori.

In Navatuyaba there seems to be a clear link between change agents and knowledge access. In these instances, the change agents have chosen to use their knowledge to work on projects they view as contributing to the community. However, there may also be individuals whom I did not interview who have access to such knowledge and use that for their household's benefit. For example, I was told there are several lawyers and government employees who lived in Navatuyaba, but they were not mentioned as participating or leading any community projects. However, as discussed in Section 7.4, if these households are doing well financially they may be contributing to the well-being of the community via practices such as *kerekere* and giving that would not be mentioned in interviews as they are considered normal and everyday activities.

Most residents have access to running water, as well as toilets with septic systems; however rubbish and pollutants in the Toga and Rewa Rivers were reported as impacting directly on human health as well as the health of the aquatic species vital to subsistence (e.g. *kai*, shrimp). Hunger and contaminated-water related diseases were not mentioned by interview participants; the only health-related illness mentioned were rare occurrences of mosquito-borne disease (i.e. dengue).

In summary, while traditional and other knowledge is present, its distribution throughout Toga is uneven and there are concerns that traditional knowledge is not being passed down to younger generations. However, there are individuals that could act as change agents, potentially increasing adaptive capacity.

8.2.2. Social Capital

The sub-factors in the PACAF for social capital include community diversity, leadership, collective action strength, access to external support services and networks as well as governance. While the

PACAF does not explicitly mention differentiating social capital by bonding, bridging or linking, it describes the social capital element as "close bonds within communities, and networks of relations between communities and external organisations that enable informed, collective, and coordinated responses to manage climate risks" (USP 2012:3), a conceptualisation similar to bonding and bridging networks. Governance is the decision-making and implementation processes that include local input and information sharing that are effective within the cultural context. The strength of collective action reflects the community's collective identity, ability to work together and the number of community groups with clear responsibilities. Community diversity is the number of immigrants, mataqali and households without access to ancestral resources access, number of religions, as well as economic equality and educational attainment across the community. For example, too many different religions can split a community as religion is a central social activity for most iTaukei villages. The PACAF assumes that lower diversity can result in higher adaptive capacity due to potential for more cohesive identity, higher collective action and an even distribution of resources. It also highlights that leadership and governance can ensure equitable resource access regardless of diversity (or in more diverse communities) which could also boost adaptive capacity.

In an application of the PACAF, USP (2012) describes how an iTaukei village used a traditional social structure (the mataqali) to control coastal erosion; each mataqali was tasked with constructing a groyne on one part of the shoreline and good-natured teasing and competition led to quick completion of the task culminating in a communal feast. In this example, a project was completed quickly with community participation due to collective action via bonding networks. Collective action is an important component of life in Toga, and management of public and some private areas (e.g. building homes) is done collectively. In Toga's villages there is a time or day each week where the *turaga ni koro* will arrange a cleanup of public areas. Many of these activities are managed collectively and those decisions are respected by residents; however there are some actions where collective management is less effective, for example the cleaning and maintenance of village drainage ditches in Navatuyaba. These activities are coordinated based on norms and expectations of participation, yet not everyone adheres to these and these behaviours could be barriers to adaptive capacity. Section 6.4.4 discusses when this happens and what it means for adaptive capacity.

One element not discussed in detail Section 6.4.4 is Toga's diversity (as conceptualised in the PACAF) and its relation to adaptive capacity. Toga is generally ethnically homogenous; at the time of fieldwork there were no full-time non-iTaukei residents. There are numerous community groups (e.g. youth, women) that work on village improvement projects (e.g. Section 6.3.3). There are at least five different

churches (Methodist, Catholic, Mormon, Assembly of God, and Seventh Day Adventist), and some village residence patterns were arranged by church membership. For example, many of the members of the Mormon church lived in an enclave just outside the main village area. No interview participant mentioned splits within the community along religious lines, although in interviews people spoke of their mataqali as an important social group in terms of spending time and effort outside the household. As church membership often mirrors mataqali membership, there could be some village-level divisions due to different time and social obligations to the churches that were spoken of in terms of mataqali without mention of the church.

Navatuyaba has the most mataqali (11 were recorded in the questionnaires, although I was also told at different times there are 10 and 12 mataqali), and in interviews there was no mention of a 'newer' mataqali or one without ancestral rights to land or aquatic resources. The traditional chiefly hierarchy plays a vital role in village and district-level decision-making, as do the three *turaga ni koro*s and church leaders. Some of these individuals have played important leadership roles in community improvement projects, such as Navatuyaba's *turaga ni koro* and riverbank erosion control measures, representing opportunities for adaptive capacity as this demonstrates that parts of Toga's leadership are experienced in motivating and facilitating community projects.

Summary

This factor of the PACAF has a mixed impact on community adaptive capacity. While low diversity may be beneficial for some aspects of adaptive capacity, the benefits may not be evenly shared throughout the community. While the PACAF does highlight how in many indigenous Pacific communities low diversity can facilitate collective action, its connection between social capital having a positive effect on adaptive capacity is linked to equitable resource access. It seems to be implicit in the PACAF that bonding social capital (strong networks based around community identity) has positive outcomes for a community, however I have demonstrated in Sections 6.3.2, 6.4.4, and 7.4 that bonding social capital does not always have positive outcomes and in fact can negatively impact adaptive capacity at the household and community level. Additionally, other research has demonstrated that a diversity of social capital types (bonding, bridging linking) can boost adaptive capacity (see Section 2.4.1) and the PACAF could benefit from an explicit consideration of this.

8.2.3. Belief systems, values and worldviews

This factor of the PACAF refers to value systems and worldviews (traditional and modern/church), willingness to accept change, self-agency versus determinism, time preference[26] (e.g. present or future-orientated), and dependence on external aid. Traditional values systems and worldviews in the PACAF are considered shaped by indigenous cultural knowledge, while Western or church-based are value systems shaped by more modern (i.e. Western) and church ideologies and knowledge. Some church denominations place different emphasis on tradition (as well as self-agency or more fatalistic worldviews), and the PACAF assumes that adhering to value systems creates social capital via identity and social group cohesion. The PACAF also links higher adaptive capacity with more traditional value system adherence due to traditional skills (e.g. subsistence food production techniques) and the ability to adapt Western or church values to the traditional cultural context. This aspect is connected to the PACAF's willingness to accept change, especially if a community is willing to accept new ideas and adapt those to fit the local cultural context.

In this subsection I discuss these elements using traditional understandings of wealth and behaviour as an example of the value system and how new ideas and change are accepted. As the PACAF links traditional knowledge and values with identity and social groups cohesion, discussing the conceptualisation of a wealthy person and linking that to the cultural models from Chapter 6 and 7 demonstrates the role of the value system in adaptive capacity. Self-efficacy is related to self-agency as conceptualised in the PACAF, and collective-efficacy is related to the dependence on the external aid sub-factor which conceptualises dependence as a 'culture of dependency'.

Wealth and what makes a 'wealthy person'

Access and ownership to possessions in Toga does not operate in a "Western" notion of ownership. Material goods frequently move through kinship circles, and the iTaukei notion of what makes a wealthy person is measured by what is given away rather than consumed or acquired individually/as a household. The two quotes below demonstrate how a wealthy person has a responsibility to provide for others when asked (e.g. via *kerekere*) and share their cash, food and other resources with the Vanua (including infrastructure maintenance) and how this is defined as an important part of iTaukei culture.

> *" A rich person in the place, in the Vanua, cannot go other places and ask for something else. You know, plant his own, and also share what they, what he have with others. If* [a] *person have no*

26. An attempt at capturing time preference via the Zimbardo Time Preference Inventory was made in my questionnaire, however issues with translation and administration of that portion of the questionnaire resulted in its omission from analysis; see Section 3.4.5 and 3.6.3.

food, share - give the food to them. That's the Fijian way. In the Fijian culture, you have to share what you have to others." Karolina (female, 45-60)

"He's rich, eh - so what he should do is to help the vanua in everything it needs. Like...they always make renovations of our hall, the church, and the roads, like that. And the school. That school is for the Vanua. Ok, so helping [provide for] *what everyone uses." Lesi, (male, 15-25)*

Considering what kind of wealth or material goods people value and expend effort in acquiring provides insight into what is important for their worldview. The value placed on traditional objects, such as tabua (whale bone) and woven mats, which are exchanged via traditional ceremonial occasions (and therefore can also be tied to a specific position in the social hierarchy, i.e. one which is higher) means that these events are valued and resources (financial, time and otherwise) will be spent on them. As demonstrated in the quote by Losalina (female, 18-25) below, traditional values (sharing, accumulating traditional objects) are linked to happiness, per the cultural model of 'being in the village' (Section 6.4.2):

"L: I think the rich ones are the ones that have a lot tabuas and mats like that. And... plantation. Yeah. Not money-wise.

Q: Which would you prefer – city rich or village rich?

L: I prefer village rich!

Q: Is that a happier person?

L: Yeah!" Losalini (female, 15-25)

This exchange was just after a conversation we had about her wanting to move abroad to New Zealand or Australia for work and an opportunity to earn money, as well as have new experiences. However, she said she could never stay away and would prefer to live in the village as life was 'easier' and much happier than in cities.

There is also the public nature of giving, such as church tithing or village contributions. Weekly or monthly tithing, or annual village contributions are often made public and announced. This was explained to me as a way to demonstrate the 'goodness' of the people, as the church (or village or Vanua) had collectively (and some individuals) given so much. However, this can also induce feelings of shame and pressure if an individual or household is unable to contribute as much as they would prefer. These values guide behaviour related to understanding and accumulating savings of cash or food, which has implications for adaptive capacity (Section 7.4). For example, mataqali obligations to provide mats, food and other resources mean that households within the mataqali are expected to contribute a certain amount. As discussed in Section 6.3 households can feel forced to make choices between mataqali, church, village and household needs, which can cause emotional and social conflicts.

Some interview participants also reported feeling conflicted between being in the village and all that implied in terms of behaviour and social norms (e.g. see 'social relationships' and 'being in the village' cultural models; Sections 6.3.4 and 6.4.2). Many of those that reported this are young (i.e. less than 30) and work outside of Toga. For example, in an interview I asked Joeli (male, 26-35) who works for the government in Suva and is working toward a postgraduate degree in the evenings at the University of the South Pacific (USP) if this was something he struggled with. He replied:

> *"Yes, because I live in 3 worlds everyday. When I wake up in the morning I'm in the village so it's my village life. In the village there are the village rules and the village way of living and it has its own tabus and relationships of who we're related to and who we can talk to and how we do it. And after that from 8 o'clock I'm in the office at work. At the office the way we think and the way we do our work is very different than what we do in the villages. It's a foreign system. And then in the evenings I go and continue my education at USP and that is another system all on its own. At the university you can talk freely about many things that you can't talk freely about in the village. And at the workplace there are some things you can't talk freely about either. So those are the three worlds I live in almost every day. It's sometimes a struggle to have to go to all three different ones in one day because they're all so different. Sometimes it's hard to know what my place is, at what time and in what space. When I'm in the village or in the workplace they have their own set of rules, but when I'm at the university it's much freer." Joeli (male, 26-35)*

Other interview participants I talked to echoed similar feelings and experiences moving between physical places with different expectations and value systems. These individuals experience and understand different ways of thinking and doing things in addition to their traditional values, and have the potential to bring some of these into the village and adapt them to traditional ways of doing things. However, this still needs to be done in a way that follows norms and rules. Joeli is one of the individuals involved in the modified village governance structure (Section 6.4.3) and spoke how difficult it was for both young and older people to go against the norms of older people "telling the younger ones what to do". Some interview and questionnaire participants also connected the influence of Western and modern culture to the "disappearance" of iTaukei culture via reduced adherence to social norms (e.g. see pages 141 and 145), such as those associated with the cultural model of 'respect'. This is viewed as having serious consequences for the physical environment.

Joeli has also been involved in some community development and climate change adaptation projects (in other villages outside Toga through his job). When asked what he thought of these project in general, he replied:

> *"I have been involved in a few of these similar things, and I think the biggest problem is implementation. People are very interested in learning but then when they ask us what to do, and we say it, that is when the project stops. People are very happy to talk about it for a long time. We*

will talk about it for hours in the grog[27] session about what it is to do, but then nothing ever happens. Part of the issue is also, in the village everyone has their own role and their own job. For example, each clan has a very specific job in the village and they spend a lot of time filling that role. Things won't happen if you tell them what to do and it doesn't fit with their traditional roles and responsibility. And also a lot of the work happens at the clan and smaller levels. So if a project only talks to people at the bigger village scale, things can get lost before things can take place at the scale at which things actually happen. For example, if someone came in and said the village had to build a seawall, they should be talking to the craftsmen clan because they are the best ones to do the building work. But if outsiders don't know this, then they don't come in knowing they need to to talk those specific people and those things don't ever get implemented. Even if you pick someone who is well educated from the village, they will not be able to speak to everyone. Again, you need to talk to the right people. Like the spokesman clan to communicate between the chief and the people."
Joeli (male, 26-35)

Joeli highlights how important the existing social structures are for climate change adaptation projects. Within these social structures there is traditional knowledge and skills specific to mataqali roles (e.g. carpentry and construction skills within the craftsman mataqali), and he identifies a barrier to climate change adaptation due to an unfamiliarity with or adapting to the cultural context.

Knowing and believing: perceptions of collective and individual efficacy

Perceived self-efficacy refers to persons' perceived ability to accomplish an action or engage in a behaviour, and perceived group efficacy refers to one's perception that a group (often a group that one is member of) is able to accomplish or engage in a behaviour. Perceived self-efficacy has been included as an important determinant of adaptive capacity (e.g. Grothmann and Patt 2005; Kuruppu and Liverman 2011) and found to be positively correlated with adaptation in health-related behaviours (Schwarzer and Fuchs 1996). In this section I discuss issues around perceived self-efficacy in relation to engaging a new behaviours or making changes in the Vanua social hierarchy, as well as elements of trust and perceived group efficacy. In general, people's belief that they could not engage in certain behaviours was often due to a perceived lack of specific resources (e.g. knowledge, financial) and also lack of trust in groups to engage in certain activities.

Hypothetical scenarios and efficacy perceptions

To understand how people may respond to different kinds of climate or environmental changes, interview participants were asked what they would do a series of hypothetical situations. These included extreme heat waves, flooding, extreme storm events, rapidly increasing food prices and crop loss. Interview participants were also asked about a variety of hypothetical adaptation or village development

27. 'grog' is a colloquial term for kava.

measures and their perceptions of how well these projects would work in their community. These questions were open, and no suggestions of alternative behaviours or actions were provided. Less than five participants answered they did not know to the questions.

In general, people's responses to the hypothetical scenarios included actions that were often relatively small changes in behaviour that most participants felt they would be able to do easily. For example, in response to a heat wave many people mentioned working less in the middle of the day, using the river to cool off and making sure everyone, especially children and the elderly, drank more water. Others suggested wearing lighter clothing and relaxing traditional garb, such as men not wearing shirts and women to wearing fewer layers of clothing (e.g. some women will wear ankle-length dresses over ankle-length skirts), and also using a heat wave as an opportunity to encourage traditional weaving knowledge (to weave palm fans). There were a few participants who referenced prayer and divine intervention as the best way to respond to these events, however the majority described small behavioural changes not dissimilar to current activities.

People also described their responses to much more extreme storms and flooding as similar to current storm and flooding responses. Several people referenced hurricanes they had experienced in the 1970s (e.g. Hurricane Bebe), describing a village under two metres of water and limited external assistance in the immediate aftermath, where they relied on others and used traditional cooking methods that permit food to be stored for several days. Most people who described or referenced these severe impacts expressed confidence that they would be able to do so again, based on previous experience. Despite some reports of post-disaster recovery being difficult there was a perception of high self and group efficacy based on previous experience in almost all interview responses. Several participants also expressed that they would not wait for government assistance post-hurricane, that they would work as a family and village to keep themselves safe (e.g. in the village hall or churches) and also on immediate aftermath recovery efforts (i.e. food and water provision, removal of debris and animal carcasses).

In addition to personal experience, people also discussed using cultural traditions as an adaptive behaviour, for example moving back to more traditional ways if food prices were to increase:

> *"It is not so bad for those of us that live in the village. Because we can use candles instead of electricity. And because there's plenty of food, all around us. Like the people in the olden days, when they boiled the cassava they would drink the water, and ate all the vegetables, and that's why they lived for 80 years, or 90 years. Not like us nowadays. We don't eat such good food. And instead of the kerosene, we could just use the fire wood, And the coconut husks, and the paper, and the coconut shells." Lorna (female, 46-60)*

In this statement Lorna also implies that people living in the village, as opposed to urban areas, may be more able to respond to this kinds of changes due to the natural resources around them, as well as a conflation of more traditional ways of living and eating with greater longevity. This demonstrates a perceived association between traditional ways of life and an increased ability to respond to changes, i.e. adaptive capacity.

There were also some interesting contradictions in what people said they would do to respond to events. One of the hypothetical scenarios was a storm washing away most of the plantation land from 10 families. Participants responded that they would support families that lost land because, as demonstrated in the quote below, that is what it means to be Fijian. However, when asked if this event occurred to her household, Elina referred to private savings and keeping money separate from the socially acceptable giving and sharing practice rather than relying on other support.

> *"Q: What would you do if a storm washed away 10 families' plantation land?*
>
> *E: Just help them.*
>
> *Q: How so?*
>
> *E: That's the main thing in the Fijian* [way]*, help one another. Just give them food, clothes, anything they need.*
>
> *Q: What if one of those plantations was your plantation?*
>
> *E: That's why we have to do our financial things, keep apart some money. For that time. That time you face that kind* [of event]*, you know what to do." Elina (female, 36-45)*

This is an example of people both working within the traditional system as well as using the more recent cash-based economy to create a "rainy day fund" for the household. This also indicates a perceived level of separation or perhaps doubt in the ability of the rest of the community to be able to provide and assist with recovery after an extreme event.

Based on current and previous experience with different events, most participants expressed varying but generally positive levels of belief in the ability of their household and village to respond and adapt to certain scenarios, indicating perceptions of self- and group-efficacy for events similar to ones experienced in the past. However, discussed below are situations where self- and collective-efficacy perceptions were more diverse or negative.

Participation, social hierarchy and perceived efficacy

Participation in meetings and other public fora is important for perceptions of self and group efficacy. Some interview participants linked frustration or difficulty in influencing decisions or actions at the mataqali or village level with low self-efficacy. These are related to the cultural model of respect

(Section 6.4.5) where there are specific norms and rules for behaviour based on position and hierarchy (e.g. gender, age, mataqali). There is high agreement from all interview and questionnaire participants that participation in these public fora is very important, however what that looks like and how much influence individuals perceive they have is more varied. Those who were younger (i.e. under 30 or 35), and also female, generally described participating as attending meetings, but only speaking up if they were there as part of a designated group defined by age/gender (e.g. the village youth group). There was some individual variation reported around how comfortable participants felt speaking and "talking straight", especially in district meetings, which are less formal and behaviour around some of the speaking rules (i.e. age/gender/mataqali) can be more relaxed. Some participants reported feeling comfortable speaking at these meetings, however these participants were also all male and over 50.

The hereditary hierarchy system is also highly respected and accepted, even if the decisions being made are perceived as unequal (e.g. Section 6.4.1). For example, one individual[28] described being unhappy with the distribution of land in their mataqali. When asked if there was anything they could do about it they replied:

> *"Yes, I think... it is very hard task for us. Because the turaga ni mataqali* [mataqali leader] *is someone that is passed down the generation, [...] if this one dies it passes down to his son. So if this leader, the present leader isn't... we say he's not good. Then we have to wait for him to pass away, then we can get a new leader. We can't just take over, we can't just have someone take over his position!"*

This description of accepting decisions made by leaders was common among interview participants. There were some examples of participants describing when they were able to "talk straight" to a husband/wife/father/mother, mataqali leader or village leader, but these were also situations described as taking place privately. In situations where there may be more limited ability to publicly or privately share grievances or weigh in on decisions, self-efficacy perceptions are low and decisions made by leaders are accepted (even if there are disagreement with the outcome). This does not mean that all people in Toga uniformly accept outcomes and decisions made at other levels in the social hierarchy, as discussed in Section 6.4.3.

Although some people expressed a more fatalistic outlook and low perceived self-efficacy this was not uniform. This variation in perceived self-efficacy has adaptive capacity implication as individuals with lower perceived efficacy may be less motivated to engage in adaptive activities (Grothmann and Patt 2005; Eakin et al. 2016), and this could be acting as a barrier to adaptive capacity. Additionally, as those with lower perceived self-efficacy were more likely to be from groups lower in the hierarchy, there is

28. As this individual was critiquing a mataqali leader their age and gender are not shared.

potential for increased motivation from those with higher self-efficacy (i.e. many who were higher in the hierarchy) who may make decisions that could maintain or exacerbate current inequalities.

Trust and perceived collective efficacy

During interviews participants were asked their opinions of various hypothetical village-level projects, including the feasibility of these kinds of projects working in Navatuyaba. One of these was a fish farm owned and managed by Navatuyaba. Many participants were in favour of the idea, especially about the potential of a community-owned fish farm to produce income for the village. The biggest concerns highlighted were concerning land availability and project management. As all village-owned land is occupied, participants were unsure where a fish farm could go although several participants suggested a mataqali with extra land donating a piece of it for this purpose.

The concerns over who and how the hypothetical fish farm would be managed reflect varying perceptions of group efficacy (see Section 6.4.4 for discussion of concerns about managing a hypothetical fish farm). Several participants also brought up the example of another Vanua owned business, a tractor, as an example of potential issues with Vanua or village-owned business. I was told a tractor was purchased with Vanua and government funds, to be available to hire out to residents at discounted rates, with proceeds going back into the tractor business and to the Vanua. The business was managed by a Vanua committee, and the tractor was purchased and presented to the village with a large ceremony attended by the important local and government representatives, including the Minister of Agriculture in December 2013[29], but I was told it was only in use 1-2 times during my fieldwork (ending May 2014). There are other tractors available to rent from people outside Toga and I was told that local residents were continuing to use those. Although I was unable to verify all these details, regardless of whether the Vanua tractor was being used frequently or not, there was a perception that a Vanua committee with individuals chosen based more on hierarchy than ability (and without relevant training) could not be trusted to manage a project or business on behalf of the Vanua, similar to concerns reported about managing the hypothetical fish farm example mentioned above.

Overall, perceived collective-efficacy varied. Commonly brought up issues of rubbish clogging drains and a decline in village activity participation indicate a number of people perceive that the village, as a group, may not be able to accomplish tasks that many people feel are basic necessities (e.g. keeping the village clean). This is also reflected in the way a number of participants spoke about certain activities, namely those that involve running a business such as the tractor or a fish farm. The expressed doubts and lower collective-efficacy could also reflect an unfamiliarity with ways of doing things and value

29. See photo from the ceremony on page 74.

systems that are more modern/Western, such as running a business involving transactions and relationships conceived of differently than in the cultural model of the Vanua (Section 7.3).

In contrast, when asked about hypothetical scenarios that were close to experiences similar to actual experience people have had, group efficacy perceptions were increased. For example, many participants expressed confidence that their household, mataqali or village would be able to deal with and recover from a severe hurricane or flood, as they had done so in the past and understood how to go about dealing with these kinds of events. There was some hesitation with willingness to accept new knowledge if it did not fit culturally, with 64% of questionnaire participants agreeing that new ways of doing things that did not fit with *va'a vanua* could work now, but not in the long-term. Although newer ways of doing things are present (e.g. mobile phones, increased use of social media such as Facebook by young people), this also demonstrates that there may be some hesitation at accepting new ways of doing things until how well they fit *va'a vanua* is established.

Dependence / Independence: reliance on external organisations

Post-disaster, external organisations (e.g. Red Cross) can play an important role, depending on the severity of the event. People relied on external organisations for food after events that flooded all of Toga (e.g. Hurricane Bebe), however people also described post-disaster recovery as something larger managed within Toga (e.g. organising cleanup of debris, distributing food if not all residents had flooded plantations). In general, there is not a high level of dependence on external organisations for smaller scale events (e.g. some households flooding). However, for food and shelter for severe impacts such as flooding destroying all crops and a total evacuation of people, Toga's residents rely on external assistance to meet immediate needs while also managing recovery independently (in terms of cleaning up, rebuilding, etc).

Summary

This factor has a mixed impact on adaptive capacity. The strength of the Vanua as a behavioural guide does provide a sense of social cohesion and can act a reservoir for traditional skills and knowledge. As demonstrated above some people in Toga associate traditional values and ways of life with adaptive capacity, and values are identified as a determinant of adaptive capacity (e.g. O'Brien 2009). Other modern/Western values systems, that some of Toga's individuals navigate daily, could provide new ideas and these individuals could provide assistance assimilating and adapting new knowledge to traditional practices. However, many of these individuals are younger and traditional values and norms restrict their authority or ability to advise community elders and leaders, representing a potential bottleneck in community information sharing and learning and a barrier to adaptive capacity. Perceived

self- and collective-efficacy for different activities varies depending on familiarity with the activity (and potentially the associated value system, e.g. running a business).

8.2.4. Resources and distribution

This PACAF factor concerns amount and distribution of resources within the community to meet basic daily needs (e.g. food) as well as health and factors influencing quality of life: arable land, fisheries/aquatic resources, income, infrastructure and services and water/sanitation. The PACAF assumes that lack of access and/or uneven distribution can indicate lower adaptive capacity due to additional pressure placed on current resources, inequality or higher incidences of hunger or disease.

Land, aquatic resources and income

Most households rely on a combination of the plantation, river and the store for daily and weekly food (Table 8.2). Diets are typically based on taro or cassava (from the plantation), some other fruits and/or vegetables (also from the plantation or accessible forest land), and a protein source. 90% of households grow taro and 96% grow cassava on their plantations. The protein is *kai*, shrimp, or fish from the river, or can be chicken or another meat purchased from somebody in the village or from the store. Food from the store typically includes sugar, flour, rice and other sundries.

Table 8.2 Daily and weekly food source consumption. The percentages in the table represent the frequency which households eat food from different sources at least daily or weekly. Households were able to select more than one option, e.g. the plantation often provides staple crops that are then supplemented with protein for the river or store. *Muana (n=36); Vunisei (n=30); Navatuyaba (n=57); Vanua (n=123)*

	Plantation	River	Store
Muana	100%	89%	92%
Vunisei	93%	83%	97%
Navatuyaba	98%	82%	95%
Vanua (all Toga)	98%	85%	94%

In order to meet daily needs as shown in Table 8.2, a household requires access to plantation land, the river and an income source for purchased food (as well as school costs, transportation and participation in Vanua/mataqali activities). Most households meet these needs through a combination of subsistence planting and harvesting from the river, as well as selling food grown on the plantation or harvested from the river, or by receiving income from a household member engaged in full or part-time work. 75% of households in Toga receive at least part of the income from their plantations and/or the river. This is frequently in combination with a household member in full-time or part-time work (frequently in Nausori or Suva), or financial support from other family members residing away from the village

(e.g. other population centres in Fiji or abroad). Land quality was reported as generally fertile with some pesticide and fertiliser use, and some interview participants reporting using self-produced compost (due to cost and preference for a 'natural' product). Many of the staple root crops can be harvested 6-8 months after planting (and some varieties even earlier), meaning that post-disaster donated, given and purchased food needs to last 6 months at least.

Given the importance of plantation land for meeting food and income requirements, access to plantation land is very important. However, land availability frequently came up during interviews and informal conversations as an issue people identified as either a current or near-term future problem. People linked land availability to erosion and/or population growth. Additionally, land availability in Toga is limited because Toga is an island and traditional customary land tenure has fixed boundaries for mataqali land (see Section 4.2). These land availability issues constrain adaptive capacity as indicated here, and could be a barrier to adaptive capacity in the future.

Limited land availability affects the ability of some households to meet subsistence needs, increasing the reliance on purchased foodstuffs. Some households have also been limited in their ability to grow more to generate additional income (either to offset changes in food prices, or to meet mataqali, village or other financial requirements) due to land shortages.

> *"Unemployment is the major concern nowadays because most of us rely now on the goods bought from the shops since there are no space available for us to plant on." Nemani (male, 18-25)*

This concern is not only limited to land availability, but is also related to the quality of the land. Plantation land that is either eroding or in an area that floods frequently was also identified as an issue driving people to purchase, rather than grow, their food.

> *"The biggest problem we are facing is that most of the things that we used to plant, we are now buying because the excess water in the fields prevents us from working the land." Merewai (female, 26-35)*

Other residents of villages in Toga were concerned about their current and future ability to maintain their livelihoods based on land availability. These future concerns were primarily centred around erosion reducing overall land quantity and population growth decreasing the areas available to each household:

> *"Since there are so many erosions, we are not sure whether the land that we reside on will be here for years to come or not." Rusila (female, 18-25)*
>
> *"I think that the island of Toga will not cater for all the future generations of the island because of the constant erosion of soil." Asaeli (male, 26-35)*

"The amount of people living in Toga is ever increasing and it is not corresponding with the land available." Viliame (male, 46-60)

Land also occupies a unique place in an iTaukei worldview. Although ownership of most possessions is considered fluid and dynamic, land is not considered a possession but is a larger part of identity and community (e.g. Biturogoiwasa 2001). When discussing different potential responses to erosion I asked participants about a hypothetical land reclamation program that would reclaim some plantations to set aside as a buffer zone[30]. Many participants rejected the idea, saying that land could not be taken away from people by the government or anyone else. Several older participants thought that could potentially be a good idea, but most of those rejected the idea when asked if they'd be willing to give up a portion of their own plantation land.

"Its very hard... cause here there not plenty land in one of the mataqali. We just divide into pieces to plant our food. [...] I can't just give it cause that is where we plant our own. We just survive with it." Elina (female, 36-45)

People linked their ability to survive with the land, and these quotes demonstrate the reliance on specific plantation areas for household subsistence and income. Additionally, the following quote reflects the emotional upheaval that many people expressed in interviews when asked what they would do without their land.

"Since our house is right beside the river, when it is flooded over and erodes, we have no where else to go because that is our piece of land." Osea (male, 26-35)

The young man above states that he and his family would have nowhere else to go if their land was taken away. The quote below follows on this sentiment, with another young man describing how those in the mataqali that do not have jobs work on the plantations. However due to limited land availability, those without wage employment cannot count on staying in the village and being able to farm.

"Right now in my mataqali things are okay, there's lots of employment and lots of people are starting to move to town. And those of us who don't have employment, we are farmers. And that should be okay, but the problem is that there isn't enough land here for us. So the options left are to buy land, to lease land. But you have to find the land to lease also. So would be very good for the mataqali to expand their land, maybe by leasing more. Or for everybody to use it well. Maybe to do different things, that bring in more money, like a poultry farm or something like that." Timi (male, 18-25)

The young man above describes a potential scenario where the mataqali leases or purchases land and uses this extra land for the benefit of the mataqali. The young man is part of the family mentioned in Section 5.2.2 that has leased land outside of Toga due to poor land quality (i.e. frequent flooding) of

30. The hypothetical project involved 10 families giving up half their plantation land to be planted with vegetation that would prevent erosion for at least one quarter of Toga. The question was designed to test attachment to plantation land within the mataqali versus prioritisation of Vanua and community needs.

their current plantation as well as limited land availability within their mataqali. The potential negative (as well as positive) social and identity implications of leasing and living on land outside of Toga also discussed in Section 7.3. This family's choice to pool cash resources to lease land, as well as build a house and spend time on the new land planting and tending crops is an example of adaptive capacity. This example is unusual; they were the only household who mentioned they were engaged in leasing land away from the Vanua as a response to limited land availability and quality. The household consisted of 10 people of mixed generations, with at least six adult income earners (including non-wage workers who work on the plantation). These additional adults in a household can both place extra pressure on a household to provide food and shelter, but can also provide opportunities for resource and labour pooling, as this household has done. This is an example of collective action at the household scale to respond to current and future issues with land quantity as well as quality of land (due to flooding). Time away from the village and Vanua can mean a loss of social connection as presence and attendance at village events will be less frequent with more time spent away. This could have further impacts on emotional ties to the Vanua and one's identity, as well as potentially leading to a sense of fragmentation at the community level.

Infrastructure, services and water/sanitation

Adaptive capacity is also somewhat constrained by water quality issues due to impacts on human health and aquatic resources. Although potable water availability for households is widespread (via water mains and the main water treatment plant), water quality in the Toga and Rewa Rivers was also reported by interview and questionnaire participants as an issue of concern. Several interview participants reported noticing an increase in skin diseases, especially among children, in recent years. One interview participant said that he did not permit his family to swim in the river due to health concerns, and water quality issues linked to health problems and aquatic food resources were identified during interviews as issues that people were concerned about at both the household and Vanua level.

Infrastructure is generally good, with access to education, markets and medical facilities in Nausori and Suva via public transport. Taxis are also available, and there is a visiting nurse and local primary school. Mobile phones are common, and radios and televisions are also widespread. These facilitate communication during an emergency; however during flooding the road on the island may become impassable and the culvert connecting the island can quickly flood. This cuts Toga off, although there are some boats and rafts available to transport people if needed (depending on the situation/ emergency). Footpaths permitting access around the village can become dangerously slippery during heavy rain, and being housebound for long periods by those with mobility issues (e.g. wheelchair users

or amputees) was reported by several interview participants. This has implications during extreme events, as quickly moving to evacuation areas may be needed, as well as an ability to participate in mataqali, village and Vanua activities.

Summary

Adaptive capacity for this factor in the PACAF is mixed. While access to infrastructure and services is more evenly spread throughout Toga, access to income generating activities, land (land quantity), and experiences with household and plantation flooding (land quality) are unevenly distributed. The issues raised in interviews and the questionnaires around land availability (and the examples of families impacted by poor land quality due to flooding) represent a potential barrier to adaptive capacity in the future. If households are unable to meet their subsistence needs, they may need to engage in increased wage employment, which can impact their ability to fulfil and participate Vanua and church activities (see Section 6.3.2) as well as having an emotional and social cost.

8.2.5. Options

The PACAF's options factor includes three sub-factors: options available for climate change adaptation, monetary livelihoods and food acquisition. The climate change adaptation sub-factor includes the possibilities that are available and accessible to the community and primarily refers to externally-conceived options and those that empower communities learning to adapt, given that those based on traditional knowledge and skills are included in the Human Capital factor. Monetary livelihood options as defined in the PACAF refer not only to livelihood diversification, it also includes the ability to derive income with future climate changes. Food acquisition refers to various means and access to food sources for subsistence, during famine, and imported foods.

In Toga, adaptive capacity is somewhat constrained due to access to and availability of options for climate change adaptation. Flooding and erosion were identified as two of the most serious issues, and dredging the Rewa River is one of the solutions preferred by residents although they have limited ability to control or initiate dredging, as well as potential negative ecological impacts from dredging rivers (e.g. disturbing benthic organisms such as *kai*; Tamata et al. 2010). There are adaptation measures in place (e.g. raised homes and plantations, tree planting along riverbanks) based on local knowledge. However there are other projects identified during interviews as desirable and beneficial for the community which require funds, technical expertise or authority beyond the community. For example, removing the culvert at the northern end of the island and replacing it with a bridge would be costly and Toga would need to work with the government to authorise and accomplish this. Another project was brought up in an interview after watching the trees planted for erosion control eroding into the

Toga River; a combination of hard structures and planting along riverbanks for long-term erosion control was proposed but then immediately dismissed as too costly financially (although the individual who proposed it had worked for the Public Works Department on riverbank erosion construction and had the technical knowledge to advise such a project).

Another element influencing options for climate change adaptation are the organisations conducting community-based climate change adaptation projects. While Toga has not experienced any formal projects, in nearby villages organisations such as USAID (US Agency for International Development) and USP have implemented climate change adaptation projects aimed at erosion control and agricultural development (respectively). I interviewed seven participants from different levels of government in Fiji that had been involved in climate change adaptation projects, as well as participants from several large international environmentally focused NGOs also engaged in community-based climate change adaptation projects.

According to three of the interview participants from environmental NGOs and the Fijian government, there are a growing number of community-based climate change adaptation projects within Fiji as it can be easier logistically to get to and to get around compared to some other Pacific island countries. This also applies to the selection of project sites within, with interview participants describing situations where project site selections were made politically or based on a personal preference for working with individuals perceived to be more cooperative than others, rather than community needs or vulnerability. Several of the participants discussed the need to incorporate community and cultural viewpoints and approaches and a preference for holistically focused projects. However, they also discussed how rare these kinds of projects could be as donors had specific remits, frequently targeted at a single sector or type of potential climate change impact. Some other barriers discussed by almost all of these interview participants included funding cycles and reporting needs mismatching the reality of conducting a project "on the ground". As discussed in Section 3.4.2, slowly building relationships based on informal exchanges and spending time together (talanoa) is important for doing research as well as any other kind of development work in an iTaukei community. Although non-Pacific Islanders, three interview participants from several of the NGOs were aware of the importance of practices such as talanoa and expressed frustration that project funding cycles and timelines prevented them engaging in these activities. However, as discussed in Section 8.2.3, recognition of the importance of working within the local cultural context does not always result in projects that employ this knowledge.

In terms of the monetary livelihoods and food acquisition sub-factors, Toga's proximity to Suva also means there are more connections to NGOs and research organisations than more remote communities may have. For example, an examination of depuration to add value (and reduce human health concerns) of *kai* by the International Union for the Conservation of Nature (IUCN) and a USP student took place in Toga. These kinds of projects have the potential to turn into larger scale projects, and also build relationships between the community and these organisations for potential future work/ assistance. These kinds of projects may not be specific to climate change, but assistance building the ability of local residents to scale up businesses can increase livelihood diversification and facilitate future income earning even with climate change impacts. Toga's proximity to Suva and Nausori also mean there are more current and future potential options for food acquisition and income generation. Employment and purchased food is more available, which could be an opportunity in the future if current plantation and river-based livelihoods are unable to meet future subsistence needs.

Summary

While there is higher adaptive capacity due to more potential options for livelihoods and food acquisition, adaptive capacity may be constrained by adaptation options. There are issues with implementation and barriers within projects and implementing organisations, as well as a finite amount of land in Toga and efforts to mitigate or prevent flooding and erosion may end up being costly and technical (and have other negative impacts, e.g. dredging). With the separation of the livelihoods and food acquisition sub-factors from adaptation options, the PACAF conceptualises climate change adaptation as specific to climate change impacts rather than as efforts to holistically increase resilience or reduce vulnerability. While ability to adapt to specific climate impacts is important, including a more holistic view may also permit examination of trade-offs that may have to be made for some of these activities. For example, dredging can reduce impacts from flooding, but can also negatively impact aquatic food resources, such as *kai*. The PACAF may benefit from including more nuance on the interaction between the impacts of different options and the community, including potential unintended consequences or maladaptation.

8.2.6. Information and awareness

This factor of the PACAF refers to local awareness of climate change (via scientific information or locally experienced and observed), as well as the ability to link information about climate change to sectors of community life which has been linked to higher adaptive capacity (e.g. USP 2012; Warrick et

al. 2016). This factors also includes ability of individuals to analyse information and how well external risk communications reach and are understood (e.g. weather forecasts or emergency broadcasts).

Access to climate information and climate-related risks (e.g. hurricanes) is generally high in Toga, with radio, television, newspaper and word-of-mouth used to share information on immediate and near-terms weather forecasts, in addition to a broad understanding of their climate based on experience and observation. Proximity to Nausori and Suva facilitate the movement of this information, and the Fijian Government has produced a glossary of climate change terminology in Fijian. However, this information is very technical (i.e. translating 'ocean acidification' terminology into a vernacular will not result in local understanding unless the scientific concepts are also explained in non-technical terms). Despite, there are a number of Toga's residents that have attended climate change-related workshops from NGOs or the government, or are studying climate change at university. These individuals, in addition to television and newspapers, have the potential to increase awareness and understanding of climate change within Toga. However, USP (2012:52), also notes that while there are often assumptions that increased knowledge and awareness of climate change leads to informed decisions on climate change adaptation (i.e. implying a rational-actor based understanding of decision-making), they feel that in reality increased access to 'scientific' climate change information does not necessarily have a high impact on local climate change adaptation decision-making.

Although access to climate change information is common, linking this information to the local area is not always common, as non-locally specific messages are often repeated in newspapers and television (based on reading six months of the two major Fijian newspapers and interviews). For example, some interview participants spoke about all the islands of Fiji, including the high volcanic island of Viti Levu (highest point of 1200 m) "sinking" within the next 100 years. These participants had read or heard about other Pacific islands "sinking" (e.g. Kiribati, Tuvalu and other atoll countries) and also heard that was happening to all of Fiji. Some interview participants also mentioned 'dirty' air as a cause of climate change, and tree planting to clean the air as one of the solutions. This may represent misinformation, or a misinterpretation of technical information that may not have been communicated in the Fijian language.

In interviews and the questionnaire, I asked participants their preference for and to evaluate the benefits and costs of potential adaptation and community development options. The answers provided by many participants demonstrated that individuals were able to analyse and evaluate information and potential options. For example, when discussing the impacts of and how to address a drought, one young man discussed impacts on most of Viti Levu due to impacts on hydroelectric generation (up to

65% of Fiji's electricity is generated by hydropower; Dornan and Jotzo 2011). Although some individuals answered these questions with "I do not know," this may reflect that they were tired or did not want to engage with the question, rather than reflecting their ability to analyse information. This method is used in the PACAF and while useful for a quick overview of potential capacity of individuals, the method requires careful consideration and caution about interpreting lack of engagement with an interview as inability to analyse information.

Summary

Adaptive capacity for this factor is mostly positive. Toga has access to climate change and climate risk information, and there is potential within Toga for this information to be 'translated' as some available information is technical. There is also capacity to analyse and evaluate options and information (conceptualised as similar to a potential barriers to adaptation in the 'planning' stage of adaptation). However, there also seems to be some misinformation or misinterpretations of climate change change causes and impacts.

8.2.7. Previous experience with climate events

This factor in the PACAF is the experience of and how a community has dealt with periods of significant disruption and change, including both climate- and non-climate related (e.g. hurricanes or floods, disease outbreaks or earthquakes). As discussed previously with perceived self and group-efficacy and in Chapter 5, people in Toga have experience dealing with and recovering from periods of climate-related change and disruption. The issues of particular concern associated with the periods of change and disruption identified by questionnaire and interview participants are flooding on plantations and within homes, erosion, water quality impacting aquatic food species, and hurricanes. As discussed in Section 5.2, people have responded to these events in various ways. Although not explicitly a factor in the PACAF, examining how these previous experiences are understood as issues can provide additional insight to barriers and opportunities for adaptive capacity. One aspect of barriers and opportunities for adaptive capacity is what actions people choose to take to address issues, and these are predetermined by past experience, as well as perceptions of what problems are and how to solve them (Adger et al. 2009). Understanding a problem in a certain way can lead to expectations of actions to address, and is demonstrated by attribution of the causes of flooding and erosion, and how to solve these issues by Toga's residents. These expectations and understandings are based on previous experience and observation of the local environment. Flooding and erosion are used here to demonstrate how experience can shape understanding of causation and solutions as they are the two

issues identified as serious threats for the Vanua (see Section 5.3) that also were mentioned in almost every interview.

Previous experience and shaping cause and solution for flooding and erosion

People in all three villages noticed changes in both erosion and flooding over time, and most also reported these as problems or negative events. More than 87% of questionnaire participants in all three villages reported changes in flooding, while a majority also noticed changes in erosion (Table 8.3). Questionnaire participants from Muana and Navatuyaba noticed changes in erosion more than those from Vunisei, not unexpected as more erosion was reported along the Toga River side of Toga and as more pronounced as the southern end of Toga, closer to Navatuyaba.

Table 8.3. Proportion of households that noticed changes in flooding and erosion. *Questionnaire participants per village reported noticing a change in flooding and a change in erosion. (flooding: n=128; erosion: n=127)*

	Navatuyaba	Vunisei	Muana
Noticed changes in Erosion	87%	63%	73%
Noticed changes in Flooding	97%	90%	87%

To understand how people think about these issues, I also asked why they thought flooding and erosion had changed (Figure 8.1 and Figure 8.2). People's explanation of why erosion had changed are more mixed than for flooding, with most participants selecting more than one reason why they believed it had changed; most people highlighted dredging in the Rewa River or poor drainage within the village as the reasons for flooding changes. 51% of participants selected dredging as the only the reason for flooding changes, whereas only 36% of participants chose only one reason for erosion changes (that the water is flowing differently). When asked about reasons for the water flowing differently now, some participants identified upstream development and land use change, as well as cutting down trees on the riverbank in Toga. A few participants said that climate change could be the cause, however also stated they were not sure about climate change as a cause because they were not sure what it was. Both the selected reasons for changes in flooding have tangible and clear responses: cleanup drainage ditches and have the Rewa River dredged, while the fact that multiple reasons for erosion changes were selected indicates a less clear connection to specific actions.

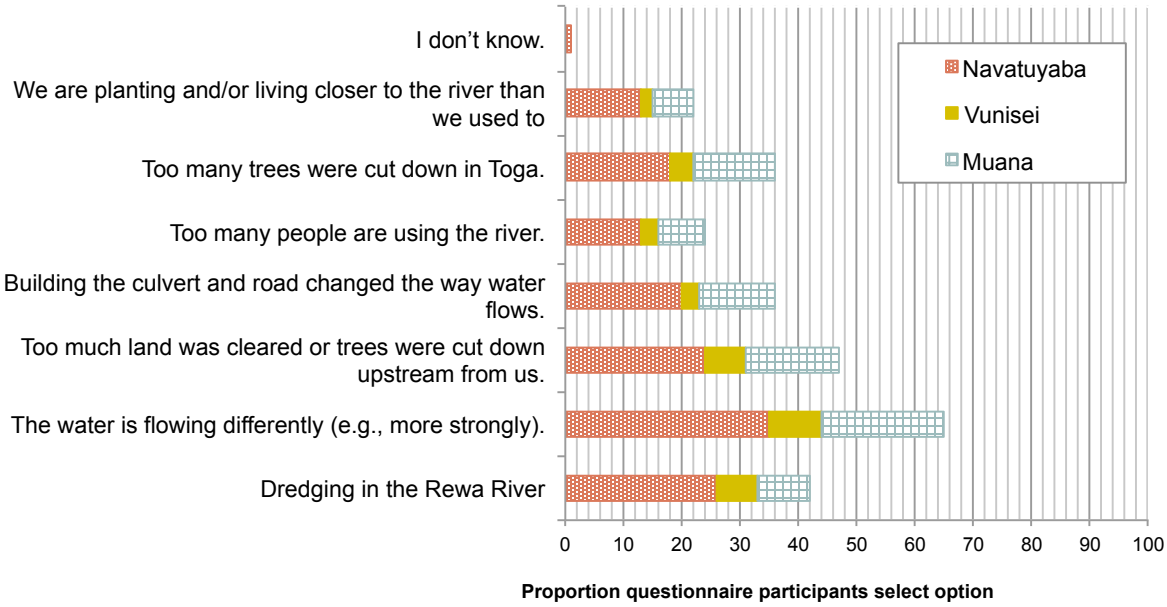

Figure 8.1. Attribution of changes in erosion. *(Navatuyaba n=60; Muana n= 30; Vunisei n= 37).These options were sourced from interviews and informal conversations. Questionnaire participants could chose as many options from the selected lis, and also had the option of adding reasons. Five added reasons included rubbish blocking drains, trees debris clogging the culvert and air pollution.*

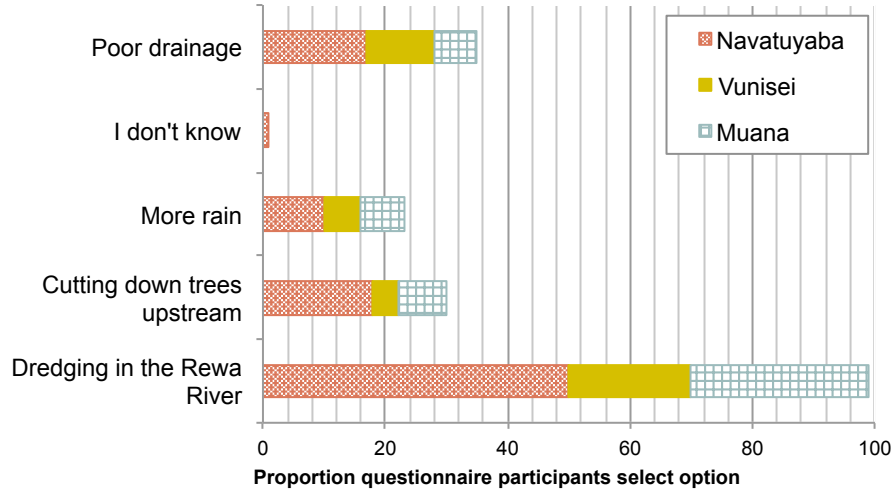

Figure 8.2. Attribution of changes in flooding. *(Navatuyaba n=60; Muana n= 29; Vunisei n= 38). These options were sourced from interviews and informal conversations. Dredging was by far the most common reason people provided. Questionnaire participants could chose as many options from the selected list as they preferred and had the option of filling in additional reasons. The three additional reasons included dumping rubbish on the riverbank and too many floods (n=11 for rubbish on river bank).*

In contrast, it was much clearer why people thought that flooding had changed over time. Over half of those who answered (53%) listed dredging in the Rewa River as why flooding has changed. Also interesting is that almost 20% of participants highlighted poor drainage (in part due to rubbish clogging

drains) as a cause of flooding. Unlike river dredging and upstream land use, this is something that the community has relatively high levels of control over.

When asked what the solutions to flooding and erosion were, participants frequently mentioned more dredging as a solution to both issues. Reasons provided by participants for why it wasn't being done included speculation on government choices, overall costs of dredging and general delays with government projects in Fiji (implying that some people felt that dredging was going to happen again in the future). There was an Environmental Impact Assessment for Rewa River dredging in 2010 (Tamata et al. 2010). However, in my research determining the connection between dredging as the cause and as the solution for issues with flooding and erosion was difficult. I was not able to find specific dates for recent dredging practice and dates provided for flooding and erosion varied in their specificity. Most questionnaire and interview participants mentioned changes, however when asked for specific dates or events the answers varied, indicating different experiences linked to the impact of dredging as well as dredging having a cumulative impact on household and plantation flooding. Many participants described dredging has something that "used to happen" indicating it has not been a frequent practice or effects have not been noticeable in recent years.

One participant[31] in Navatuyaba brought up alternative erosion control measures during an interview, that he felt would work on the island: a combination of hard structures, graded riverbanks to minimize wave damage and planting both fast-growing vegetation for the near-term and slower growing trees with larger root structures for long-term bank stabilisation. He felt that the main limitation for doing something like this was primarily cost, followed by a lack of expertise in the community. These perceptions of solutions and barriers to implementation are based on assumptions that assets (i.e. expert knowledge and finance) are necessary to address these issues, and the barrier to implementation is the lack of these assets in Toga.

Participants had the option to write in attribution causes in addition to those provided, and two participants linked air pollution to changes in flooding. These attribution causes were drawn from several hours of conversation with village residents and leaders discussing erosion and flooding as major problems over 4 months. However I also recognise that the list of provided options may have framed the way these questions were answered. How most local residents attribute changes in flooding and erosion shapes the issues as ones that can be solved in certain ways (e.g. by reintroducing dredging). Additionally, barriers to implementing the specific actions (e.g. increased dredging practice,

31. His knowledge of these measures was potentially due to working for the government on erosion control projects elsewhere in Fiji, as his answer was unusual compared to other interviews.

bank stabilisation) were often discussed in terms of lacking financial assets or knowledge rather than framing the issue in other ways, e.g. growing population increasing the number of people living in more flood-prone areas, acceptance that flooding and erosion are constant processes in a delta system.

Summary

For certain weather-related events, such as flooding and erosion, people's perception of what causes these is closely related to the kinds of solutions that are seen as viable and effective. The main barriers to implementing these solutions were described as the lack of primarily financial and knowledge assets. The adaptive capacity from this factor is positive; Toga has experienced and responded to numerous periods of change and disruption. However, the more widely accepted attribution of flooding change is directly connected to a technical solution which community members expressed numerous barriers toward obtaining. Agreement over attribution of erosion changes is mixed, although most offered solutions rely in some part on external technical expertise or financial support. Although not explicit in the PACAF, exploring how previous experiences are understood and may shape preference for solutions can be used to determine more than a 'track record' of successful recovery from periods of significant change and disruption.

8.3. Opportunities and Barriers to Adaptation

Based on the factors identified in the PACAF, adaptive capacity is mixed in Toga. I used the PACAF to evaluate adaptive capacity, and through this evaluation I identified a combination of existing and potential opportunities and barriers for Toga's adaptive capacity. I have also identified determinants of adaptive capacity important for Toga, and the relative importance and relationship between these determinants. Table 8.4 below outlines aspects of Toga that contribute to, impede or are a mix of contributions for Toga's adaptive capacity. These elements are organised by the seven factors of the PACAF to provide an overview of the contribution of that factor to adaptive capacity. For each of these there is a mix of elements that contribute to, deter from or have a mixed impact on adaptive capacity. For example, in the resource factor, good access to services and infrastructure outside Toga can contribute to adaptive capacity via facilitating support in an emergency, as well as present an opportunity for alternative income generation options. However, limited land availability can be a barrier to adaptive capacity as population increases and land access is not equitable distributed. The opportunities and barriers to adaptive capacity and adaptation related to these elements are discussed below.

Adaptive capacity is not evenly distributed throughout Toga, with some mataqalis or households more or less impacted by these aspects than others. For example, as mataqali land boundaries are primarily fixed, regardless of population fluctuations within a mataqali, some households within a mataqali may be allocated land that is of poorer quality (i.e. frequent flooding). Some mataqalis have land that may be more prone to erosion or flooding than others. As a result some mataqalis or households within a mataqali are unable to produce as great a surplus of food for income and/or to meet traditional and church obligations - resulting in an inability to save a buffer of cash or potentially declining participation in village communal activities as a reaction to emotional stress (or a choice) due to an inability to meet obligations. This is an example where the existing culturally-based land tenure results in barriers for adaptive capacity for some, while others may have opportunities. These opportunities could arise directly from those barriers if those households/mataqali chose to lease unused land to households/mataqalis with flooding or eroding land or use for additional income generating activities for their mataqali.

Some households have responded to limited quality land within their mataqali by leasing land outside the Vanua for additional living and planting space, however that behaviour is not common, and could have implications for land availability in other communities. As mataqali land does not expand/ contract with human population fluctuations, the balance of this as a barrier or an opportunity can change over time. There is also a temporal element via interactions with ongoing natural (and human-influenced) processes of erosion and accretion in Toga. Reliance on the plantation and rivers for food mean that any events disrupting land availability or water quality can have further consequences for food production and income. This demonstrates that although land as a resource is important for adaptive capacity, the access to and the distribution of land can have a greater influence on potential adaptation actions. The mix of access to income generating activities as well as uneven experiences with regular flooding on plantation land is a potential barrier for adaptation. As discussed previously, ability to *kerekere* and the communal nature of the Vanua mean that households that experience lower incomes or frequent flooding are more likely to draw on these support networks, and therefore potentially reduce the ability of these networks to save or spend resources on adaptive activities. This tension between the household and the village is one that people are aware of, and make different choices in how to navigate (e.g. see Section 6.4.4).

One of the opportunities for adaptive capacity in Toga is a result of the communal nature of life and the sharing and constant exchange of food, goods and other resources. This approach to sharing and exchanging goods is an opportunity as these behaviours and exchange networks are in place during and

Table 8.4. Contributions toward and deterrents from adaptive capacity. *The columns indicate elements from the PACAF that are contributions toward (+), deterrents from (-) adaptive capacity, or are a combination (+/-). These examples are drawn from Section 8.2*

Adaptive Capacity Factor *(from PACAF)*	**+**	**+ / -**	**-**
Human capital	Traditional knowledge present and utilised		Traditional knowledge loss, especially in younger people
	Health/sanitation overall good		Some traditional knowledge may become less relevant (e.g. calendar) with climate change
	Presence/potential for change agents within community (especially among young people)		
Social capital	Ethnically homogenous	Balancing commitments to supporting networks/Vanua can be hard to balance	Uneven distribution in educational achievement and wealth
	Presence/potential for leadership within community (especially among young people)		Larger village/Vanua population size can be harder to engage with all individuals/have full participation
Belief systems, values and worldviews	Vanua is strong behavioural guide	Varying levels of perceived self- and collective-efficacy depending on how different/ similar the behaviour is current behaviours	Low perceived group-efficacy for projects involving cash
		Mixed willingness to engage in new behaviours	
		Mix of here-and-now and future thinking	
Resources and distribution	Good access to most services (relative)	Mix of access to income generating activities at community level (is positive for some households, not all)	Highly uneven experience of regular flooding within Toga
	Agricultural production relatively easy (although land productivity spatially heterogenous)		Limited land availability (although heterogenous by mataqali)
Options	High potential for other livelihood diversification/ options via proximity to markets and support organisations		Funding and technical expertise perceived as barrier to many adaptive actions
Information and awareness	Most people familiar with term climate change		Only very general awareness of climate change and some misinformation present
	High potential for sharing knowledge via individuals w/in Toga w/knowledge of CC		
	Good access to most weather information		
Previous experience with climate events	History of successfully dealing with climate/weather events		

post-disaster to meet needs and aid recovery. This is seen in other traditional practices related to natural resources, such as *tabu* for aquatic species. Non-iTuakei residents on the other side of the Toga River have historically respected and aided enforcement of the *tabu* when it has been placed on the river in the past. These collective action practices are examples of social capital, collective action and values and are important in shaping potential adaptation actions.

Another opportunity for adaptation is the presence of individuals that could act as change agents or play a leadership role. There are individuals within Toga that have expertise or advanced degrees in such topics as climate change, erosion control measures and agricultural practices, and potentially others. How these individuals may be able to act as change agents or influence leadership will likely depend on individual willingness as well as status within the social hierarchy. They may be able to motivate for change or influence events by speaking publicly, or perhaps may need to act in more informal and private settings depending on their age, gender and mataqali.

The influence of personal experience and observation in understanding and shaping issues such as flooding and erosion is also important. Potential barriers and opportunities can be a result of how issues and solutions are shaped, such as the example of flooding perceived to primarily have causes related to dredging, which is also the solution. When options for climate change adaptation or community development to address issues within Toga are discussed, identifying solutions and agreement on the solutions' effectiveness could be a potential barrier if consensus is difficult to reach due to conflicting understandings of causes and solutions. This, and the above examples, also demonstrate the role of elements such as social capital, collective action, values, efficacy perceptions and perceived attribution of stress (e.g. flooding or erosion).

Activities and experiences that are similar to what people have engaged in historically may also be present as opportunities, while more unfamiliar activities or activities associated with value systems that are not well-integrated into the local cultural context could be barriers to adaptation. As mentioned above, material goods constantly move between households and possessions are not owned as they are in a "Western" sense. For example, if a boat was an important resource for community access when the bridge is flooded, it would not only benefit the household that had the boat, but also members of that mataqali, the church and also others within the village. If one was conducting an adaptive capacity assessment, for example, considering that hypothetical boat as belonging only to one household, it could miss that the boat would provide benefit to a large proportion of, or potentially the entire, village. This is another example of how understanding the context of an area when examining adaptive capacity is vital, and the role a framework such as the PACAF could play regionally for assessing

adaptive capacity. Not understanding the social context of ownership and possessions could lead to the loss of important nuance in how resources are understood and accessed. Additionally, the health and well-being (in terms of environmental quality and as producing food) of the land and water within the Vanua are considered integral to the identity of people from Toga, and therefore care of these resources is not considered a separate or additional activity, but rather part of daily life.

8.4. Conclusion

This chapter examines and identifies potential barriers and opportunities for adaptation in Toga. The movement of and access to resources in Toga is mediated by cultural rules, which can be understood as the Vanua. In this context, the Vanua is vital toward understanding potential adaptation action. For example, how land (and therefore income generating activities) is accessed and the role of norms, values and perceived self- and collective-efficacy have greater influence on barriers and opportunities in this context than the presence or absence of assets used for adaptation (e.g. natural resources). Culture, conceived as a set of shared norms (e.g. those that characterise the Vanua) influence the way that people understand and access resources, social, natural and financial and use those resources to engage in adaptive actions. Although the availability of land for all of Toga is limited and cannot be easily changed (as it is an island), the way that land is allocated to and within mataqalis affects the amount and quality of land households have access to for subsistence and income generation, and therefore impacts potential adaptation actions of households and the village. Households adversely impacted by poor land quality will rely more on their mataqali or the wider community. This supports thinking about potential adaptation action as embedded in cultural practices, as the culturally-based values and worldviews of the Vanua are the primary guidelines for behaviour and interactions for individuals and groups between themselves and between themselves and the natural environment.

Although many local level climate change adaptation projects either pay lipservice to the importance of this cultural component or incorporate where possible, many of these projects and programs are single issue or single sector specific. As demonstrated in this chapter, adaptation is embedded in cultural practices and therefore not easily addressed as part of a program with a narrow focus. In this iTaukei setting, emphasising the cultural context, including worldviews and norms shaping behaviour provides a more nuanced understanding of potential barriers and opportunities to adaptation action. Discussion and synthesis of this research, including more reflection on the application of the PACAF to my data is in the following chapter.

Chapter 9. Discussion and Conclusion: Implications for potential adaptation actions in Fiji

9.1. Introduction

The goal of this research was to understand the way that culture, understood as a set of shared norms, influences risk perceptions and the tensions between potential adaptation actions at the level of the village and the households. This has been done with a critical examination of social capital, risk perceptions, and cultural norms. This thesis adds to our empirical knowledge base around the role of social capital, culture and potential adaptation actions at the household and village scale.

I argue that thinking about culture and cultural practices is important for understanding potential adaptation actions. This emerged as a theme in the findings in response to each of the three research questions set out in Chapter Two:

- the current understandings and responses by households in the community to climate and environmental change;
- the shared norms characterising the Vanua and the role of social capital and the Vanua in potential adaptation actions; and
- exploring potential adaptation actions that best serve the interests of the village and households in the village.

In the following section (9.2), I discuss key findings from my case study and highlight other emerging themes from my findings: the role of risk perceptions and perceived self- and collective-efficacy shaping problem attribution and adaptive response choice; the importance of cultural norms shaping behaviour; the tension between adaptation actions that serve the interests of the household versus those that serve the interests of the village; and the importance of bringing in a deeper understanding of the cultural context for understanding potential adaptation actions. Although it is well-recognised that adaptation to climate change and environmental change is context specific (e.g. Smit et al. 2001; Yohe and Tol 2002; Brooks et al. 2005; Adger et al. 2007; Brown and Westaway 2011; Adger et al. 2013), the findings in this thesis demonstrate that there is a gap in our understanding of potential adaptation actions in the Pacific. This research addresses this gap by demonstrating the role of cultural values, norms, perceptions and practices and their relation to potential adaptation actions in Toga's iTaukei context.

The Vanua is an overarching concept relevant to all three questions. The explanatory depth provided by using the Vanua as a lens enhances our understanding and grants a fuller understanding of household and community potential to respond to environmental variability and climate change in an iTuakei context. This has theoretical implications, discussed in Section 9.3.1, as considering adaptation a cultural practise and linked to the Vanua furthers our theoretical understandings of adaptation, social capital and indigenous worldviews. In Section 9.3.2 I also discuss the methodological contributions of my approach to explore potential adaptation actions. I discuss policy implications and potential future research directions in Section 9.4 and final concluding remarks in Section 9.5

9.2. Main insights from the study

9.2.1. Current understandings and responses to climate and environmental change

I examined current and past actions and responses to environmental variability and change within Toga, in response to my first research question, "How is climate variability and environmental change currently understand and responded to at the household and village level?" as well as explore throughout the thesis the potential adaptation actions that best serve the interests of households or the village. . This provided a starting point for understanding how Toga may be able to respond to environmental and climate change in the future. Although the capacity to engage in adaptation actions can change over time, the worldviews and perceptions held by the research participants in Toga when evaluating threats and risks are unlikely to change significantly in the near future as they are based on shared cultural understandings of the natural environment and social behaviour that guide many current behavioural choices. The people of Toga employ a mixture of household actions and coordination and effort at the community level to respond to natural variability and environmental change. To engage in these responses people draw on household resources as well as the resources of the wider community, demonstrating a complex relationship based on reciprocity between these two scales for supporting responses to natural variability in environmental change (also as demonstrated in Chapters 6 and 7).

These findings also reveal the importance of culturally-based perceptions in shaping potential responses (Adger et al. 2013). Although rational actor based assumptions about risk evaluation and action assume that action is more likely to occur when risks are evaluated as tolerable (as opposed to acceptable risks which would result in no action, or intolerable which represents an adaptation limit; Dow et al. 2013), risk evaluations are mediated by context-specific elements such as direct experience,

event attribution, worldviews and culture (Whitmarsh 2008; Adger et al. 2011; Adger et al. 2013; McNeeley and Lazrus 2014). I demonstrated that peoples' evaluation of threat impact and occurance in Toga was influenced by whether threats were understood to have a greater impact on the household or the village. These differences indicate different understandings of what is valued at these scales and what could potentially be evaluated as a "tolerable" risk. There are also differences between how Toga's three villages perceived different threats, indicating that direct experience plays a role as each village has different experiences and resources which are affected differently by these threats.

The gender differences in risk perceptions also highlight the role of worldviews and cultural and social understandings in how risks and threats are understood. At the household- and Vanua-scale the proportion of people perceiving the occurrence of threats was generally similar for men and women, demonstrating agreement between both genders on the types of threats that impact the household and Vanua. The differences in the perceived severity of threats indicate that the perceived impact of these events is likely rooted in gender based differences in experience and cultural roles. For example, men and women's roles and behaviours result in different experiences with high temperature due to their different work patterns in the home or on the plantations at different times of day and clothing types. The impact of rising food prices on the Vanua, seen as more severe by women, could be linked to women's responsibilities to provide food for Vanua events. Behavioural norms (e.g. around gender and age) shape experiences, which in turn shape understanding of *sautu* in the Vanua, as discussed in Section 7.2.

My research supports findings by others looking at risk perceptions in the Rewa delta. Like Nolet (2016), I found that flooding was perceived as having negative impacts, but was also perceived as a natural occurrence and the source of some benefits. The taro from Rewa is famed for its flavour, owing to fertile floodplains where it is grown, and the joking about flooding discussed in Section 5.2.1 is interpreted as indicative of the ability of Rewa's people to deal with flooding, as opposed to people from other parts of Fiji (Nolet 2016). Cultural practices and resources, such as building raised homes, elevating possessions, relying on social networks for assistance, and traditional knowledge used to recognise when floods are coming, shape responses to flooding and other threatening events/ situations. These are important for risk perception as they add to the context in which people perceive risk and choose to respond.

Is also important to recognise that threats related to environmental and climate change are just some of many threats impacting life in Toga. Although climate change adaptation programs and projects are frequently targeted at a specific climate threat or risk (e.g. sea level rise), the findings in this thesis

supports other research (e.g. Eakin and Lemos 2006) that demonstrates the interconnected nature of these threats on people's daily lives and livelihoods. The threats perceived as most serious to the Vanua by Toga participants were related to physical loss of Vanua land (erosion) and a lack of participation in community activities indicating a social and spiritual loss to the Vanua. In contrast, threats perceived as more serious for the household related primarily to meeting daily needs and the physical loss of Vanua land. This leads to some interesting conclusions. It demonstrates the importance of the land and its role as the Vanua for both households and the community. Although relatively few households are physically losing land to erosion, it was still perceived as one of the most severe threats at the household level. The connected issues of drainage problems and non-participation also reflects the value placed on participation as a vital activity for the Vanua. It is also interesting that losing an income and rising food prices were seen as collectively more severe than all other threats to the Vanua other than the top three, emphasising the importance placed on fulfilling Vanua obligations through contributions of food and money. These findings reveal the complex relationship between the household and the Vanua; being able to meet daily household needs and have enough to also meet obligations is vital for fulfilling Vanua commitments and participating in reciprocal exchange relationships.

Five threats considered most directly related to climate change: changes in rainfall variability, hurricanes, increased air temperatures, rising water level and changes in fruit ripening seasonality (Australian Bureau of Meteorology and CSIRO 2014; Nurse et al. 2014) were perceived by fewer study participants as impacting both the Vanua and household. However, interestingly these climate-related threats were perceived as having a more severe impact on the household than on the Vanua. This could have implications for how climate change is communicated and how community-based adaptation projects are implemented, as projects may be more successful if aimed at facilitating household responses. The village and community play an important role in facilitating large scale and preventative action, and responses to erosion, hurricanes and intense flooding are coordinated at the community scale. However responses to rainfall variability and smaller scale flooding are the responsibility of the household. As these impacts become more frequent and more severe, how responses to these threats are coordinated may need to be reconsidered or require management at the community scale.

As climate change impacts interact with broader environmental change, communal land and aquatic resources may be impacted. People already recognise issues around water quality and its potential impact on their primary protein sources. Increased water temperatures and salinity will impact *kai* and shrimp, as will current and potential future upstream developments. The relationship between water quality and human health are threats currently perceived as worse (i.e. more severe impact and higher

incidence) for the Vanua than for the household. This could indicate potential latent capacity for Toga to respond to these threats, utilising existing social structures to engage in collective action as this is a threat to a communal resources (water) and Toga can draw on traditions of addressing communal resource issues.

The findings from Chapter 5 reveal that people in Toga employ a mixture of responses to climate variability and environmental change. These responses draw on household capacity and the wider community, and can be reactive or proactive. Risk perceptions depend on the scale of the threat (affecting the household or the Vanua), and are shaped by experiences associated with culturally-defined roles for different genders or age groups, as well as direct experience with a threat (e.g. flood). The differences in how threats to different scales of social organisation are perceived can have implications for designing or implementing climate change adaptation.

9.2.2. Social capital and potential adaptation actions

In Chapters 6 and 7 I demonstrated that social capital provides a useful lens for examining the generic social capacities to respond to environmental and climate change by mediating resource access. I also explored how these capacities are mobilised in response to hazardous and other events and throughout explore and compare the potential adaptation actions that best serve the interests of households or the village. Examining the norms and rules guiding behaviour and social interactions in social capital provides a way to understand access to social and physical resources. For example, social networks provide assistance and social norms relate to accessing land for planting, the river and aquatic resources.

The relationships between people and their natural environment, and the norms and rules governing these relationships, are the core of iTaukei social life. Many relationships, especially those of kinship and other kinds of bonding relationships (e.g. shared identity) as well as vertical linking relationships, are consistently maintained and used in times of stress to mitigate impacts of socioeconomic or environmental shocks or changes in Toga. However my research shows that the presence of these strong relationships and high social capital do not equate to positive outcomes for everyone, as demonstrated also in other communities elsewhere by Goulden et al. (2013) and Jordan (2015). Households are frequently forced to make choices between meeting their own needs or meeting obligations to other social networks such as the church, the village and the Vanua. Claims on group members as a disadvantage of bonding social capital is describe by Portes (1998). These choices can have costs socially, as well as emotionally with potential impacts on identity and feelings of belonging.

Different choices and conflicting obligations, as well as the fact that in this context social capital is a public good (Section 6.4.4), means there are opportunities for free riding and transgressions, demonstrating the 'dark side' to social capital (e.g. Portes 1998; Levine et al. 2014; Portes 2014) and how bonding networks can increase vulnerability (e.g. Wolf et al. 2010). Prioritising meeting obligations to the church or to the Vanua may mean that households are not able to save to provide a buffer for times of stress or shock. Nevertheless, they may draw on the network of the church or Vanua instead. However, if the stress or shock is widespread it can compromise the ability of the wider network (e.g. the Vanua) to meet the needs of everyone within the network, and the Vanua may need to draw on other networks through additional bridging or linking relationships, such as other Vanua in the Burebasaga Confederacy or to national-level church groups or NGOs. These tensions are important for considering how and what choices people may make to engage in potential adaptation actions.

Although maintaining these reciprocal relationships can be considered constantly maintaining or 'banking' social capital, in times of stress or shock, households who have not contributed as much to the village or the Vanua would not be turned away or refused if they required assistance. This kind of free-riding also led some to feel like some aspects of the Vanua (e.g. individuals in the hierarchy) were losing its trustworthiness. Despite no one reporting losing or declining trust in the Vanua itself, the trustworthiness of leaders to enforce and maintain the Vanua were aspects where trust was reported as being lost. This could be seen as a negative outcome of social capital (Ostrom and Ahn 2003). Reduced trust in individuals was associated with not observing social norms or not behaving in ways consistent with the cultural models. This can impact adaptation, as the kinds of norms and rules around behaviour which are vital components of the Vanua (e.g. behaviours associated with the 'respect' cultural model) are still perceived as trustworthy, however trustworthiness in the ability of leaders can be reduced. Social networks that provide assistance to households or entire communities at times of shock or stress are important for recovering after disasters and motivating collective action (Adger 2003; Pelling and High 2005; Osbahr et al. 2010).

In Toga some of these issues around trust led some individuals to report feeling helpless to influence leaders or decisions. However, I demonstrated in Section 6.4 that there are also individuals that worked within behavioural norms to influence leadership, working 'behind the scenes' to communicate viewpoints or influence decisions. Examples include the group of young men that worked with village elders to modify the village governance structure or women who worked with their in-laws to speak for them in meetings. These individuals used their knowledge of the cultural models of 'respect', 'social relationships' and the 'Vanua' to accomplish goals and have their voices heard, whilst also working

within the bounds of social norms that restrict the expression of certain voices in the social hierarchy (e.g. women and young people) in certain fora (e.g. formal Vanua meetings as opposed to more informal village or mataqali meetings). This navigation of norms embedded in cultural models is important for adaptation as it is an expressions of agency for individual and collective purposes.

Toga's strong bonding social capital is reinforced through exchange and reciprocity relationships. Similar to other research (e.g. Pelling 2003; Pelling and High 2005; Osbahr et al. 2010), bonding social capital in Toga is associated with survival and reactive behaviours during and post natural disasters. Other research has suggested that during and post-event bonding social capital is used reactively (e.g. pooling and sharing food after a tropical cyclone event) and is episodic for the duration of the event/ recovery period (e.g. Jordan 2015). However, the collective behaviours in Toga based on bonding social capital originate in relationships reinforced through cultural practices (e.g. food sharing, traditions such as *kerekere*) meaning that bonding social capital here is durable.

Strong bonding social capital without a diversity of other forms of social capital can also lead to reduced experimentation and increased group homogeneity, which has potential for reduced resilience (Newman and Dale 2005; Jordan 2015). Other research has found that a diversity of social capital (bonding, bridging, linking) can counteract this and encourage proactive responses to climate variability and change (e.g. Adger 2003; Newman and Dale 2005; Osbahr et al. 2010; Jordan 2015). Bonding social capital in Toga is strong, however some bridging and linking social capital is present and drawn upon during disaster and post-disaster recovery, such for obtaining food aid and new seedlings from NGOs, aid agencies, government and Church groups after hurricanes. These results demonstrate the complex nature of social capital.

As pointed out by Portes (1998; 2014) downsides to strong bonding social capital can include reinforcement of exclusionary social norms, excessive claims on members and restriction of individual freedoms. I demonstrated some of these limitations in Sections 6.3.2. The fact that only 13% of households in Toga reported fulfilling all obligations and meeting household needs with no problems over a three year period suggests the prioritisation of the village, Vanua, Church and kinship needs and requests over saving or personal/household spending. There are also examples of exclusionary norms associated with the 'respect' and the 'Vanua' cultural models, primarily experienced by women who married into the Vanua and do not feel able to speak openly in mataqali or village meetings.

I demonstrate that social capital in Toga is mobilised via networks and relationships with specific rules and norms about who and how to access these, following expectations and norms about trust and especially reciprocity. Conceptualisations of reciprocity, respect and how to interact with other people

and the natural environment are specific to the iTaukei of Toga. To understand how these conceptualisations influence and guide behaviour, I described in Chapters 6 cultural models of 'social relationships', 'being in the village' and 'respect'.

In this research I consider these cultural models as strongly connected and arranged hierarchically (Strauss and Quinn 1997; Garro 2000). Incorporating the three models described in Chapter 6 and building on cultural practices and understandings, such as *kerekere* and *sautu* in the Vanua, I described the cultural model of the 'Vanua' in Chapter 7.

These cultural models demonstrate how people understand their relationships with each other and the natural environment, as well as the networks and norms that constitute social capital. These cultural models are primarily related to bonding social capital, but also are useful for understanding bridging and linking social capital. Although there is a geographic element, seen in the 'being in the village' model, understandings of reciprocity, respect and associated behaviours also occur outside the physical space of the village or Vanua. These understandings include shared identity networks, i.e. those not based on kinship and can be considered bonding or bridging. The distinction is made between networks that are external to the tight knit kinship-based networks that make up a village or Vanua, such as faith-based groups. However, as many families belong to the same church these networks within a village could be considered bonding. The networks that reach to other villages or for example to the wider Methodist Church in Fiji could then be considered bridging. Such networks would potentially provide linking relationships when they include a hierarchical connection, such as to Church leadership. As I described in Section 6.4.3, government representatives attend and are seen to participate in village or Vanua events, a behaviour that is part of the 'respect' cultural model and an example of linking social capital.

The agreement between research participants in their understanding of the Vanua and the 'Vanua' cultural model is suggested by findings from Chapters 5, 6 and 7. Perceptions of risk to the Vanua differ from perceptions of risk to the household (Section 5.3). Perceived threats to the Vanua can include threats to land (erosion), food production from common property resources and Vanua functioning. There are similarities with understandings of *sautu* for the Vanua (Section 7.2), including importance of land and biophysical resources and the rules and norms important for the Vanua (Sections 6.3 and 6.4). However there were also some differences in how risks to the Vanua and *sautu* in the Vanua were understood based on gender and age, suggesting that while the cultural models highlighted a common understanding, culturally-defined roles and experiences can shape interpretation

of these models. This is consistent with other work on cultural models that has theorised that while they are shared, their understanding is mediated by social experience (Strauss and Quinn 1997).

This research demonstrates the high bonding social capital in Toga, including its downsides. Although there is some bridging and linking social capital, the downsides of bonding social capital could be reducing the capacity of households and Toga to respond to environmental and climate change. I also argue that social capital in Toga is a public good, and demonstrate that there are problems related to free-riding, which can also impact the capacity of households and the Vanua to engage in adaptation actions.

Determining whether high social capital is equivalent to adaptive capacity depends on the adaptation of whom to what. Within a number of Pacific-based modern development and climate change adaptation projects and programs, understanding and assumptions about adaptive capacity often include an understanding of the world based on a dual human nature dichotomy (Barnett and Campbell 2010). These projects can also include an understanding of social capital that is still somewhat rooted in its rational actor approaches and origins, which make assumptions about what is beneficial and harmful and who and what may be involved in maintaining and accessing social relationships. I show here that this may be inappropriate for this context. A more in-depth understanding of the social context is imperative to avoid assumptions that an area with communally held resources has high social capital that is equivalent to high adaptive capacity and therefore reduced vulnerability. The strong bonding relationship between individuals and the Vanua has benefits for potential adaptation actions, but as I have revealed in Toga, a close bonding relationship can also have downsides that can negatively impact adaptation.

9.2.3. Barriers and opportunities to potential adaptation action

There are a variety of barriers and opportunities for household and village adaptation in Toga and I examined these in Chapter 8 usinga Pacific specific framework for examining adaptive capacity, the PACAF, as well as throughout the thesis by exploring and comparing the potential adaptation actions that best serve the interests of households or the village. By examining barriers and opportunities for potential adaptation actions and comparing them across the household and village level rather than linking them to specific adaptive actions, my research focuses on areas that may be crosscutting for adaptation and development.

In Toga, geographic proximity and relationships with external NGOs and government agencies, proximity to Suva and Nausori for potential employment, the presence of potential knowledge and

resources within the community, and ability to engage in successful collective action all present opportunities for adaptation at the household and village level. However, increasing loss of traditional knowledge, a growing population and limited land availability are identified as potential barriers to adaptation. Additionally, the strength and guiding principles of the Vanua can make meeting commitments towards household and community obligations difficult while simultaneously providing a strong network and social safety net.

I demonstrated that barriers and opportunities for adaptation are not even across Toga, and can vary seasonally and annually. Existing land tenure can lead to barriers or opportunities, depending on household size and land quality and quantity. Leasing land outside Toga is an adaptive strategy for some households, however there is also potential for maladaptation due to impacts on social ties and removing arable land from another community. Further, high reliance on plantation lands and the rivers mean that any extreme events negatively impacting those resources can have high impacts on subsistence and income. Knowledge in the form of formal education and technical knowledge is not evenly accessed between and within Toga's villages. Although there are individuals with technical knowledge that could be used to inform responses to environmental variability and climate change, not all of these individuals may be able to share their expertise due to behavioural norms related to their age or gender (i.e. observing the norms in the 'respect' cultural model).

There are varying levels of perceived self- and collective- efficacy for different adaptive behaviours and responses to environmental change. In Toga, lower self-efficacy was often associated with fatalistic attitudes about social hierarchy and decision-making. Higher perceptions of self- and collective-efficacy were more often associated with actions and behaviours that were more familiar. This finding is consistent with social cognitive theory where elements of mastery (learning from your own success or failure) and vicarious experiences (learning by observing others) contribute to self-efficacy (Bandura 1977). However, it was not only familiarity with an action, but also whether that action fits with familiar cultural models, especially for perceived collective-efficacy. As revealed with issues around trust and free-riding in collective actions (e.g. managing a hypothetical and real business; Sections 6.4 and 8.2.3), collective efficacy perceptions were higher not only for actions and behaviours that were familiar in terms of experience, they were also higher for behaviours that were consistent with the 'Vanua' cultural model.

Assets, such as natural and financial resources are important for potential adaptation actions in Toga. However, the ability to access and mobilise those resources, as well as intangible resources (e.g. social capital), is also very important. I demonstrate that access and mobilisation of resources is shaped here

by cultural rules and norms inherent in the Vanua. While tangible resources, such as financial or natural capitals, are important for potential adaptation actions, shortages of these are mediated by social capital, risk perceptions, perceived collective-efficacy and values. The Vanua provides a lens to understand these elements in the iTaukei context. Utilising the Vanua as a tool to understand these elements highlights the connection between culture and adpatation.

There are numerous different ways of conceptualising and assessing adaptive capacity. Despite recent literature recognising the need to be inclusive of subjective and context-specific elements (e.g. perceptions of efficacy, identity, place, values) influencing adaptive capacity, there are fewer studies testing the contribution of these other elements to adaptive capacity at different scales and in different contexts, especially the Pacific region (Barnett and Campbell 2010). Factors that influence the mobilisation of adaptive capacity can be important barriers or opportunities for adaptation. These limits or opportunities will not occur solely in the ecological, economic or technical realm (Adger et al. 2009; Barnett et al. 2015). In fact, when only examining limits or barriers in these realms, there is the possibility of conceptualising the limits as predetermined from outside the system, therefore as objective and absolute (Adger et al. 2009). For example, an outsider in Toga may see a lack of technical farming equipment such as tractors a problem of technology access, rather than a characteristic of ownership and sharing of possessions in this social context.

As a Pacific-adapted framework, the PACAF provides a useful framework to examine barriers and opportunities to potential adaptation actions in Toga. Although it has not been widely tested, it has been applied in several Pacific country settings (Warrick 2011; USP 2012; Warrick et al. 2016), and Chapter 8 of thesis provides another application in a different setting. The application of PACAF in this thesis revealed several opportunities, but also some limitations that would benefit from being explored and examined in the future to improve the applicability of the framework. The social capital element in the PACAF does not distinguish between types of social capital. It also associated low community diversity with high social capital and more equitable resource access. However, other research has demonstrated that a diversity of social capital (bonding, bridging and linking) is important for responding and adapting to climate variability and change (e.g. Newman and Dale 2005; Osbahr et al. 2010; Goulden et al. 2013; Jordan 2015) and this research reveals that high bonding social capital is not equivalent to equitable resource access. PACAF applications in the future may benefit from targeting a diversity of social capital types. The 'Options' factor separates livelihoods, food acquisition and climate change adaptation. However, if climate change adaptation also includes efforts to holistically reduce vulnerability or increase resilience it could be difficult to consider the interactions

and trade-offs if efforts are considered separately. The PACAF could benefit from additional nuance to consider holistic projects as well as matching them to community goals and worldviews.

9.3. Research Contributions

9.3.1. Empirical and Theoretical contributions

This thesis has examined the role of social capital, cultural context and potential adaptation actions. In Chapter 2, I described the influence of cultural values, norms and perceptions on potential adaptation actions (Section 2.3). Culture is "central to understanding the causes and meaning of, and human responses to climate change" (Adger et al. 2013:112), and I demonstrate its central role in mediating human behaviour, perceptions and norms related to resource access and distribution vital for potential adaptation actions. Social capital has received increasing attention in climate change adaptation research, and my research adds to that body of work. I also propose utilising a concept indigenous to the cultural context of my study site (the Vanua) to examine the role of culture in adaptation. This section examines my thesis's contributions to the understanding of culture in adaptation, the relationship between social capital, social norms and potential adaptation actions, and the role of culture in adaptation.

Adaptation is context dependent and heterogenous across temporal and spatial scales (Adger 2003; Eakin et al. 2010; Berman et al. 2012; Lemos et al. 2013; Adger et al. 2013). This research adds to the empirical knowledge base demonstrating how culture and worldviews can shape what is perceived as threatening (Slovic and Peters 2006; Whitmarsh 2008; Wolf et al. 2010; Nolet 2016). How *sautu* (well-being) is understood is defined in relation to the Vanua, which in turn influences risk perceptions in Toga. Risks perceived as most threatening were related not only to negative impacts on household subsistence and income, but also as threats to individual identity, household ability to fulfil obligations and the *sautu* of the Vanua.

One of the main ways culture is central to adaptation is demonstrated via the Vanua. Indigenous worldviews and traditional indigenous knowledge in the Pacific are important for resilience and adapting to climate change (McMillen et al. 2014). These worldviews do not distinguish between the human and the natural (a dichotomy more common in Western and developed nations; Barnett and Campbell 2010). This "conflation of nature and culture" (Rudiak-Gould 2012:50) highlights the problem of framing climate change as an environmental problem when it is viewed and accepted as a holistic problem within these worldviews. In fact, Rudiak-Gould (2012) argues that people like

Marshallese Islanders have valuable lessons for climate change scientists about widening climate science conceptualisations and the inexorable links between culture and climate change.

Another theoretical contribution of this research is adding to our understanding of the interactions between culture and adaptation by contributing to the growing body of research on the sociocultural context of climate change adaptation (Tschakert 2007; Ensor and Berger 2009; O'Brien 2009; Adger et al. 2013). This includes the tensions between adaptation actions that are in the best interests of the household (as household understand their best interests) and actions in the best interest of the village (as the village collectively understand its best interests). The village is reliant upon collective action to provide resources when needed, and free riding or non-participation may reduce the capacity of the Vanua to recover after an extreme event. For example, after a large flood if a large proportion of households have not contributed to clearing drains and assisting with clearing any remaining animal carcasses or choose not to share food or cash then the adaptive capacity of the Vanua is reduced. However, households can also benefit if benefits from collective responses and adaptation to environmental and climate change are shared equitably. These tensions result from the interaction between the variation in perceived risks to households and to the Vanua and behavioural norms guiding behaviour in the Vanua. There are instances where norms for maintaining *sautu* can result in actions that benefit the village at the cost of the household, while actions that benefit households may cost the Vanua. People are aware of these tensions and choose to navigate them in different ways, which has implications for our theoretical understanding of the role of culture in adaptation and adaptation tradeoffs at different scales.

These findings fit with other research on adaptive capacity in the Pacific region. Utilising the Pacific-specific PACAF, Warrick (2011) and Warrick et al. (2016) found determinants related to perceptions and social capital to be relatively more important than those related to resource availability. Although their work was on more remote islands with potentially higher limits to assets (e.g. livelihood opportunities on remote islands are often more limited than in Toga), these results do demonstrate that there may be certain characteristics of adaptation specific to the Pacific Island Countries. This thesis adds to this empirical work by revealing that determinants related to perceptions and social capital to be relatively more important than those related to resource availability in Toga. This research also tested the PACAF and revealed some areas that could benefit from further examination and refinement.

This research also adds to our understanding of the importance of perceptions of self- and collective-efficacy, risk perceptions and social capital. Research has established the importance of perceived self-

efficacy in climate change adaptation (Grothmann and Patt 2005). Similar to Kirrupu and Liverman (2011) this research found an association between perceived self-efficacy and specific actions, especially actions that are familiar. Perceived collective-efficacy here follows a similar pattern, in that there was lower perceived collective-efficacy for actions that were less familiar. However, reasons for lower perceived collective-efficacy emphasised perceived concerns or lack of trust in the allocation and coordination of resources within the group. Perceived collective-efficacy has not been explicitly applied to adaptation studies in the Pacific region, and this thesis offers insight into this concept and its relevance for collective action. Social capital offers a way to examine the role of trust in the allocation and coordination of resources within a group, with implications for adaptation.

This thesis contributes to our understanding of social capital's relation to adaptation. I have added to the empirical work demonstrating that relatively high bonding social capital is not exclusively a positive attribute, and the potential benefits and limitations can be unevenly spread across the community. This finding adds to research on the potential downsides of bonding social capital to climate change adaptation (Wolf et al. 2010; Goulden et al. 2013; Jordan 2015). Bridging and linking social capital have the potential to increase adaptive capacity, especially when there is a diversity of social capital types. Leonard and Onyx (2003) demonstrated that not all bonding social capital consists of 'strong' ties, while not all bridging consists of 'weak' ties. This is the case in Toga, where not all bonding social capital is based on 'strong' ties with other individuals, but rather a 'strong' tie in a bonding relationship with the Vanua. This relationship and trust in the Vanua leads to behaviours to strengthen this relationship. Even when individuals perceive others as transgressing, they engage in reciprocal exchanges with others as part of maintaining their social capital with the Vanua. The lack of widespread diversity in social capital types in Toga has important implications for future potential adaptation actions. Bridging and linking capital can facilitate innovation and information sharing (Woolcock and Narayan 2000), which are important for learning and adapting to climate change (Moser and Ekstrom 2010).

How social capital is measured is important. For example, national or international assessments often use proxies (e.g. number of civic organisations) to measure social capital, and this has the potential to provide a misleading picture of adaptive capacity by missing out on power relations or exclusion if not contextualised with smaller scale empirical research (Pelling and High 2005). My research aligns with other research in Fiji providing a contextual and culturally-based understanding of social capital. Nainoca (2012) demonstrated the centrality of kinship to social capital and the benefits strong bonding social capital can have on community based resource management, while Sano (2008) found that bridging and bonding social networks facilitated information access that enhanced resource

management and reduced conflict. I add to these with a nuanced examination of the uneven distribution of positive and negative attributes of strong bonding social capital, and the potential for strong bonding social capital to act both as an opportunity or a barrier to adaptation.

9.3.2. Methodological contributions and limitations

This research demonstrates that incorporating an indigenous concept or worldview to examine potential adaptation actions can add depth and contextual understanding. Utilising the Vanua as a lens to interpret and understand my data permitted a more context-specific understanding to social capital and potential adaptation actions. It can be epistemologically challenging to incorporate indigenous concepts with understandings and concepts originating in 'Western' academic thinking, and a critical realist epistemology and interpretation of my data through the Vanua provided a way to address these challenges.

I explored the use of cultural models as a tool for understanding social capital and potential adaptation actions. These models provide useful insights into ways people understand the Vanua and social norms. Using qualitative and quantitative methods allowed me to build and understand the sharedness of these understandings. Further research on cultural models would benefit from additional ethnographic inquiry and understanding of the Vanua, such as a longitudinal case study and more work done in the local vernacular, to determine what other behaviours or understandings of the Vanua may be relevant to responding to environmental change.

I used a case study approach to investigate the relationships between culture and potential adaptation actions. Case studies can be limited by generalisability and replicability, however the in-depth nature of a case study also permits investigation of additional nuance and detail. This research demonstrates that using ethnographic approaches in case studies of potential adaptation actions can add explanatory depth to observed social processes and outcomes related to environmental and climate change responses. However, this approach also requires time and cultural awareness. Cultural barriers to participants "talking straight" to an outsider can be mitigated with reflection and time spent with the community, however it is important to keep in mind these cultural barriers when conducting research.

9.4. Policy implications and future research

This research has demonstrated the role of culture in potential adaptation actions and the importance of incorporating culturally-based understandings into climate change adaptation and development projects and programmes. The policy context is important for future climate change adaptation, as well

as how this context will influence, and is influenced by local level understandings and perceptions of adaptation.

The Fijian Government published its Climate Change Policy in 2012; it includes consideration of culturally-appropriate adaptation technologies and systems as well as stakeholder consultation methods for adaptation (Government of Fiji 2012). The Climate Change Policy is also designed to serve as an implementation framework for the government's sustainable development policy and goals. One of the initial implementation stages of this is to conduct community and sector vulnerability assessments across Fiji. As these assessments will likely be used to allocate project efforts and priority setting it is important these should include nuanced and culturally based understandings of adaptation. This might include not assuming that high social capital results in positive or equitable outcomes for everyone and recognition of the role of the Vanua in shaping behaviour and motivations. Balancing the needs of households and a village is important, as is understanding the complex interactions, perceptions and relationship between these two scales in an indigenous Fijian context.

Additionally, this research demonstrates that adaptation can be considered as embedded in cultural practices and therefore not easily addressed as part of narrowly focused projects or programmes. Strong bonding social capital has the potential to stifle innovation, and this research shows some the downsides of high bonding social capital at the community scale. Policies that harness the strengths of bonding social capital and encourage bridging via strong ties (e.g. Leonard and Onyx 2000) and linking social capital to enhance diversity of social capital can address some of the barriers to potential adaptation actions discussed here. However, this should be done carefully as projects can reinforce existing power structures and unequal social patterns (e.g. McCarthy 2014). This also speaks to one of the guiding principles of Fiji's Climate Policy: equity and fairness (Government of Fiji 2012). Other potential opportunities for adaptation include a tradition of collective action and natural resource management, such as *tabu*, which has been identified as a tool for marine management and building resilience to climate change (Boer and Clark 2012; McMillen et al. 2014).

This research shows that factors that influence potential adaptation actions are important areas for policy focus, as well as interesting areas for further research. The presence, amount or quality of tangible resources that can be used for adaptation can be mitigated by cultural factors, such as risk perceptions of behavioural norms, and the relationship between these can vary at different scales (i.e. household or village). Perceptions of collective efficacy, especially around certain collective actions revealed an interesting dynamic between trust and familiarity of behaviours, and also reveal areas for further research. What kinds of drivers could be influencing these beliefs? What role does perceived

collective-efficacy play in responding to climate variability and environmental change, and is this different in urban and rural (i.e. village) settings?

Some work has demonstrated that there could be a shift in the forms and outcomes of social capital of Pacific Islanders when they move from rural to urban areas. The importance of the 'being in the village' cultural model lends support to this idea, revealing an interesting area of further research. A question arises as to what happens to some of the documented downsides of bonding social capital and what are the implications for other forms in urban areas of Fiji, or in iTaukei diaspora communities? What can we learn about the role of risk perceptions and shared behavioural norms in potential adaptation actions in other groups in Fiji, such as Indo-Fijians? Investigating this may provide valuable insights with policy implications as urban population and adaptation needs increase. Frameworks, such as the PACAF offer an opportunity to approach examining adaptation in the Pacific, however further refinement, such as how to consider varying manifestations of bonding social capital is required. Research is also needed into how operationalise the answers to these research questions into meaningful policy and practice that enhances potential adaptation actions.

9.5. Concluding remarks

I have examined the way that culture, understood as a set of shared norms, influences risk perceptions and the tensions between the potential adaptation action as the level of the village and the households within it. I demonstrated that culture and cultural worldviews influence behaviour important for adaptation, including collective action, risk perceptions and perceived self- and collective-efficacy. Potential adaptation actions can be considered embedded in cultural practices, with important implications for climate change responses and development policy and projects.

What has emerged in this research is the ways that culture is central to adaptation. Responses to environmental change in Toga are shaped by culturally-mediated risk perceptions, values and rules and norms mediating access to resources. It is recognised that adaptation is context dependent, and this research shows that cultural practices and processes are important for understanding responses to current and future natural variability and environmental and climate change.

Social capital is important for potential adaptation actions In Toga it lays the framework for collective action as well as providing important support for both the household and the community. However, there are documented downsides to strong bonding social capital and its potential to maintain inequalities. A diversity of social capital types, including strong bridging social capital, may mitigate these downsides and have the potential to increase adaptive capacity. While social capital within the

Vanua mean there is a level of vulnerability that households are unlikely to experience (i.e. food and shelter will be provided), bonding social capital also means that existing inequalities may not be challenged. The strong bonding tie between individuals and the Vanua is also an important component of potential adaptation actions. The Vanua provides benefits (e.g. food, shelter) and behaviours that maintain or strengthen this relationship and can result in collective action to reduce vulnerability or increase resilience for the community, but perhaps also limit household capacity to engage in adaptive actions that serve their interests.

It is important to remember that adaptation actions that benefit the village may not directly translate to actions that benefit households within the community. The relationship between potential adaptation actions at the household and village scale is complex. The relationship between the two may be inverse (better for community while worse off for household) for some households, while the opposite is true for other households. Addressing issues of inequality within the community may reduce the likelihood that some households reduce their adaptive capacity to boost the community's. However, it is also important to remember that the well-being of the community is at the heart of the relationship with the Vanua and guides behaviour and interactions between individuals, groups and the natural environment. Climate change adaptation in the Pacific region will likely need to be more holistic, rather than sector or impact specific, to ensure long-term viability and sustainability of communities in the region. Values and worldviews, such as the Vanua, are vital contextual aspects to understanding potential adaptation actions in Fiji.

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Appendix A. Interview topics and schedule

These were the general topics and questions followed during interviews, however not all all topics were asked based on previous conversations with the participant, if the participant did not have time or if I made a judgement call about the participants desire to participate in the research. These topics were not all asked in this order, although I did not usually ask about climate change until the very end.

Demographic:

How many people live in your household?

What is your mataqali?

Where does your family's food come from?

Where does the income for you and your family come from? (e.g., kai, plantation, handicrafts, other)

How many years did you go to school?

What are your biggest household expenses?

Nature/Environment

When I say nature or the environment, what does that mean to you?

How important is nature/environment to you? To your family? Mataqali? Yavusa? Koro?

Do you use anything from the environment? What? Your family? Mataqali? Yavusa? Koro? Fiji?

What does a healthy environment look like, for you?

Who has responsibility to maintain the environment?

How do you know these things? Where did you learn about them?

Can you explain the vanua, in the village to me and what it means to you??

What do people do to keep the vanua strong and vanua sautu?

Whose responsibility is it to do that?

How do you know that? Where did you learn about that?

Can you describe a rich person in the village – have/doesn't have; do/doesn't do?

Threats/Challenges

Can you list at least 3 things you feel are threats and challenges to you?

Your family?

Mataqali? Yavusa?

Koro? Fiji?

Which of these are most threatening? Why?

Which are least threatening? Why?

Can you/family/mataqali/yavusa/koro/Fiji do anything about them? What? Why/why not?

Of the threats to you, your family, your mataqali and the village – if you had to pick one that is most threatening, which? Why?

What are your goals/wishes for you in the future?

Your family?

Mataqali?

Koro?

Experiences

Have you or your family ever experienced: *(What did you do? When it was, what happened, who was involved?*)

A bad flood?

Storm?

Drought?

Have you lost crops to heat/drought/too much water/anything else in the last 5 years?

Has your family lost land to erosion in the last 10 years? If yes, how much?

What kinds of changes have you seen in your life in the village – weather, environment, people, behaviour?

Future:

What do you think will happen in the future to you, your family in 10 years (dream, hope)?

What do you think the village will be like in 50 years, what will have happened/ happen?

Identity

For you, what does it mean to live as a kai viti?

How do you know these things? Where did you learn about them?

What does it mean to be part of your mataqali/ tikina/ koro? What are X known for? How are these different from others? How are they the same?

Decisions

Who makes big decisions and who makes little decisions in your family? (e.g. deciding what to cook/what food to bring home for little and how larger amounts of money will be spent for bigger).

If you wanted to change something (small decision), how would you do it?

If you wanted to change something (big decision), how would you do it?

Scenarios:

What would you do if you experienced a heat wave that lasted 3 months (e.g. *katakata*, 33°C+ every day)?

What would you do before (if you knew if was going to happen), during, after? Who talk to, what do, decide?

If all the crops on your plantation dies from a blight and you had to start over with new seeds/plants, what would you do?

If you family's house was damaged and needed to be rebuilt, what would you do?

What would you do in a very high flood?

A very strong hurricane flooded most of the village (1-2m) for 1 week. After the storm, it is very hot and there are lots of mosquitos with dengue and the water in the river is carrying diseases from upstream, so some people are getting sick. Most of Fiji was badly damaged, so the government is taking a long time to get to people to offer assistance.

A drought with almost no rain for 6 months that meant no rain for crops and very little water from the taps?

A very strong storm washed away the fields of 10 families?

If every for 5 year was got warmer and warmer? Too warm for crops and less and less return?

If every for 5 years the kai got smaller and harder to find?

What if all of those things happened?

Activities:

What do you think of: (*get details of why answer the way they do*)

Plantings (trees and grasses) along the riverbank for erosion control?

Building walls along the riverbank for erosion?

Moving houses away from areas that flood frequently?

Raising or moving the pathways so they don't flood as often?

Redoing all the drainage in the village so it does not flood as much? Village comes up with ½ money and does all the work, NGO helps with expertise and rest of money.

Planting different crops that are better with heat/flood but taste different and came from Ministry of Agriculture?

A wetland is restored on the east side (Rewa River side) of the island, but several plantations have to be abandoned for the wetland. What is one of the wasn't yours? What if one was yours?

A fish farm was put in the village – village had help installing but running, managing and maintaining is the responsibility of the village. How would you

manage and what do you think overall about this project?

If you had to choose between riverbank planting or a riverbank wall, which would you choose and why?

If you had to choose only one of those – which and why?

Climate Change:

What does climate change mean to you?

What do you think the impacts in the village will be?

Where have you heard about it?

Appendix B. Participant pseudonyms and demographic information

Research ID	Name	Gender	Age	Village	Interview/ Questionnaire (I/Q)
S20A4	Joni	Male	46-60	Navatuyaba	I
S30A4	Maciu	Male	46-60	Navatuyaba	I
S35A2	Joeli	Male	25-34	Navatuyaba	I
S23B4	Litia	Female	46-60	Navatuyaba	I
F9B5	Nanise	Female	61+	Navatuyaba	I
S37A4	Solomoni	Male	46-60	Navatuyaba	I
F7B5	Koila	Female	61+	Navatuyaba	I
S01B4	Karolina	Female	46-60	Navatuyaba	I
S24A1	Timi	Male	18-25	Navatuyaba	I
S32A4	Tomaci	Male	46-60	Navatuyaba	I
S12B3	Elina	Female	36-45	Navatuyaba	I
RA3Q20	Josua	Male	46-60	Muana	Q
S02B5	Ana	Female	61+	Navatuyaba	I
RA1Q12	Solomoni	Male	46-60	Navatuyaba	Q
RA4Q14	Ela	Female	36-45	Navatuyaba	Q
RA3Q8	Talicia	Female	18-25	Navatuyaba	Q
RA4Q5	Jarryd	Male	46-60	Vunisei	Q
RA4Q7	Elisheva	Female	26-35	Muana	Q
RA1Q11	Viliame	Male	46-60	Navatuyaba	Q
RA1Q2	Luisa	Female	36-45	Muana	Q
RA6Q10	Talicia	Female	36-45	Navatuyaba	Q
RA3Q15	Laisa	Female	18-25	Vunisei	Q
RA6Q14	*Gender not indicated*	N/A	36-45	Navatuyaba	Q
S15B1	Elena	Female	18-25	Navatuyaba	I
RA6Q15	Sera	Female	26-35	Navatuyaba	Q
RA6Q9	Saviera	Female	36-45	Muana	Q
RA7Q2	Jope	Male	61+	Navatuyaba	Q
RA6Q4	Joseva	Male	18-25	Vunisei	Q
S17B5	Viviana	Female	61+	Navatuyaba	I
S13B1	Losalini	Female	18-25	Navatuyaba	I
RA2Q6	Epeli	Male	26-35	Muana	Q
RA3Q22	Alifereti	Male	18-25	Navatuyaba	Q
RA6Q7	Naomi	Female	26-35	Muana	Q
S14A1	Lesi	Male	18-25	Navatuyaba	I

RA3Q2	Joji	Male	46-60	Navatuyaba	Q
S21B4	Lorna	Female	46-60	Navatuyaba	I
RA3Q9	Nemani	Male	18-24	Navatuyaba	Q
RA2Q14	Merewai	Female	25-36	Navatuyaba	Q
RA2Q9	Rusila	Female	18-24	Muana	Q
RA4Q11	Asaeli	Male	25-36	Navatuyaba	Q
RA3Q19	Osea	Male	25-36	Muana	Q

Appendix C. Questionnaire

English Version

RA: _____ **Q:_____**

Mataqali: _____ **Yavusa: _____**

Koro: _____

Vinaka for your participation! The first few questions are about food that you grow and eat.

1. I am going to read you a list of plants – please tell me if they grow on your plantation and/or close to your house. *(check all that apply, if there are things that are not on this list please write in)* **Is there anything else you grow that I did not say?** *(write any answers in the blank spaces provided – please write down specific plants, for example "eggplant, tomato" rather than "vegetables")*

I don't have one/don't grow anything Vegetable/Other: _____
Tavioka
Dalo
Bele

2. Do you sell anything from your plantation? Io Sega

If yes, what: _____

3. I am going to read you a list of plants – please tell me if they are plants you have easy access to – i.e. they grow on your land or you can get them easily without having to buy them in the market *(check all that apply, if there are things that are not on this list please write in)* **Is there anything else that I did not say?** *(write any answers in the blank spaces provided – please write down specific plants)*

Coconut Voivoi Banana
Mango Firewood
Other:_____
Soursap Pawpaw
_____

4. Do you have: *(check all that apply)*

Toa Pig Goat Other livestock/poultry: _____
Duck Cow Horse

5. My plantation is:

The right size Too small to grow what we need Too big for myself and my family

6. How often do you eat from:

	Less than once a month	At least once per month	At least once a week	Every day
The plantation				
The river				
The store				

7. In this next question I am going to read statements to you. Please listen carefully and say io if you agree with the statement or sega if you disagree. There is no right or wrong answer to any of these. Please answer from your own perspective and take as much time as you need to think about these.

It is important to keep your face and your voice neutral while you are reading and recording the answers. We want people to be honest answering these questions, and sometimes people will change their answers if they think the person asking the question has an opinion on something.

1	Io / Sega	If there are bad things that happen in the vanua (e.g. disease, not very many jobs) we can do something, we are able to take care of ourselves without any help from outside.
2	Io / Sega	I think there is less rain now in the dry season than there used to be.
3	Io / Sega	I think there is more rain now in the rainy season than there used to be.
4	Io / Sega	I think it is warmer in the dry season than it used to be.
5	Io / Sega	I think it is cooler in the rainy season than it used to be.
7	Io / Sega	There are more kai and prawns now than there used to be.
8	Io / Sega	Any changes with rainfall have nothing to do with pollution in the air.
9	Io / Sega	Any changes with rainfall are not because of people, but because these changes happen naturally.
10	Io / Sega	Any changes with the temperature have nothing to do with pollution in the air.
11	Io / Sega	Any changes with temperature are not because of people, but because these changes happen naturally.
12	Io / Sega	There is nothing than anyone can do about changes in temperature, rain, or flooding – only God can control these.
13	Io / Sega	We can fix the changes in temperature, rain and flooding if people in Fiji and everywhere in the world stop polluting, cutting down trees and keep their environment clean.
14	Io / Sega	There are changes in things like rainfall, flooding and temperature and I think we need to make some changes in how we do things so we can live better with those changes in the future.
15	Io / Sega	The water comes up higher now during high tide than it used to.
16	Io / Sega	Erosion is something that always happens in rivers.
17	Io / Sega	When I respect the rules and ways of the vanua, the vanua will take care of me.
18	Io / Sega	The plantations are part of the vanua, but no one but the individual planting on that land has responsibility to take care of it.
19	Io / Sega	There are not many things we can do about bad things that happen in the vanua because we don't know how or we don't have the money to fix problems.
20	Io / Sega	If I do not respect my elders, listen to my mataqali, or take care of my surroundings something bad will happen to me.
21	Io / Sega	The changes in rain, temperature and sea level rise that are happening now cannot be stopped even if people all over the world stop polluting and take care of the environment.
22	Io / Sega	The leaders of my mataqali and yavusa do not have a responsibility to listen to their people, come to all the meetings and try to make decisions that make life better for everyone.

23	Io / Sega	Although God made the world for us, we have to take care of it or else bad things like climate change will happen.
24	Io / Sega	The changes in rain, temperature, when fruits become ripe and bad floods are happening because God is unhappy with what some people are doing.
25	Io / Sega	If the leader of my mataqali or koro does not come to meetings or participate then I do not have a responsibility to participate either.
26	Io / Sega	If I do not live va'a vanua then bad things will happen to my surroundings, like the river and my plantation.
27	Io / Sega	Even if I know that what a leader is saying is incorrect or I disagree with it, I will do what I am told.
28	Io / Sega	When I see a decision in a meeting that I think is unfair or wrong, I wish there was something I could do about it but I know there is nothing I could to do to change it.
29	Io / Sega	If I know that what a leader is saying is incorrect or I disagree with it I will speak up in the meeting.
30	Io / Sega	If I know that what a leader is saying is incorrect or I disagree with it I will approach them privately to share what I was thinking.
31	Io / Sega	I am glad to not speak in meetings and don't want to be asked my opinion, I prefer to have someone tell me what do.
32	Io / Sega	What I do reflects more about me as an individual than it does about my vanua.
33	Io / Sega	I would support anything that stops flooding and erosion on Toga, even if there were negative impacts on people that lived downstream in the river.
34	Io / Sega	The leaders always know the best course of action.
35	Io / Sega	If the only way to prevent erosion and flooding on Toga damages resources for a few people in Toga I would not support it.
36	Io / Sega	New ways of doing things that do not fit with va'a vanua may work now, but will not be successful in the long-term.

8. I am going to read a list of things to you. Please tell me if any of them have happened to you at least once the last 3 years? *(check all that apply)*

I was unable to save money to make small repairs on my house or purchase something because of mataqali requests.
I had to choose between giving to the church or fulfilling my mataqali obligations.
I had to choose between buying food/paying for school fees and fulfilling my mataqali obligations.
I borrowed or asked for money to fulfil my mataqali or village contributions.
I have been able to fulfil all my mataqali obligations and give to the church with no problems.
I don't know

9a. This next question is about what it means to keep the vanua sautu. I am going to give you 7 cards with different things on them. Please rank the cards according to how important they are keeping the vanua sautu, from your own perspective: *(1 is the most important, 7 the least. Hand the cards with the red around the border to the participant and write down the order they place them in.)*

	Keep the land (plantations, trees, soil) free from rubbish and pollution, producing good food.
	Keep the river and river resources (water, kai, prawns) clean and free from rubbish and pollution.
	Infrastructure (e.g. roads, footpaths) that makes access to church, town, schools, etc. easier and safe.
	The way people dress.
	Respecting elders and leaders.
	Jobs and economic opportunities.
	Participating in meetings, clean ups and other mataqali, village, and vanua activities.

9b. Please explain why your ranked the these in the order you did.

_____

_____

_____

_____

10. This question is to learn about how people in the vanua think about the past, present and future. In this section, I am going to read a statement to you. Please answer how much each statements is like you or not like you on a scale of 1 to 5. 1 is nothing like you, 5 is exactly like you. There is no right or wrong answer, this is about what you personally are like.

It is important to keep your face and your voice neutral while you are reading and recording the answers. We want people to be honest answering these questions, and sometimes people will change their answers if they think the person asking the question has an opinion on something.

		Not like me at all	Some-what not like me	Neither like me or not like me	Some-what like me	Very much like me
1	Familiar childhood sights, sounds, smells often bring back many wonderful memories.	1	2	3	4	5
2	I often think of what I should have done differently in my life.	1	2	3	4	5
3	It gives me pleasure to think about my past.	1	2	3	4	5
4	I do things impulsively.	1	2	3	4	5
5	If things don't get done on time, I don't worry about it.	1	2	3	4	5
6	When I want to achieve something, I set goals and consider specific means for reaching those goals.	1	2	3	4	5
7	There is much more good to recall than bad in my past.	1	2	3	4	5
8	When listening to my favourite music, I often lose all track of time.	1	2	3	4	5
9	I try to live my life as fully as possible, one day at a time.	1	2	3	4	5
10	Ideally, I would live each day as if it were my last.	1	2	3	4	5
11	Happy memories of good times spring readily to mind.	1	2	3	4	5
12	I meet my obligations to friends and authorities on time.	1	2	3	4	5
13	I make decisions on the spur of the moment.	1	2	3	4	5

14	I take each day as it is rather than try to plan it out.	1	2	3	4	5
15	The past has too many unpleasant memories that I prefer not to think about.	1	2	3	4	5
16	I've made mistakes in the past that I wish I could undo.	1	2	3	4	5
17	I get nostalgic about my childhood.	1	2	3	4	5
18	Before making a decision, I weigh the costs against the benefits.	1	2	3	4	5
19	Taking risks keeps my life from becoming boring.	1	2	3	4	5
20	Things rarely work out as I expected.	1	2	3	4	5
21	It's hard for me to forget unpleasant images of my youth.	1	2	3	4	5
22	It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products.	1	2	3	4	5
23	Even when I am enjoying the present, I am drawn back to comparisons with similar past experiences.	1	2	3	4	5
24	You can't really plan for the future because things change so much.	1	2	3	4	5
25	My life path is controlled by forces I cannot influence.	1	2	3	4	5
26	I complete projects on time by making steady progress.	1	2	3	4	5
27	I take risks to put excitement in my life.	1	2	3	4	5
28	I often follow my heart more than my head.	1	2	3	4	5
29	I am able to resist temptations when I know that there is work to be done.	1	2	3	4	5
30	Life today is too complicated; I would prefer the simpler life of the past.	1	2	3	4	5
31	I like family rituals and traditions that are regularly repeated.	1	2	3	4	5

32	I think about the bad things that have happened to me in the past.	1	2	3	4	5
33	I keep working at difficult, uninteresting tasks if they will help me get ahead.	1	2	3	4	5
34	Spending what I earn on pleasures today is better than saving for tomorrow's security.	1	2	3	4	5
35	I think about the good things that I have missed out on in my life.	1	2	3	4	5
36	I like my close relationships to be passionate.	1	2	3	4	5

Vinaka for answering the questions so far. This next section is about problems you may face in your household and the vanua.

11. How many times has your plantation flooded (water for more than 2 days) in the last 3 years?

Never 1-3 4-6 7-10 More than 10

12. How many times has your house flooded (water close to or inside the house) in the last 3 years?

Never 1-3 4-6 7-10 More than 10

13. Is your house raised off the ground? Io Sega

13a. If yes, how much: less than 1 metre 1-2 metres more than 2 metres

14. Have you noticed changes in flooding? Io Sega

14a. If yes - from this list, what do you think is causing the changes in flooding (can pick more than one)? *(check all that apply)*

Dredging in the Rewa River
Cutting down trees upstream
More rain
Poor drainage
Other: _____
I don't know

15. Have you noticed changes in erosion? Io Sega

15a. If yes - from this list, what do you think is causing the changes in erosion (can pick more than one)? *(check all that apply)*

The water is flowing differently (e.g., more strongly).
Dredging in the Rewa River
Too much land was cleared or trees were cut down upstream from us.
Building the culvert and road changed the way water flows.
Too many people are using the river.
Too many trees were cut down in Toga.
We are planting and/or living closer to the river than we used to
I don't know.
Other: _____

16.

(16 a) This question is about problems facing you and your household and the vanua. First look at these cards. Please make two piles: one pile is if that card has a problem faced by you and your household, the other pile is for things that are not problems. There are blank cards if there are problems you think of that are not already on the cards.

(16 b) After you make your two piles, hand the one that is not problems to me. From the remaining pile, choose 5 things that are bigger problems and rank those. 1 is the biggest problem down to 5.

While they are choosing and ranking the problems, write a "0" in the HH problem column for each thing that they said was not a problem. When they are done ranking ask question 16b.

(16 c) Please repeat the same process, but this time thinking about the vanua – from your own perspective what are things that are problems or not problems that the vanua experiences. (16 d) Make the two piles (problem/no problem). Then choose 5 from the problem pile and rank those.

While they are choosing and ranking the problems, write a "0" in the Vanua problem column for each thing that they said was not a problem. When they are done ranking ask question 16d.

Take as much time as needed with this question, the rankings can be the same or different for HH and vanua – it is up to the participant. No prompting.

HH (16a)		**Vanua (16c)**		
0= no problem 1= problem	*Rank*	*0= no problem 1= problem*	*Rank*	
				Toga Island is eroding.
				Flooding in homes.
				Flooding in the plantation.
				Rubbish in the drains causing blockages that make flooding worse.
				People not participating in village meetings, clean-ups, etc.
				The price of food has become too high.
				There is not enough land to support all the children now when they grow up and want to plant.
				Pollution in the Toga River is worse and may affect the kai, prawns and fish.
				It rains differently at different times of year than it used to.
				It is hotter now than it used to be.
				Water comes up further with high tide now than it used to.
				Fruits become ripe at different times than they used to (like breadfruit).
				A strong hurricane.

				Losing your job.
				That Toga Island will be too small for everyone to live here in 20 years because of erosion.
				That Toga Island will be too small for everyone to live here in 20 years because of population growth.
				The river is less clean and people could get sick (e.g. skin diseases) from being in the river.
				Other:
				Other:

16b. Please explain why your ranked the problems in the order you did for your household.

_____

_____

_____

_____

_____

16d. Please explain why your ranked the problems in the order you did for the vanua.

_____

_____

_____

_____

_____

17a. Look at the three potential options to address erosion on the other sheet *(the ones with green around the boxes)***. Please rank them according to which one you would prefer to happen in the vanua:** *(1 is the your favourite, 3 your least favourite)*

	Building concrete walls to slow down erosion. This costs more money than some other options, will take time to build and will slow down erosion for at least 10-20 years.
	Planting more trees and grasses along the river bank to slow down erosion. This does not cost very much and can be started right now, but will not be as effective at preventing erosion as the other options.
	A combination of trees, smoothing steep river banks, planting grasses and building walls of sandbags and other natural materials to slow down erosion. This will most likely slow down erosion the most, but will take longest to do and be the most expensive option.

17b. Why did you choose (1) as your favourite and (3) as your least preferred?

_____

_____

18a. Please look at these potential solutions to some issues people have brought up in the vanua *(show them the list on the extra sheet – outlined in blue).* **From your own perspective please say what you think about the following solutions to problems in the vanua.**

	I do not think this would work at all	I do not think this is a very good idea	Neither like or dislike	This idea may solve some problems	I think this solution is one of the best
1. All planting or building within 50 metres of the riverbank is prohibited. There will be fines for anyone planting anything or building a new building (current buildings are ok) in that area.	1	2	3	4	5
2. All homes must be raised at least 1 metre off the ground, the homeowner has to fund this if the house is not already raised.	1	2	3	4	5
3. Fines for anyone caught dumping rubbish in the drains or river.	1	2	3	4	5
4. The culvert at the road is removed and a bridge built instead. This will help with water flowing in the Toga river, removing more sediments at the river bottom, potentially reducing erosion and making the water cleaner. The road may be closed off and on for several months while this happens.	1	2	3	4	5
5. Fines for people not participating in village clean ups without good reason (e.g. taking care of someone who was sick, were at work, etc).	1	2	3	4	5
6. Those farmers whose field flood regularly use soil brought in from elsewhere (other parts of Toga) to build up the planting areas so they are above flooding height for most floods.	1	2	3	4	5

18b. If you had to choose ONLY ONE of the previous options, which would you choose and why?

_____

_____

_____

_____

Vinaka vakalevu for your time so far. There are only a few more questions about you and your household:

19. Gender: Man Woman

20. Age : 15-25 26-35 36-45 46-60 61+

21. How many people live in your household right now?_____

22. What is the highest level of education you completed?

Class 7 or before		Certificate/technical study	
Form 5 or before		Some undergraduate	
Form 6		Bachelors degree	
Form 7		Postgraduate degree/ diploma	

23. From the list of the following, where does your income come from (can pick more than one): *(check all that apply)*

Plantation Full-time work Pension Family provides when we need it
River Part-time work Other:
_____

Vinaka vakalevu for sharing your time and your answers!

Fijian Version

Koro: _____ RA Name: _____
Q#:_____

Mataqali: **_____ Yavusa: _____**

Vinaka vakalevu na vakatavi. Nai matia ni vica na taro oqo e baleta na kakana oni tea ka kania.

1. Au na wilika vei iko e vica nai tei mo na tukuna vei au kevaka o tea tiko ena nomu i letiei se ena yasa ni nomu vale. *(Mo ni na raica kevaka e dua na ka e sega ni volai tiko moi ni qai vakacuruma)* **E dua tale beka na ka o tea tiko, au sega ni cavuta?** *(Vola nai sau ni taro ena vanua e lala tiko e ra, mo vola vakamatata me vaka oqo "baigani, tommata" ka sega ni "kakana draudrau")*

Au sega ni tea e dua na ka Kakana draudrau: _____

Tavioka

Dalo

Bele

2. O ni volitaka beka e dua naka o ni tea tiko? Io Sega

Kevaka, io na cava so:
_____

3. Au na wilika yani e so na i tei, mo tukuna vei au ke vaka e tu vakarawarawa, me vaka volivoliti iko – e tu ena nomudou Qele, o ni rawa ni kauta ga mai ka vakayagataka ka sega ni o ni na volia. *(kevaka e sega ni dua na ka e volai tiko e keri au kerea mo ni na qai vola toka vakamatata na itei yadua e ra)*

Niu Voivoi Jaina

Maqo Buka So tale:_____

Seramaia Weleti

4. E tiko beka na nomu? *(Mo raica vakavinaka qai vola nai sau ni taro)*

Toa Vuaka Me So tale: _____

Ga Bulumakau Ose

5. Na levu ni nomu i teitei:

Vakarauta ga Lailia (ka sega niu na rawa ni tea kina e levu na ka)

Levu (vei au kei na noqu matavuvale)

6. E vakacava na veika o na kania mai na:

	Lailai mai na dua na vula	**Vakadua na vula**	**Vakadua na macawa**	**Veisiga**
Teitei				
Wai				
Sitoa				

7. Ena taro ka tarava. Au na wilika e dua nai tukutuku vei kemuni. Au kerea moni vaka rorogo vinaka sara ka tukuna mai vei au kevaka o ni duavata se sega. E sega ni dua mai sau ni taro e donu se cala moni sauma mai na taro ena nomuni vakanananu. Ka moni taura na kena levu ga ni gauna moni vakasama taka kina na ka oqo.

E bibi na kemui rairai kei na rorogo ni nomu vosa me dei ena nomu wilika ka vola nai sau ni taro. E gadrevi me ra dina ena kena saumi na taro baleta so na gauna e na veisau nai sau ni taro baleta ira nanuma rio o koya e vakatataro tiko e na vakalewa na nodrai sauni taro.

1	Io / Sega	Ke yaco tiko e so na leqa e na vanua me vake na (taunimate, sega na cakacaka) e so na ka eda rawa ni cakava vakei keda ga ka da sega ni waraka na veivuke mai taudaku.
2	Io / Sega	Au nanuma ni sa lailai na uca e na gauna oqo me vaka e dau yaco e liu.
3	Io / Sega	Au nanuma ni sa levu cake na uca e na vula i uca e na gauna qo mai na gauna dau yaco kina e liu.
4	Io / Sega	An nanuma ni sa katakata vakalevu cake e na vula i katakata mai na kena dau yaco e liu.
5	Io / Sega	Au nanuma ni sa batabata cake e na vula i uca me vaka e dau yaco e liu.
6	Io / Sega	Sa levu cake na kai kei na moci e na gauna qo mai na gauna iliu me vaka e liu.
7	Io / Sega	Na veisau ni tau ni uca e sega ni veiwekani ka na vagagai ni caga e na na maliwa lala.
8	Io / Sega	Na veisau ni tau ni uce e sega ni vakavuria na tamata ia sa yaco tiko ga ena noda vuravura.
9	Io / Sega	Na veisau ni vakaraunikatakata e sega ni vagaga na cagi e na maliwa lala.
10	Io / Sega	Na veisau ni vakaraunikatakata e sega ni vakavuna na tamata ia e baleta ga na veisau e yaco tiko ena noda vuravura.
11	Io / Sega	E sega ni dua e rawa ni veisautaka na katakata, uca se ualuvu na kalou ga e vakatulewa.
12	Io / Sega	E da rawa ni veisautaka na vakaraunikatakata, uca, kei na ualuvu kevaka e da tarova e viti kei na vuravua taucoko na kena tarovi na benu vakaca kei na musu kau me savasava kina na vanua eda bula tiko kina.
13	Io / Sega	E sa levu na veisau e na veika me vaka na tau ni uca, ualuvu, vakaraunikatakata au nanuma ka meda na cakava e so na veisau ena veika da vakayacora meda tiko vinaka kina ni yaco mai veiveisau oqo e na gauna mai muri.
14	Io / Sega	Sa levu na wai ena gauna oqo mai na gauna e dau ua levu kina ena gauna e liu.
15	Io / Sega	Na sisi ni Qele e dua na ka e dau yaco ena uciwai.
16	Io / Sega	Niu rokova na lawa kei na vanua, na vanua ena qarauni au.
17	Io / Sega	Na teitei e tiki ni bula vakavanua ia e noda i tavi yadua ga na lewe ni vanua meda tea ka qarauna.
18	Io / Sega	E sega ni levu na ka meda cakava ni yaco e dua na leqa ena vanua baleta ni da sega ni kila na ka meda cakava, ka sega tale ga vei keda nai lavo meda vakavinakataka kina na leqa oya?
19	Io / Sega	Kevaka au sega ni rokovi ira na qase, vakarorogo kina noqu mataqali qarauna veika e tu vakavolivoliti au no e na yaco vei au e dua na ca.
20	Io / Sega	Na veisau ni uca, vakaraunikatakata, tubu ni yalayala ni wai sa yaco tiko, ena sega ni tarovi rawa kevaka mada ga na vuravura taucoko sa tarova na vakasabusabutaki ni vanua ka qarauna da tiko vakavolivolita.
21	Io / Sega	Nai liuliu ni veimataqali kei na yavusa e sega ni nodra i tavi mera vakarorogo vei ira na nodra tamata, me na qole mai ena bose ka tovolea mera vakalulewa me vinkaka kinda ne nodra bula verimaliwai.
22	Io / Sega	E dina ga ni kalou e buli kida kei na vuravura eda bula kina ia meda na qarauna ke sega ena yaco vei kida e so na ka ca me vaka na draki veisau.

23	Io / Sega	Na veisau ni uca, vakaraunikatakata, ni sa dreu na vuanikau ka sa yaco na ualuvu, baleta na kalou sa cudruvi keda baleta ni sa sega vinaka na ka edo vakayacora tiko na tamata.
24	Io / Sega	Kevaka e sega ni dau gole ena Bose vakaro na noqu Turaga ni mataqali ia e sega ni yago vei au mei vakaitavi.
25	Io / Sega	Kevaka au sega ni rokova na vanua ena yaco e so na ka ca, e na wai, kei na noqu teitei.
26	Io / Sega	Kevaka e tukuna na noqu i liuliu so na ka, au sega ni duavata kina, au na cakava go na ka e tukuni.
27	Io / Sega	Niu raica na vakatulewa ena Bose ka nanuma ni sega ni dodonu, au nuitaka niu dua na ka meu cakava e dua na vakatulewa, ia au kila ni sega ni dua na ka me na veisautaka.
28	Io / Sega	Kevaka au nanuma ni ka e tukuna tiko na noqu i liuliu e cala se au sagata, au na vosa kina ena Bose.
29	Io / Sega	Kevaka au kila ni sega ni dodonu na ka e tukuna tiko na noqu i liuliu au na kacivi koya vakatikitiki io ka wasea vei koya na ka au nanuma.
30	Io / Sega	Au marautaka niu sega ni vasa ena Bose, ka sega ni tarogi vei au na noqu nanuma au vinakata cake me dua e tukuna vei au na ka meu cakava.
31	Io / Sega	Na ka au cakava e baleti au vakalevu me vaka o au e dua ga na tamata e tiko ena dua na vanua.
32	Io / Sega	An na tokana e dua na ka me tarovi kina na ualuv kei na sisi ni qele e Toga kevaka mada ga era na sega ni duavata kina na tiko ena uciwai e ra.
33	Io / Sega	O ria na noda i liuliu era kila na ka vinaka duadua me vakayacori.
34	Io / Sega	Kevaka na tatarovi ni sisi ni Qele kei na ualuvu e Toga ena vakacacana nai yau bula au na sega ni tokona.
35	Io / Sega	Na veika vou ka sega ni donu me na vakayagataki ena vanu ena yoga e na gauna qo ia ena sega ni vinkaka e na dua na balavu.

8. Au na wilika yani e so na ka vei iko Tukuna vei au kevaka sa yaco oti vakadua vei iko ena 3 na yabaki sa oti? *(Mo raica vakavinaka qai vola nai sau ni taro)*

Au a sega ni rawa ni maroroi lavo me vakavinakataki kina na noqu vale se volia e dua na ka baleta ni sa levu na ka e dau lavaki ena mataqali.

E dodonu meu digitaka meu soli ka kina lotu se na ka e lavaki ena mataqali.

E dodonu meu digitaka na voli kakana, saumi curucuru kei na kena vakayacori na veika ena mataqali.

Au na kere i lavo me caka kina na veika e lavaka na mataqali kei na koro.

Au sa rawa ni cakava na veika e lavaki ena mataqali ka soli ka talega kina lotu ka sega na kana leqa.

Au sega ni kila.

9a. Na taro tarava me baleta na cava na kena i balebale na maroroi ni vanua me sautu. Au na solia vei iko e 7 na tiki ni pepa ka volai toka kina e so na ka duidui. Mai na nomu nanuma kei na vakatulewa e na kena na maroroi na noda vanua. *(mai 1 koya e bibi eduadua, 7 koya mamada. Solia na tiki ni pepa ka toqai toka kina na bai damudamu vei ira na vakaitavi, vola nai tuvatuva era nanuma)*

	Maroroi na vanua (teitei, vunikau, Qele) me galala mai na kena benuci ka vakasabusabutaki ni vurevure ni kakana vinaka.
	Maroroi na uciwai kei na kena i yau bula (moci, kai, wai) me savasava ka kua ni benuci.
	Vurevure ni veitosoyaki (mevaka gaunisala ni lori, kei sala simede e loma ni koro) ka vakarawarawataka na veitosoyaki i valenilotu, tauni, koronivuli, etc. rawarawa ka veitaqomaki.
	Nai sulusulu
	Rokovi ira nai liuliu kei na Qase.
	Cakacaka kei nai vurevure ni lavo.
	Vakaitavi ena Bose, sasamaki kei na cakacaka ni mataqali, koro kei na vanua.

9b. Vakamacalataka na nomu tuvai iratou e cake mai na 1-7.

_____

_____

_____

_____

10. Na taro oqo e baleta na nodra nanuma na lewe ni vanua me baleta na na gauna oqo, gauna sa oti kei na gauna se bera mai. Ena wasewase oqo au na wilika e dua na i tukutuku. Au kerea iko mo na sauma o koya e vakataki iko, se sega, e na kenai vakarau mai na 1 – 5. 1 sega ni vakataki iko, 5 e vakataki iko. E sega ni dua na taro e donu se cala, oqo e baleta na ka o nanuma vakai iko.

E bibi na kemui rairai kei na rorogo ni nomu vosa me dei ena nomu wilika ka vola nai sau ni taro. E gadrevi na dina ena kena saumi na taro baleta so na gauna ena veisau nai sau ni taro baleta ira nanuma rio o koya e vakatataro e vakalewa tiko na nodrai sau ni taro.

		Sega ni o au	Sena ni vakataki au	Sega ni o au se vakataki au	E so e vakataki au	E vakataki au sara ga
1	Tautauvata ni ka o raica, rogoca ka boica e kauta lesu tale na nomu vakanananu ena gauna o se gone kina.	1	2	3	4	5
2	Au dau vakasamataka na veika duidui dodonu me'u cakava duidui ena noqu bula.	1	2	3	4	5
3	Audau marau niu namuma na noqu vei gauna sa oti.	1	2	3	4	5
4	Au sega ni dau vakasamataka vakabibi na ka au dau cakava.	1	2	3	4	5
5	Kevaka e sega ni caka e dua na ka ena kena gauna au sesa ni leqataka.	1	2	3	4	5
6	Ena gauna au via rawata kina e dua na ka au tuvana nai tuvatuva kau cakava e dua i tuavatuva meu rawata kina.	1	2	3	4	5
7	E levu cake na noqu nanuma na veika vinaka mai na veika ca na veika ca sa yaco oit.	1	2	3	4	5

8	Niu dau vakaroroqo ena noau sere taletaki au dau guilecava na gauna.	1	2	3	4	5
9	Au tovo lea meu bula vakavinaka ena veisiga yadua.	1	2	3	4	5
10	Au na tovoka meu bula vakavinaka ena veisiga me vaka sa kerai otioti.	1	2	3	4	5
11	Veigauna vinaka sa yaco oti e dau tu ga ena noda vakanananu.	1	2	3	4	5
12	Au rawata vakavikana na noqu i tavi vei ira na noqu itokani kei nai tikotiko ena kena gauna donu.	1	2	3	4	5
13	Au cakava na noqu vakatulewa ena gauna ga e yaco kina e dua na ka.	1	2	3	4	5
14	Au dau lako curna na veisiga ya dua ka sega ni dau navunavuci.	1	2	3	4	5
15	E levu veika ca sa yaco oti ka'u sega ni via vakananuma tale.	1	2	3	4	5
16	Au a cakava e so na cala ena gauna sa oti kau diva maidaga ka rawa ni'u vakasuka.	1	2	3	4	5
17	Au dau vakananuma na veika vinaka e yaco vei au e niu se gone.	1	2	3	4	5
18	Ni bera niu cakava e dua na vakatu lewa au vakarautaka na kena i sau nai na kena yaga.	1	2	3	4	5
19	Au dau sega ni ririko ni cakava e so na ka me'u kakua ni vucesa kina.	1	2	3	4	5
20	E sega ni dau yaco e levu sara na ka au namaka.	1	2	3	4	5
21	E dredre sara ga vei au meu guilecava na veika a yaco vei au ena gauna au se cauravou/goneyalewa kina.	1	2	3	4	5
22	E kauta mai vei au na marou kei na taladrodro ni cakacaka kevaka au a vakasamataka nai naki kei na veika e na kauta mai.	1	2	3	4	5
23	E dina marou tiko ena gauna oqo dau kauta lesu tale na noqu vakanananu me'u vakatautauvata ni veika au sa sivita oti se yaco oti.	1	2	3	4	5
24	Ena sega ni rawa ni tuvana na veika e tu mai liu baleta ni sa levu na veisau.	1	2	3	4	5
25	Na noqu bula e vakatulewataki ena veika au sega ni vakatulewataka.	1	2	3	4	5
26	Au sa cakava oti na noqu veika vaka vuli ena noqu cakava so na vaka tulewa vinaka.	1	2	3	4	5
27	Au dau doudou me'u cakava na veika esome vakamarautaki au.	1	2	3	4	5
28	Au dau muria ga na vakatulewa ni yaloqu kei na utoqu mai na noqu vakasama.	1	2	3	4	5
29	Au rawa ni tarova na veitemaki niu kila na tu na ka e dodonu me vakayacori.	1	2	3	4	5
30	Na bula ena gauna oqo so rui dredre au taletaka cake na bula rawarawa eda a na bula ga bula kina ena gaua e liu.	1	2	3	4	5

31	Au teleitaka na bula vakai i vakarau vakamatavuvali ka vakavanua me talevi tale.	1	2	3	4	5
32	Au dau nanuma lesu na veika ca ka yaco vei au ena gauna sa oti.	1	2	3	4	5
33	Au na lako curuma tikoga na veika dredre, ke ra na vukei au me'u tosa kina iliu.	1	2	3	4	5
34	Na noqu vakayaqataki lavo ena veika au taleitaka nikua e vinaka cake mai na noqu mamaroroi me baleta na veka ni mataka.	1	2	3	4	5
35	Au dau vakananuma na veika vinaka au a sa sa calata mai na noqu bula.	1	2	3	4	5
36	Au taleitaka na noqu veiwekani voleka me ka mosi ka bibi vei au.	1	2	3	4	5

Vinaka vakalevu na saumi taro tiko, na taro tarava e baleta na leqa e so iko na sotava ena nomu matavuvale kei na vanua.

11. Sa luvu beka vakavica na nomu i teitei (me luvu ena 3-4 na siga) ena yabaki tolu sa oti?

Sega 1-3 4-6 7-10 More than 10/ Sivia na 10

12. Sa luvu beka vakavica na nomu vale (na wai e voleka yani, se curu i loma ni vale) ena tolu na yabaki sa oti?

Sega 1-3 4-6 7-10 Sivia na 10

13. E cere beka na nomu vale? Io Sega

13a. Kevako, io e vica: 0-1 mita 1-2 m Sivia na 2 m

14. O sa raica beka na veisau ena ualuvu? Io Sega

14a. Kevaka io – na cava beka o nanuma ni vakavuna na veisau ni ualuvu (o na rawa ni digia e dua se sivia e dua? *(Mo raica vakavinaka qai vola nai sau ni taro)*

Vakatitobutaki na uciwai
Musu na kau ena uciwai mai cake (ulu ni wai)
Levu na uca
Sega ni vinaka nai keli
So e na ka tale: _____
Au sega ni kila

15. O sa raica beka na na veisau ena sisi ni Qele? Io Sega

15a. Kevaka io mai na veika e toqai, na cava iko nanuma ni vakavuna na sisi ni Qele iko rawa ni digitaki me sivia na dua? *(Mo raica vakavinaka qai vola nai sau ni taro)*

Sa duatani na kui ni wai (e.g. sa rui kaukauwa)
Vakatitobutaki ni wai ena Rewa River.
Sa levu no musukau ena bati ni uciwai e na ulu ni wai.
Tara na kalavati kei na gaunisala e veisautaka na drodro ni wai.
Levu na tamata sa vakayagataka ma uciwai.
Levu na vunikau sa musu tiko e Toga.
Eda sa teitei ka tiko volekata na uciwai.
Au sega ni kila.
So tale: _____

16. Na taro oqo me baleta na vei leqa o sotava tiko kei na nomu matavuvale ena vanua. Ono raica na vei tiki ni pepe oqo. Cakava me rua nai bibibini. 1 – leqa o sotava kei na nomu matavuvale. 2 – Na ka e sega ni leqa. E tiko tale ga na Tiki ni pepa lala kevaka o nanuma e so tale na leqa e sega ni volai tiko o na rawa ni qai vola ena pepa oya.

Ni o sa cakava oti na nomu vakatulewa ni rua nai binibini pepa qai solia mai vei au koya ko iko nanuma ni sega ni leqa. Main nai binibini ka se vo tu digia e 5 ka o nanuma ni leqa levu ena nomu vakatuleqa 1 – 5.

Ena nodra sa digia ka vakalulewataka na leqa vola o ena HH ena vanua era nanuma ni sega ni leqa ni sa oti na nodrea tuva na leqa qai taro 16b.

Vakamuria na na gaunisala ni taro vata ga oya ena gauna oqo me baleta no vanua. Mai na nomu nanuma vakasama kei na vakatulewa na cava o nanuma ni leqa/sega ni leqa ena nomu vanua. Cakava e rtua nai binibini leqa/sega ni leqa. Qai digia e 5 mai na binibini leqa.

Ena gauna sa digitaki kina na leqa ena kena i tuva 1-5 ena leqa ni vanua ia ena veika era tukuna ni sega ni legq ni sa oti Taroga sara na Taro 16d.

Taura vakalevu na gauna o vinakata ena Taro oqo. Na kena Tuvai ena tautauvata se Duidui ena HH kei na vanua e vakatau vei koya o Taroga tiko.

HH (16a)		**Vanua (16c)**		
0= no problem 1= problem	*Rank*	*0= no problem 1= problem*	*Rank*	
				Sa sisi tiko na Qele e Toga.
				Ualuvu ena veivale.
				Ualuvu nai Teitei
				Benu enai keli e vakavuna na Ualuvu me ca vakalevu.
				Lewe ni koro era sega ni vakaitavi ena Bose vakoro kei na sasamaki (etc).
				Sa toso cake nai sau ni yaya kei na kakana.
				Sega ni veirauti na Qele vei ira na gone nikua ni ra na tubu cake mai mera na via teitei.
				Vakadukadukataki na uciwai e Toga ka sa ca vakalevu ka vakavuna na kena na vakaleqai nai yau bula (kai, moci, ika).
				Na uca sa duidui na kena gauna ni tau e na yabaki mai na gauna e liu.
				Sa sivia cake na katakata mai na katakata eda dau sotava e liu.
				Sa tubu cake nai yalauala ni wai mai na yalayala e dau yacva i liu.
				Vuankau so dreu ena dudui ni gauna me vaka e dau dreu kina i liu (mevaka na uto).
				Cagilaba kaukauwa.
				Sa sega mai na cakacaka.
				Sa na lailai na yanuyanu o toga mera na bula kina na tamata ena 20 na yabaki mai oqo baleta na sisi ni Qele.
				Na yanuyanu o Toga sana lailai vei ira na tiko kina ena 20 na yabaki main oqo ena kena sana tubu tiko ga nai wiliwili ni Tamata.

				Na uciwai sa sega ni savasava ka ra na tauvimate na tamata (e.g. mate ne kuli) mai na nodra dau vakayagataka tiko na uciwai.

16b. Vakamacakataka na cava na vuna o tuvana kina nai tuvatuva ni Leqa me vaka o cakava ena nomu Matavuvale.

_____

_____

_____

_____

_____

16d. Vakamatakataka na cava na vuna o tuvana kina nai tuvatuva ni Leqa me vaka o cakava ena nomu Vanua.

_____

_____

_____

_____

_____

17a. Raica mada na 3 nai tucatuva/nanuma me baleta na nomu na vakamacataka na kena na Tarovi na sisi ni Qele ena dua tale na draunipepa (*Drokadroka*) **Tuva me vaka na ka o vinakata me caka ena nomu vanua.** *(1 ko iko taleitaka. 3 ko iko taleitaka ga vakalailai)*

	Tara Bai ni ua simede e sau levu, taura na gaua me Caka kina Tarova na sisi ni Qele 10-20 yabaki.
	Tei kau kei na co ena bati ni wai. Sega ni sau levu le rawa ni caka ga qo e sega ga ni na yaga sara me vaka na kena tale eso.
	Cakavata kece na Tei kau, vakasava taki na bati ni wai, Tei co kei Tara Ba ni Wai ena taga nuku, kei veika Bula Tale e so me tarova no sisi ni Qele la e taura e dua na gauna balavu me caka kina ka sau levu talega.

17b. Na cava iko digitaka kina na (1) me o taleitaka kei na (3) me vaka e sega soti sara ni taleitaka.

_____

_____

_____

_____

18a. Kerekere ke rawa ni o ni Raica e so nai wali ni Leqa era kauta cake mai na lewe ni

vanua. *(vakaraitaka vei ira nai tuvatuva ena dua na tiki ni pepa – ka roka taki ena karakarawa).* **Mai na nomu vakatulea se nanuma tukuna na cava o nanuma me na i wali ni leqa kina vanua.**

	Au sega ni vakabauta ni na yaga	Au sega ni vakabauta ni vakasama vinaka	Ena vinakati se seaga	Na vakasama oqo ena walia e so na leqa	Au nanuma ni vakasama oqo e vinaka duadua
1. Sa vakatabui na Tara Vale se Teitei ena 50 mita mai na Bati ni uciwai. Ena totogi taka e dua e tetei se tara vale ena vanua oya.	1	2	3	4	5
2. Me na lave cake na veivale me Dua na mita la mena sauma ga nai taukei ni Vale ke se bera ni vakaceretaki.	1	2	3	4	5
3. Me ra na totogitaki o ira era benu vakacava ena i keli se bati ni uciwai.	1	2	3	4	5
4. E kau lauvi na kalavati ka me tara na wavu ena vukea na drodro ni wai ena uciwai e Toga. Ena vakasavasavataka na uciwai vakalailai taka na sisi ni Qele ka na savasava kina na wai. Ena sogo tiko na giaunisala ena vica na vula me vakayacori na cakacaka qo.	1	2	3	4	5
5. Totogitaki o ira era sega ni vakaitavi ena sasamaki vakoro (ia mena dua nai ulubale vikaka mera na solia na sega ni vakaitavi me vaka qaravi tauvimate/ cakacaka).	1	2	3	4	5
6. O ira na dauteitei e dau luvu wasoma na nodra i teitei mera na vakayagataka na Qele ka kau mai ena dua tale na vanua e Toga me vakaceretaki kina na nodra vanua ni teitei me tiko e cake mai nai yalayala ni ualuvu.	1	2	3	4	5

18b. Kevaka moni na digia e dua mai na veika e sa tarogi toka e caka o cei o ni na digia/ baleta?

_____

_____

_____

_____

_____

Vinaka vakalevu na nomuni solia tiko na nomuni gauna sa vo wale ga oqo e vica na taro me baleta na nomu matavuvale.

19. Turaga Marama

20. Yabaki : 15-25 26-35 36-45 46-60 61+

21. How many people live in your household right now?_____

21. E vica beka na lewe ni nomuni matavuvale ena gauna oqo?

_____

22. Na cava beko nai vakatagedegede ni nomuni vuli?

Kalasi 7		Sitivikiti	
Fomu 5		Some undergraduate	
Fomu 6		Bachelors degree	
Fomu 7		Postgraduate degree/ diploma	

23. Na cava beka na, vurevure ni nomu lavo *(ona rawa ni digia me sivana dua)***:**

Teitei Cakacaka saumi Peniseni Matuvuvale

Wai Caka vakagauna So tale:

_____

Vinaka vakalevu na nomuni solia na nomuni gauna kei na nomuni saumi taro!

Appendix D. UEA Ethics Application Forms

GUIDANCE NOTES

These notes are in three sections: general information (for all applicants); additional information for students (UG/PGT/PGR) and additional information for faculty/research associates.

1. GENERAL

Guidance on ethics is available in the International Development Ethics Handbook and on the UEA website http://www.uea.ac.uk/dev/ethics Please consult these sources of information before filling this form.

STUDENTS

You must submit this application form and any accompanying documents as follows:-

1) Electronically to Professor Janet Seeley - j.seeley@uea.ac.uk, with a copy to dev.ethics@uea.ac.uk **AND** copy to your Supervisor.
(Consent forms etc should be submitted as separate documents and not included in the same file as the ethics form. Complete the top of the Part B page)

2) A hard copy INCLUDING THE **REQUIRED SIGNATURES** to:
DEV Local Office, room ARTS 1.72, School of International Development.

Checklist: **BEFORE** submitting please check the following:

- ✓ You have included a consent form and an interview schedule/ survey if these are being used in the research
- ✓ Your Supervisor has read and commented on your ethics form and accompanying materials (consent form, questionnaire or interview schedule if these are being used)
- ✓ You and your Supervisor have signed the original form
- ✓ You have included *your name in the file name* of the electronic copy of the form and any accompanying documents. **Forms which are not properly labelled will be returned and may miss the deadline for that month's ethics committee meeting**. You have you completed the top Section of the PART B of the form (on the last page)
- ✓ You have copied your supervisor in on the electronic submission
- ✓ You have submitted a risk assessment form signed by you and your supervisor to Learning and Teaching Services

ALL OTHER APPLICANTS

You must submit this application form and any accompanying documents as follows:-

1) Electronically to Professor Janet Seeley - j.seeley@uea.ac.uk, with a copy to dev.ethics@uea.ac.uk. (Consent forms, etc should be submitted as separate documents and not included in the same file as the ethics form. Complete the top of the Part B page. Include your name in the file name of the electronic copy)

2) A hard copy INCLUDING THE **REQUIRED SIGNATURES** to DEV Local Office (Room 1.72), Arts 1, School of International Development.

- **RESUBMISSION** – if you are asked to resubmit your application following review by the committee, please resubmit a new signed hard copy and electronic form, **PLUS include a letter** with your revised application **detailing** how you have responded to the committee's comments. The covering letter should be submitted as a separate file, not included within the ethics form.

2. Additional information for Students (Undergraduate and Postgraduate taught and Postgraduate research)

Students should ensure that their supervisor has read and approved their application, and any subsequent resubmissions.

a) DEV UG/PGT students must include their ethics form as an appendix in their dissertations.
b) DEV UG/PGT students who seek ethical clearance, and therefore include their form as an appendix, must include a brief paragraph (which may be expanded in an appendix, if space is limited) describing the ethical issues related to their research and any changes to their outline procedures.
c) Applicants should not start data collection before ethical approval is granted.
d) Postgraduate research students will be required to submit a one page report on the ethical issues related to their research to the PGR students office at the conclusion of their fieldwork, which will be forwarded to the Chair (the PGR students hub will have a record of who seeks ethical clearance from the International Development Committee or from another Committee).
e) Postgraduate research students are expected to include their ethics form as an appendix in their thesis and explain their approach to ethical issues in their thesis. Examiners are increasingly aware of ethical issues in research and may well ask questions related to the ethics of research during the viva voce.
f) Separate guidance is available for UG Development Work Experience students in the School of International Development. Please consult course directors.

3. Additional information for Faculty/Research Associates Faculty members/research associates are invited to submit a copy of their full proposal with this form.

Dev Faculty/DevCo associates members should submit a report on the ethical issues related to their research to DEVCo at the conclusion of their project, which will be forwarded to the Chair (DEVCo will have a record of who seeks ethical clearance from the International Development Ethics Committee or from another Committee). Please use the form available at https://intranet.uea.ac.uk/dev/intranet/ethics (if you do not have access to the intranet please request the form from Dev.general@uea.ac.uk or from the Committee Chair).

Faculty/research associates who access research funding via SSF/other route, rather than DEV, will be asked to voluntarily send their report to the Chair of the International Development Ethics committee (a list will be kept by the Chair of such projects so that we can check).

Faculty/research associates with projects that last more than one year will be required to submit an annual report to the Chair of the International Development Ethics committee reporting on progress. Please use the form, which should not time consuming to fill in—the template is available at

ETHICAL APPROVAL – GUIDANCE NOTES

UNIVERSITY OF EAST ANGLIA

INTERNATIONAL DEVELOPMENT RESEARCH ETHICS COMMITTEE

https://intranet.uea.ac.uk/dev/intranet/ethics (if you do not have access to the intranet please request the template from Dev.ethics@uea.ac.uk or from the Committee Chair)

University of East Anglia

APPLICATION FOR ETHICAL APPROVAL – PART A

UNIVERSITY OF EAST ANGLIA
INTERNATIONAL DEVELOPMENT RESEARCH ETHICS COMMITTEE

COMPLETE ALL SECTIONS IN **PART A** AND APPLICANT INFORMATION IN **PART B**

APPLICANT INFORMATION

Forename	Shelton
Surname	Clare
Gender	Female
Student ID number *(if applicable)*	6360752
Contact email address	c.shelton@uea.ac.uk
Date application form submitted	8 April 2014
1st application or resubmission?	Resubmission – UPDATE with new method (questionnaire)

PROJECT INFORMATION

Project Title	Where do climate change adaptation decisions come from? Socio-cognitive factors, decision-making and adaptive capacity in Fijian villages

** DEV/DEVco faculty or DEVco research associate applications only:*

* Project Funder	
* Submitted by SSF or DEVco?	
If yes – Project Code:	

Postgraduate research students only:

Date of your PP presentation	July 26 2013

PERSON(S) SUBMITTING RESEARCH PROPOSAL

Name(s) of all person(s) submitting research proposal. Including main applicant	Status (BA/BSc/MA/MSc/MRes/ MPhil/PhD/research associate/faculty etc.) Students: specify your course	Department/Group/ Institute/Centre
Clare Shelton	PhD Student	DEV

SUPERVISOR AUTHORISATION

In the case of undergraduate and postgraduate research, please give details of supervisor(s). The Supervisor is asked to certify the accuracy of the following account. If the supervisor is out of the country at the time of submission they should send an email to the Chair of the ethics committee (j.seeley@uea.ac.uk), copied to dev.ethics@uea.ac.uk stating that they have seen and approved the application.

Name of supervisor(s)	Position held
Marisa Goulden	Lecturer in Climate Change, Tyndall Centre
Signature *(supervisor of student)*	Date

APPLICANT SIGNATURE

Signature *(proposer of research)*	Date

1. OVERVIEW OF THE STUDY

Describe the purposes of the research/project proposed. Detail the methods to be used and the research questions. Provide any other relevant background which will allow the reviewers to contextualise your research or project activities. Include questionnaires/checklists as attachments, if appropriate.

Overview

Adaptation to climate change can encompass a diversity of activities at multiple scales either in reaction to or in anticipation of changes in climatic variability and trends (including incremental changes and extreme events). There are a growing number of activities focused on climate change and adaptation throughout the Pacific region at multiple scales. Fiji has been active in implementing climate change adaptation activities, including efforts at the community, national and regional levels. However, adaptation can be limited by thresholds in the biophysical environment or barriers in cultural or social norms that prevent or constrain adaptation decision-making. There is a growing body of research on these social barriers; however the importance of socio-cognitive factors and underlying beliefs and perceptions influencing adaptation decision-making is little understood. Socio-cognitive factors are shaped by underlying beliefs and perceptions, such as identity, risk perceptions, efficacy, values and norms at the individual and collective level. The objective of this research is to understand what impact these factors and their antecedent beliefs and perceptions may have on individual and community responses to climate impacts and climate change adaptation decisions.

Research Questions

My main research question is "how do beliefs, perceptions, attitudes and norms (i.e. selected socio-cognitive factors) influence adaptation decisions and adaptive capacity in Fijian villages?"

The research goal is to increase understanding of the antecedents of beliefs and socio-cognitive factors that influence climate change adaptation decision-making at the individual, household and community level and how these relate to adaptive capacity in Pacific Island communities.

The following research questions will address the context of these decisions, the role of selected socio-cognitive factors in decisions about adaptation and responses to climate impacts, and how these may operate at various decision-making levels (individual, household and community) in a Fijian village:

1) What is the context for decisions about responses to climate impacts?
2) What role might perceptions, attitudes, and norms have in adaptation decisions for individuals, households and communities?
3) What role do these selected socio-cognitive factors (perceptions, attitudes and norms) and underlying beliefs and perceptions have in adaptive capacity?

Research Design

This research will be a case study of a coastal village.

Access

Access to the village will require appropriate cultural permissions, and I will go initially through contacts at the University of the South Pacific to identity potential villages and then follow appropriate traditional channels to gain entry to the village.

Methods

- **Interviews** Semi-structured interviews with key informants and with village residents will be conducted. Key informant interviews will be conducted during the preliminary fieldwork stages (the first 2 months). Semi-structured interviews in the selected village will be done during the main data collection phase using the concept of informal *talanoa* to provide data

1. OVERVIEW OF THE STUDY

on perceptions (e.g. climate change, attribution, time/future preferences, risk, and adaptation), and selected socio-cognitive factors (attitudes, subjective norms and perceived self and collective efficacy toward specified response and adaptation behaviours and climate change adaptation in general) at individual, household and community levels.

- **Observation** Village meetings and public space interactions will be observed to examine how personal and group-level perceptions and attitudes learned about in the interviews are used by community members.
- **Focus groups** Focus groups with subsets of the community (untitled men, youth over 18, women and village leaders) will discuss collective feelings of efficacy and controllability over adaptation actions and responses to climate impacts that the community has or are currently engaging in and also group-level attitudes and subjective norms. Although there is the danger that eliciting a group-level attitude toward an adaptation action may result in only the opinion of the most senior member of the focus group, structuring groups so they consist of people of similar status will attempt to overcome this issue (see *talanoa* discussion below). Focus groups will also conduct community history timelines, detailing past experiences with climate impacts (e.g. flooding/drought) and what responses were made to these and what kinds of decision-making processes were employed for each of these.
- **Questionnaire** A questionnaire will cover areas learnt about in the interviews, including ranking problems/issues, determining the extent which people have observed changes in rainfall, temperature, and natural resources consensus on cultural understandings related to decision-making. This questionnaire will be administered in the case study village as well as the other two villages that make up the *tikina* (district). As the other two villages occupy the same river island and potentially experience the same environmental issues, doing the questionnaire in the three communities will allow for a wider understanding of issues and perceptions. See Section 17 for further discussion of the *tikina* and *vanua* and their relevance for the questionnaire. (A copy of the questionnaire is attached)

Interviews and focus groups will be digitally recorded, with the permission of participants. They will be conducted in a mixture of Fijian and English, as English is commonly spoken, however it will likely be used differently than I am accustomed, and Fijian will be used for concepts that are not easily translated or understood in English. A research assistant will be present to translate during interviews and focus groups. At times, outsiders (even Fijian, if they are from a different part of Fiji) may have increased access to conversations that would be restricted to male/female only. Depending on the comfort level in the village (villages with more experience from outside researchers have been shown to be more flexible with gender norms regarding outsiders), one or two research assistants (male and female) will be hired.

Talanoa

Talanoa, or discussion/story telling, is a main feature of decision-making in Fiji (and throughout the Pacific) where issues and ideas are discussed and deliberated (formal *talanoa*), and repetition and circularity of conversation means that *talanoa* takes time, but also centres on open deliberation, respect, tolerance and fairness. Informal *talanoa* (e.g. smaller groups or one-on-one discussions) can be a method to overcome barriers to "talking straight" in formal *talanoa*, which includes focus groups. This also involves not asking direct questions without first spending time to share personal information, as well as not pressing for an answer to a direct question, rather letting the conversation move to the answer, which may be provided in the form of an anecdote rather than a direct answer.

2. SOURCES OF FUNDING

The organisation, individual or group providing finance for the study/project.
SSF and self

3. RISKS OR COSTS TO PARTICIPANTS

What risks or costs to the participants are entailed in involvement in the research/project? Are there any potential physical, psychological or disclosure dangers that can be anticipated? What is the possible benefit or harm to the subject or society from their participation or from the project as a whole? What procedures have been established for the care and protection of participants (e.g. insurance, medical cover) and the control of any information gained from them or about them?

Minimal risks are anticipated for research participants. Time and attention will be the main things I will take from participants and I will be respectful and mindful of this when scheduling interviews and focus groups. I will strive to avoid asking to meet during locally important times and be mindful of routines and other time constraints as well as where activities take place.

Information about the research, me, and reasons for being there will be provided in English and Fijian, and I will be careful to respect the confidentiality, anonymity and sensitivity of both participants and non-participants (other villagers not taking part in the research). All notes and digital recordings will be kept in a secure location and any identifying information will be removed from all data. I will be respectful of local custom and tradition regarding gender and the appropriateness of questions (e.g. direct questions with no conversational 'breaking in' period are considered very rude, especially if the questioner is not known to the questioned).

Asking about past events and decision-making processes may bring up painful incidences for participants, and I will be mindful of this and be sensitive in the questions and responses, as well as make clear that any line of questioning or overall participation may be stopped at any point with no explanation required. Additionally, discussing decisions may bring up potential areas of disagreement or conflict within the village or household, and I will be mindful and sensitive of this. Options for a private or non-private interview will be provided (option will be provided privately so the decision is not made with anyone else present). Topics of discussion that are sensitive will be avoided as far as possible during focus groups.

Focus group selection will be based on similar ranked groups in village hierarchy, and I will consult with my gatekeeper and research assistant in constructing groups to ensure that group members will feel able to speak openly and express different opinions (e.g. separate groups for village leaders, women with higher status, untitled men, and women with lower status).

Issues that could give rise to conflicts of interest may include questions about efforts in the village for projects that were 'village-wide' but maybe ended up benefitting/disadvantaging certain people. Some people may feel that they were harmed by these, or that their voices weren't heard, and that situation could have bred some kind of a feud. These kinds of issues may be representative of power differences/hierarchy within the village (or on a smaller scale within the mataqali or household) that I will need to be sensitive about as bringing up these issues may be traumatic or stir up emotions that could lead to conflict or trouble. If this is the case, then I will not bring up those particular situations and cease any line of questioning that I feel is starting to allude to any of those situations. As my initial awareness of these, and ability to understand what these could be when people are talking about them will be minimal, I will ask general questions and pay attention to reactions, body language and any other cues that may indicate distress or heated emotions (I will also consult with my research assistant on what more typical Fijian reactions are as these may differ from the body language I am accustomed to 'reading').

Other issues that could give rise to conflict include working with only some village members and not them all. Although the gift I will give at the end of fieldwork will be to the whole village (per custom) and participants will not be paid or compensated with more than basic beverages, some

3. RISKS OR COSTS TO PARTICIPANTS

may feel they have been excluded for other reasons. To address this I will attempt to bring in several different groups for the focus groups (e.g. different groups of untitled men rather than the same group for the two different focus group activities) to hear more voices. I will initially be reliant on my gatekeeper and research assistant to know if/when other people in the village may feel this way, but they may not be able or want to tell me if this is the case, and hopefully over time as I get to know the village I will be able to pick on this if it is an issue.

Additionally, as time can be fluid in rural Fiji and the use of *talanoa* will likely mean that interviews can last a long time, I will be mindful of the time taken to talk with me, and will participate in activities during interviews if needed (e.g. while mending nets, weaving palm). Additionally, I will need to be conscious of my own sense of time and not become impatient or frustrated when a morning interview starts at 3pm and ends at 3.15 because the respondent is needed to do something else. I will respect local understandings of time and treat the idea of doing things the next day/ later not as disrespectful towards myself but a different understanding of time, work and when things 'need' to be done.

Representing what people have told me as authentically and truthfully as I can is very important and I will strive to represent attitudes, norms and perceptions as they were presented to me. I will maintain confidentiality and anonymity with the data, and not use any photos that contain identifying information. I will emphasise that any and all participation is voluntary, and if I feel that participants are being coerced or feel obligated to participate I will cease the interview and restate that they are free to withdraw for no reason at any point. Comfort and safety of the participants is my primary concern. For people that are not chosen as participants, I will be open and transparent about why some participants were chosen and others were not. If jealousy or bad feelings are generated by this, I will consult with my research assistant and gatekeepers about the most appropriate way to approach it, as well as emphasise that participants do not receive any material compensation from participation. I will be spending several months in the village on a daily basis, potentially volunteering at the school, so villagers will become familiar with me and get to know me. I will share some personal information but will steer clear of topics that could be contentious (e.g. political or religious discussions).

4. RECRUITMENT/SELECTION PROCEDURES

How will study/project participants be selected? Is there any sense in which participants might be 'obliged' to participate – as in the case of students, prisoners or patients – or are volunteers being recruited? If participation is compulsory, the potential consequences of non-compliance must be indicated to participants; if voluntary, entitlement to withdraw consent must be indicated and when that entitlement lapses.

I do not plan to live in the village, however I will be spending days at a time in the village. The area I plan to select a village within (Tailevu Province) is 45 min from Suva. One of the reasons for not remaining in the village full time is that guests are typically offered the mayor's house to stay in while they relocate temporarily, and I am uncomfortable taking the entire house away from a family for extended periods of time. Additionally, most property is communal in Fiji (including houses and especially in rural Fiji), so finding a rental property can be difficult, additionally the logistics buying food (would need to travel long distances or grow my own) makes renting a house in Suva, an urban centre with plenty of rental accommodation, a more logical choice.

Upon entry to the village, a formal ceremony at a communal village meeting where I will make a *yoqona* (kava) presentation to village leaders, will be followed by an oral presentation and introduction of myself and the research (depending on the village this *yoqona* may need to be presented by a male gatekeeper rather than myself, however this will be determined during the

4. RECRUITMENT/SELECTION PROCEDURES

site selection process). I will emphasise that I am not affiliated with any NGO or other organisation operating locally (e.g. the Peace Corps is active in Fiji and I may be mistaken for a Peace Corps volunteer). This is a typical way of introducing an outsider to the village community and ensures that proper protocol is followed (formally recognising village leaders with a traditional gift and then sharing and being open about what I am doing). I will also provide a written description in English and Fijian and have these available for villagers (see attached information sheet). At this presentation I will make clear that participation is voluntary and withdrawal is possible at any point during the research.

Sampling will be purposive to select men and women at various levels within the village hierarchy (e.g. to represent each of the sub-clans in the village) and both titled and untitled men and women, and a range of ages to account for different experiences with climate impacts over time. Participants will be selected from the village with the assistance of village leaders (likely either the traditional leader, *Turaga ni Vanua,* or the mayor, *Turaga ni Koro*) or someone they designate to assist me. Working with village leaders to identify participants may skew sampling as the selection of participants may include those that village leaders may think will provide answers that I would like to hear. I will discuss the reasons for the research and emphasise that I am not looking for people that have had specific experiences or viewpoints, but that I am interested in attitudes and perceptions and therefore interested in talking to a variety of people from different positions within the village, including men and women and people of different ages. The reasons for going through village leaders for participant selection is that they are the gatekeepers for the village and talking to village members without going through the culturally appropriate channels is considered very rude and would mean that villagers would be very unlikely to speak with me.

I will initially be guided regarding whom to include in interviews and focus groups by the village gatekeeper or village member that leaders nominate to be my guide in the village. As I get to know members of the village as well as my gatekeeper, I will push to include more people if there are groups that I notice have been excluded. I will attempt to include member of both genders at several hierarchical levels (village leaders, untitled men/women and those of lower social ranks), those that are active and inactive in church groups (which are also strong social networks and hierarchy in church groups does not always mirror the village social hierarchy, although it may), and various occupations (I do not know in advance what occupations people will be engaged in, but likely farming, fishing, handicrafts, and tourism-related activities and I will try to get perspectives from people in as many occupations as possible. Additionally, many people in the village likely engage in more than one occupation and households may likely be participating in all of the above occupations and then some, but maybe to varying degrees). Initial exercises upon arrival in the village will include focus group discussion and some social and resource mapping. This will introduce me to the village and provide an overview of what kinds of groups/people/occupations/wealth categories I will likely find and I will use this information to build my interview sample frame.

Overcoming exclusion of some people/groups by vocal and/or ruling interest groups will be challenging, and I will have to accept that initially I must be guided by whoever is appointed by the village leader per custom. Becoming more familiar with the village (and them with me) will provide flexibility over time to speak to more people, and I will also need to be aware of who my gatekeeper is and isn't telling me to talk to. If I feel that they are excluding groups on purpose (or even unconsciously) I will emphasise how necessary it is for me to speak to as wide a variety of people in the village as possible, as well as pursue speaking to a wider variety on my own after I have been there a while. I will use the sampling frame built from initial community mapping exercises and observation of the community, and also ask in other interviews and focus groups who else should be included and why (snowballing combined with purposive sampling). I will attempt to involve participatory methods (e.g. community mapping and historical timelines) as these methods work well in the Pacific and increase participants' confidence in the research as well as increase a sense of shared ownership over the work. This shared ownership will

4. RECRUITMENT/SELECTION PROCEDURES

hopefully also help ensure that much of the community is represented in the work. I will have to be careful with this as well and ensure that I am giving back enough to the community as I am gaining a PhD from their information - more than the final gift, but in other forms such as the outputs mentioned in Section 18 and also discussing with the community what outputs they would like to see.

Due to the hierarchical nature of social relations in Fijian villages, people identified as potential participants by village leaders may feel obligated to participate, however when meeting with potential participants I will clearly state they do not need to participate if they do not wish, and that they are able to end participation at any point and withdraw their data (up until 1 May 2014 - see Consent Section 8).

The questionnaire will be administered by research assistants from each of the villages. It will be translated into Fijian as although people speak English, in the village people are more comfortable answering questions in Fijian. After discussion with village leaders, their preference for local assistants rather than university students was made clear. There are several issues that may arise from having local assistant, however village leaders made their preference very clear. Part of their reason was for increased ownership of the project, as the some of the data from the questionnaire will be used for the report the vanua has requested (see Sections 17 and 18 for report details). A training session where the questionnaire is role-played by all research assistants and led by myself and the gatekeeper/primary research assistant in the main village (who has experience doing village surveys). This training will also emphasise consent, not discussing answers with anyone other than myself/anonymity, and the importance of neutrality of facial, body and verbal language. The assistants will be chosen based on recommendations from village leaders (and will include village headmen). Assistants will be given 5 days to complete 10 questionnaires and will be compensated upon return of completed questionnaires.

For questionnaire participants, initial selection will be purposive sampling based on age, gender and *mataqali* (clan) to create a representative sample based on the structure of the three village populations. As village headmen are also part of those administering the questionnaire, there are concerns over participation consent and potential honesty of response. Some of these issues will be discussed during the training, however the village hierarchy does mean that people who are asked to participate may say yes regardless of their actual desire. In the research assistant training we will also discuss people missing times or avoiding the assistant and reading body language during the questionnaire and stress that those may be signs that someone does not want to participate and to move onto the next individual rather than pressure or penalise that individual into participating. In terms of response honesty, the questionnaire will be structured to ask non-sensitive questions. During the pilot, several people in the village were asked to confirm if questions asked addressed sensitive subjects. Any questions that were deemed sensitive were removed from the questionnaire during piloting.

As I am using *talanoa*, I will start interviews as a casual conversation and answer questions about myself as sharing of all things, especially knowledge is an important part of Fijian culture and essential to building rapport. I will restate that I am not affiliated with any NGO or other organisation other than the University of East Anglia. I will also go over the reasons for their selection, and the research and their ability to withdraw and/or not answer all questions at this point.

Participants from NGOs, universities, and the government for key informant interviews will be selected via snowball sampling and will be contacted directly and explanation of research and consent will be obtained at that point.

5. PARTICIPANTS IN DEPENDENT RELATIONSHIPS

Specify whether participants will include students or others in a dependent relationship (this

5. PARTICIPANTS IN DEPENDENT RELATIONSHIPS

could affect their ability to decline to participate). If such participants will be included what will you do to ensure that their participation is voluntary etc.?

I not intend to gather data from participants in dependent relationships, however the hierarchical nature of village life in Fiji means that it is possible that some respondents will feel obligated to participate based on their status within the village and relationships to village leaders or household heads. As far as possible I will take the potential for a sense of obligation into account and assure respondents that non-participation and withdrawal is acceptable as is not answering all questions. I will also follow participant's lead in setting the time, place, and who is present at interviews and do my best to be sensitive of the potential sense of obligation in participating. If I feel that participants have been coerced into participating I will cease the interview/focus group and restate that participation is voluntary and can be withdrawn at any time. If participants do not wish to be seen not participating, but are uncomfortable participating I will cease the interview and engage in friendly conversation for a little while longer if they so desire. Notes will be taken, including who is present at interviews and this will be used to inform data analysis.

6. VULNERABLE INDIVIDUALS

Specify whether the research will include children or people with mental illness. If so, please explain the necessity of involving these individuals as research participants and what will be done to facilitate their participation.

No participants under the age of 18 will be a part of the research. Additionally, the physical and mental capabilities of participants will be taken into account to ensure that respondents understand consent and the right to withdraw from the study.

7. PAYMENTS AND INCENTIVES

Will payment or any other incentive, such as a gift or free services, be made to any participant? If so, please specify and state the level of payment to be made and/or the source of the funds/gift/free service to be used. Please explain the justification for offering payment or other incentive.

No payment will be made for participation; however water or juice may be purchased for long interviews and water, juice and a snack will be provided for focus groups. A gift of *yoqona* will be made initially to village leaders, per customary introduction to the village. Gift-giving and sharing are important signs of respect in Fiji and a gift will be made to the village at the end of the fieldwork to demonstrate appreciation for the village's participation. This will likely be in the form of books or resources for the school or a small contribution toward a village-level project. The exact nature of this will be discussed with contacts (non-village members) while in Fiji to determine the appropriate nature of the gift.

8. CONSENT

Please give details of how consent is to be obtained. A copy of the proposed consent form, along with a separate information sheet, written in simple, non-technical language MUST accompany this proposal form (do not include the text of the form in this space, attach with your submission as a separate document).

Consent to access the village will be obtained via appropriate traditional and government (if necessary) channels during the preliminary fieldwork phase. An introduction and presentation to

8. CONSENT

the village will provide basic information, and for chosen participants I will restate the information provided in the village presentation and obtain written or verbal consent. If participants request additional time to think about answering I will return to them in a day or two. For verbal consent I will have a witness present to note the date and time on consent forms (attached).

For observation of village events I will formally ask all those present if they consent to my observation and note-taking. If additional people arrive after my initial request, but it would be inappropriate for me to interrupt to obtain consent, I will mark the time and continue note-taking and ask for consent after. If anyone refuses I would not use any of the notes/data that occurred after their arrival at the event.

Information sheets and consent forms will be finalised upon arrival in Fiji and translated into Fijian (and back translated), and provided in both Fijian and English.

Consent for questionnaire participation will take the form of a short statement explaining the research and the ability of the participant to elect to not participate, stop at any time, and withdraw their participation up until May 1. The village(s) have given permission for the research to take place and this counts for consent from each member of the village as well, according to village leaders. However, consent will still be requested at the start of each questionnaire (as it was for other methods). The updated explanation/consent form that will be provided to each questionnaire participant (read by local research assistants) is attached with this ethical approval form.

9. CULTURAL, SOCIAL, GENDER-BASED CHARACTERISTICS

Comment on any cultural, social or gender-based characteristics of the participants which have affected the design of the project or which may affect its conduct.

Special attention and consideration will be made of local customs and norms to maintain respect for participants and non-participants in the village as well as to minimise disturbances to all in the village. As an outsider I will have some limited leeway in my own behaviour; however a focus of my preliminary fieldwork will be spent learning about appropriate behaviour in a rural village. I will follow local custom regarding dress and speech. English is commonly spoken, even in rural areas. However, I will have a Fijian research assistant and will conduct interviews and focus groups in both English and Fijian as attitudes, perceptions and beliefs may not easily translate into English, and local understanding of terms in English may differ from my own. My research assistant will be a student at the University of the South Pacific and accustomed to translating Fijian concepts/ideas into English and communicating them with non-Fijians.

Behaviour in Fiji is gendered and based on age. As a foreign woman who looks young, I will be as aware as I can of the impact of this position and my presence in the village. I will attempt to follow *va'avanua* as best as I am able to understand it (entails the cultural protocols below as well as practicing respect, openness and sharing with everyone I encounter). Although I have not spent time in Fiji, I have lived in other Pacific Island countries, and the concepts of respect, sharing, property and manners are similar in the region.

Cultural protocols such as *veiwe'ani* (avoidance relationships out of respect), *madua* (manners or shyness), and *va'anomodi* (a respectful silence) are important ways of behaving in Fijian village life, however can limit "talking straight" especially in group discussions. Respect for chiefs, elders, village leaders and certain family members (e.g. between siblings interactions are more formal than between cross-cousins) is demonstrated through these behaviours and can prevent open discussions, especially if an elder has voiced an opinion that others may feel differently about. Using informal *talanoa* (see Section 1) can aid in overcoming some of these challenges.

9. CULTURAL, SOCIAL, GENDER-BASED CHARACTERISTICS

Personal property is conceptualized differently from Western ideas, as land is communally held by sub-clan groups, and other than small possessions (e.g. some jewelry or small electronics), property is communal. This can include farming equipment, houses, cars, or other household items as well as personal time. If someone from the village requires assistance, it is provided through time or physical materials with little or no question or hesitation. This idea of time and sharing will likely influence how people decide to participate and the time they spend with me, and care will be taken to not take advantage of people's time if they initially appear very willing/able to spend time with me as saying 'no' is not culturally relevant.

10. ENVIRONMENTAL IMPACT

Identify any environmental impacts arising from your research/project and the measures you will take to minimise risk of impact.

The primary environmental impact from this research comes from air travel, which will be minimised by taking only one flight to/from London-Fiji for the research. Additionally, travel within Fiji will be undertaken on public transport as far as is possible and safe.

11. CONFIDENTIALITY

Please state who will have access to the data and what measures which will be adopted to maintain the confidentiality of the research subject and to comply with data protection requirements e.g. will the data be anonymised?

Interviews and focus groups will be carried out by me and a research assistant. Although I will be the only one keeping the data, the research assistant will know the names and identifying details of participants. I will ensure that they understand and observe confidentiality of the participants and will include a confidentiality clause in the research assistant contract.

Data will be anonymised after collection, and individuals, household and village will only be identified by numbers. The key to this will be kept in a secured file on my computer. Key informant interviews will be coded by number and type of organisation (e.g. conservation NGO, government, research) only. In the field, notes and transcripts will be kept secured by me. Once data is transferred digitally, any identifying information will be removed and it will be kept in a password protected file/hard drive and kept in a secure physical location.

Primary data will only be made available to me and my supervisors, and only I will have access to any identifying information.

For the report and any academic articles that come from the research, village leaders have requested that the village and *tikina* be identified. They would like their story and the problems they are facing to be widely known in the hopes that it will attract attention to pressing issues (e.g. erosion) in the community and they hope that attention will bring either government or NGO assistance. However, if the village is identified it would potentially make possible the identification of individual participants. Individuals who took part were assured anonymity so any articles and write ups will handle any identifying information (age/gender/clan) very carefully. Age/gender will be provided only if it is relevant to the discussion. If so, for example, quotes will only mention the age/gender or clan of that individual in an aggregate way (i.e. female over 35, high ranking clan) Age categories will be constructed so there are the maximum number of individuals in that grouping (e.g. only 2 men over 65 were interviewed – they will be listed as male over 40).

11. CONFIDENTIALITY

12. THIRD PARTY DATA

Will you require access to data on participants held by a third party? In cases where participants will be identified from information held by another party (for example, a doctor or school) describe the arrangements you intend to make to gain access to this information.

I will not require third-party data on participants. If this changes, the same standards of confidentiality and anonymity will be applied, and if any information identifies specific individuals consent will be obtained.

13. PROTECTION OF RESEARCHER (APPLICANT)

Please state briefly any precautions being taken to protect your health and safety. Have you taken out travel and health insurance for the full period of the research? If not, why not. Have you read and acted upon FCO travel advice (website)? If acted upon, how?

Prior to arrival in Fiji I will obtain all recommended vaccinations as well as a health check-up (required for research visa). I will obtain travel and health insurance for the duration of my stay.

November – March is cyclone season and I will listen to all advice on TV/radio/newspapers regarding weather warnings and act accordingly. I will register with the US embassy (as I am a US citizen) in Fiji to ensure that any travel warnings/advice is promptly received. I will avoid any political demonstrations, and if demonstrations or military presence increases I will take steps to remove myself (elections are currently scheduled for September 2014, so fieldwork will end several months prior to elections).

I will not travel alone at night, and be cautious of taxi drivers and other crime targets. I will not carry expensive equipment (laptop, camera) on my person unless necessary. I will carry a mobile phone with emergency numbers, maintain regular contact with supervisors and friends abroad as well as contacts in Suva. As I am not living in the village, I will have time away from the village in Suva where privacy is possible and this will provide time for reflection and processing of my experiences in the village. I will also check in with myself to ensure I have enough to process my experiences and look after my own mental and physical well being.

14. PROTECTION OF OTHER RESEARCHERS

Please state briefly any precautions being taken to protect the health and safety of other researchers and others associated with the project (as distinct from the participants or the applicant).

The research assistants will be Fijian so will understand local health and safety issues. However I will also ensure that any transport we take to the village is safe (e.g. seatbelts are worn in cars). I will also work with the research assistants to make them aware of potentially sensitive issues that may arise during discussions and how to handle those delicately. The research assistant will be hired and paid a daily wage and have travel and food provided for days in the village. I will check in with the research assistant periodically to make sure they are comfortable with the work, the time, and the nature of the questions they are asking.

As I will be aligned with a gatekeeper to the village, who will likely be of high status. I will be aware of my association with someone of higher status (although going through appropriate

14. PROTECTION OF OTHER RESEARCHERS

social channels is the only way to gain access), and not show favouritism nor give gifts that are not in line with culturally appropriate distribution channels (e.g. I will follow the advice of my assistants and other contacts outside the village regarding tokens for staying in homes as sometimes it is more appropriate to give the gift to the leaders or village as a whole rather than individuals. See Section 9 for short discussion of personal property in rural Fiji).

15. RESEARCH PERMISSIONS (INCLUDING ETHICAL CLEARANCE) IN HOST COUNTRY AND/OR ORGANISATION

The UEA's staff and students will seek to comply with travel and research guidance provided by the British Government and the Governments (and Embassies) of host countries. This pertains to research permission, in-country ethical clearance, visas, health and safety information, and other travel advisory notices where applicable. If this research project is being undertaken outside the UK, has formal permission/a research permit been sought to conduct this research? Please describe the action you have taken and if a formal permit has not been sought please explain why this is not necessary/appropriate (for very short studies it is not always appropriate to apply for formal clearance, for example).

I have obtained a research permit from the relevant authorities (Fijian Immigration Department and Ministry of Education) as well as permission from the iTaukei Affairs Board and the Rewa Provincial Council.

16. MONITORING OF RESEARCH

What procedures are in place for monitoring the research/project (by funding agency, supervisor, community, self etc).

I will regularly communicate with my supervisors at UEA. Additionally, I will keep a diary and after 2 months of fieldwork take 3 weeks to reflect and revise as appropriate/needed.

17. ANTICIPATED USE OF RESEARCH DATA ETC

What is the anticipated use of the data, forms of publication and dissemination of findings etc.?

The data will be used for a PhD thesis and publication in academic journals.

The primary village for my data collection (and the chiefly village of the tikina/vanua) has requested a report identifying current threats and problems in the vanua, how climate change may exacerbate those issues and recommendations for potential solutions. The report will be used by the vanua to apply to government agencies, NGOs and donor aid agencies for funding for projects relate to climate change adaptation and community development. There have been several meetings with village leaders about the content of the report and a draft will be made available to them for comments. These comments will be addressed and incorporated into the final product. I have had many converstations with village leaders about how I have no influence regarding access to any kind of funding, but that I will write this report as requested. As far as I am able to tell they understand that I am a student, and what I will be able to provide to them is the report only, no access to any kind of donor agency or other kind of funding.

The goals of the report align with the types of questions asked for the research. Although the research (interviews, observation) was focused in one village, this report will cover the case study village and in the other two villages that make up the *Tikina* (district). These villages are part of the same *tikina* and *vanua* (*vanua* is the people, land, rules, customs and spiritual connections that make up the iTaukei – indigenous Fijian – worldview; the *tikina* is the

17. ANTICIPATED USE OF RESEARCH DATA ETC

government administrative construct that encompasses the same people and land, but without the additional spiritual and cultural aspects). These people in these three villages are all very closely related and the *tikina* is the more relevant level for decision-making on climate change adaptation, environmental management and community development.

18. FEEDBACK TO PARTICIPANTS

Will the data or findings of this research/project be made available to participants? If so, specify the form and timescale for feedback. What commitments will be made to participants regarding feedback? How will these obligations be verified?

A short non-technical presentation and summary of preliminary results will be made available to participants prior to leaving the field (report in both English and Fijian). Approximately one year after field work, a short report summarising results will be sent to the village, in both English and Fijian. Additionally, a copy of the final thesis and any publications will be provided to the University of the South Pacific. If villagers request the thesis or publications, they can also be made available.

Regarding the final copy of the thesis that will be sent to the Fijian Government, I am not yet aware of which department or how it is accessed, but it is a condition of the research permit to submit a final copy of the thesis to the Government. Information on where and access can (and will) be made available to research participants after final submission.

The last week of fieldwork will include a presentation to the three villages in the tikina the results of the report (see Section 17) requested by the tikina. This report will be in English, as they have requested. There is a professional translator in the district who has agreed to translate the report if requested in the future. A copy of the final thesis and any academic articles will be sent to the Rewa Provincial Council and Ministry of Education. There are several members of the village who have email access, so electronic copies will be sent to them.

19. DURATION OF PROJECT

The start date should not be within the 2 months after the submission of this application, to allow for clearance to be processed.

Start date	End date
November 2013	May 2014

20. PROJECT LOCATION(S)

Please state location(s) where the research will be carried out.

Village in Rewa Province on Viti Levu, Fiji.

University of East Anglia

REVIEW REPORT AND DECISION - PART B

UNIVERSITY OF EAST ANGLIA
INTERNATIONAL DEVELOPMENT RESEARCH ETHICS COMMITTEE

APPLICANT INFORMATION

To be completed by the applicant

Forename	Clare
Surname	Shelton
Student ID number *(if applicable)*	6360572
UG, PGT or PGR *(if applicable)*	PGR
Supervisor *(if applicable)*	Marisa Goulden
Project Title	Where do climate change adaptation decisions come from? Socio-cognitive factors, decision-making and adaptive capacity in Fijian villages

RESUBMISSIONS – IF YOU ARE ASKED TO RESUBMIT YOUR APPLICATION FOLLOWING REVIEW BY THE COMMITTEE PLEASE **INCLUDE A LETTER** WITH YOUR REVISED APPLICATION DETAILING HOW YOU HAVE RESPONDED TO THE COMMITTEE'S COMMENTS. Students please ensure your supervisor has approved your revisions before resubmission.

REVIEWER'S RECOMMENDATION (✓)

To be completed by the Ethics Committee

Accept	
Request modifications	
Reject	

REVIEWERS' CHECKLIST

Delete as appropriate

Risks and inconvenience to participants are minimised and not unreasonable given the research question/ project purpose.	✓	×
All relevant ethical issues are acknowledged and understood by the researcher.	✓	×
Procedures for informed consent are sufficient and appropriate	✓	×

REVIEWERS' COMMENTS

COMMITTEE'S RECOMMENDATION

SIGNATURE (CHAIR OF THE INTERNATIONAL DEVELOPMENT ETHICS COMMITTEE)

Signature	Date

Appendix E. Final report for Tikina Toga on preliminary results

Climate Change and Tikina Toga, Rewa: Current Vulnerabilities and Adaptation Options

May 2014

Clare Shelton

School of International Development
Tyndall Centre for Climate Change Research
University of East Anglia, UK

Summary

This report details current threats and vulnerabilities of Tikina Toga, an island community in the Rewa River. Upstream activities, dynamic river processes, and climate change impact the three villages in Tikina Toga. The main issues identified by the community include erosion, flooding and cultural change. Some of these will be exacerbated by climate change, and activities that address these current challenges will build resilience and help prepare Toga for future changes. Some activities that do this include:

- Working with upstream communities to address land use changes (e.g. forest clearing and runoff);
- Erosion control;
- Improving drainage on Toga Island; and
- Improving Toga River water quality, which could be address by a number of activities including replacing the culvert with bridge, reducing runoff from the Koronivia Agricultural Research station, and enforcing proper village rubbish disposal

Toga's people demonstrated a belief in their capacity to address problems, however addressing some of these issues will require significant capital investment and expertise, as well as working with outside groups (e.g. upstream communities). Land availability and food security are primary issues for Toga, and activities that increase the community's biophysical and social resilience, such as increasing river water quality, reducing flooding, or providing additional income sources will allow the people of Toga to increase their current and future quality of life.

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Acknowledgements

Thank you to all the people of Tikina Toga; Leone Tawake, Verona Tawake, Ledua Tawake, Makario Liganivai, Birisita Tamani, Panapasa, Ratu Peni Sourogo (Sr) and Ratu Peni Saurogo (Jr) for their assistance with the questionnaires, and a special thank you to Ratu Peni and Alumita Torowale for their hospitality and assistance, and Korona Kubu for her invaluable assistance. This research was funded by a Social Science Faculty Studentship at the University of East Anglia, UK.

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Cover photo: Navatuyaba Village, C. Shelton

1. Introduction

Climate change will have a variety of impacts on Pacific Island countries. Actions on multiple scales, including regional, national and local, are needed to address these impacts. In addition to climate change, Fiji is also navigating economic and social development challenges, and political instability following a series of coups. Climate change impacts will likely exacerbate existing challenges and vulnerabilities. The purpose of this report is to describe the current strengths and vulnerabilities of one district[1] (*tikina*), Toga[2], in dealing with climatic variability and how these may be impacted by climate change. Additionally, there is discussion of potential climate change adaptation actions to address the challenges and risks identified by the people of Toga.

Natural resources and local development, especially in rural areas of Fiji, are managed communally at the village or tikina level. This local level is an important entry point for local-level climate change adaptation planning, although communities are affected by regulations and decisions at larger scales. For example, in Toga, land use and other resource management decisions in the upper areas of the Rewa River catchment impact local water quality and hydrology.

The next section details the methods used and the objectives of the project. A description of Toga, including current threats and strengths is followed by a discussion of how climate change may impact these as well as potential options to mitigate these impacts.

1.1. Methods

The data presented here was collected during December 2013 – April 2014. Data was collected via semi-structured interviews in Navatuyaba, attendance at various village- and tikina-level meetings, a questionnaire conducted in all three villages of Toga, and key informant interviews within Toga and with government officers and development practitioners in Suva. A total of 10 key informant village level interviews and 39 semi-structured interviews were conducted in Navatuyaba, and 129 questionnaires were administered to the three villages. The questionnaire participants were selected based on age/gender to construct a sample representative of the tikina (Fig. 1). This report is based on preliminary analysis of these findings.[i]

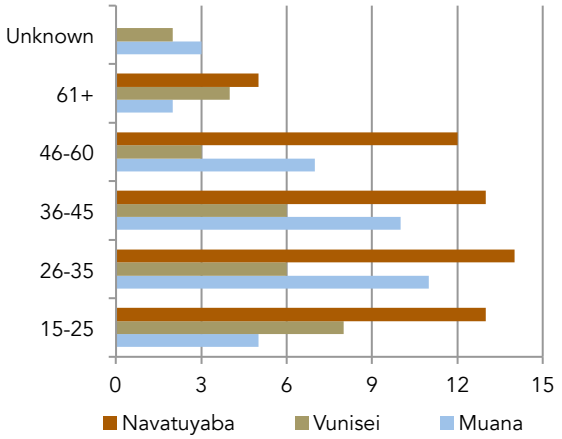

Figure 1. Questionnaire Age Distribution by Village

2. Tikina Toga Setting

2.1. Land and Water

Tikina Toga is located in Rewa Province on the island of Viti Levu, Fiji (Fig. 2). The tikina is made of up of 3 villages: Muana, Vunisei and Navatuyaba. There are approximately 1700 people living in the three villages, of which Navatuyaba is the largest. Toga is an island on the western side of the Rewa River, located between Suva and Nausori. The Rewa River is Fiji's largest, and drains approximately one third of Viti Levu. Erosion and accretion are constant processes in river systems and have impacted Toga's livelihoods in the past and present. For example, Navatuyaba was formally located on the Rewa River side

[1] A *tikina*, or district, is an administrative unit of 2 or more villages. Several tikinas combine to form a Province and several provinces form a Division, of which there are four in Fiji. In Tikina Toga family groups extend between the three villages.
[2] Pronounced "Tonga"

of the island, but in 1960 was moved to higher ground on the Toga River side by the government due to erosion (Fig. 2). Much of the old village site has now eroded away.

The Toga and Rewa Rivers around Toga are tidally influenced, although the water is too fresh for mangroves to grow or marine species to be frequently found. Marine fish swim upstream with high tide and are caught occasionally, but the river's primary resources are the *moci* (shrimp, *Macrobrachium spp.*) and *kai* (freshwater clams, *Batissa violacea*). Fish are also caught, but the *moci* and *kai* are the primary aquatic resources consumed and sold in the villages and at markets in Nausori and Suva. Selling *kai* is more common than *moci* and is frequently done by women. Although collecting *kai* and *moci* was traditionally women's work, in recent years men, women and children will harvest in the river.

Figure 2. Tikina Toga, located on the Rewa River and Toga River, in Rewa Province, Viti Levu.

The plantations and river provide some income for 74% of people, while 23% rely exclusively on plantations or the river for their income. Just over half (53%) of households rely on someone working full- or part-time. This data reflects both the ease of access to areas where there is work (e.g. Nausori, Suva) and also the importance of the local land and river resources for livelihoods. This is also reflected in what people eat; 93% eat from the plantations at least once a week (cassava, dalo and bele), while 90% eat purchased food at least once a week (bread, sugar, tinned food). Food from the river is also eaten at least once a week by 81% of Toga (*kai*, *moci*, and fish). Although purchased food is eaten frequently, steep price increases in the last 5-10 years were reported in interviews.

Figure 3. Preparing *kai*.
PHOTO: C. Shelton

Residents reported increases in sediment and decreases in water depth in the Rewa River. They cited increased clearing of land upstream and changes in the government's dredging of the main river channel as some of the causes of these changes.

A culvert connecting the villages to the Kings Road, replacing an old bridge at the north end of the island, was built several decades ago. This culvert has restricted the flow of water in the Toga River. Residents reported slower flows, shallower water depth and less flushing of nutrients, rubbish and sediment since the culvert's construction. The culvert itself both severely restricts flow in the Toga River and is prone to flooding during high intensity rainfall, especially during high tide. During potential storm events, when emergency access is most important, the flooded bridge cuts off Toga from road access. Additionally, villagers reported that the reduced flow has increased sedimentation and contributed to the growth of aquatic plants (see the green areas covering the river near the north end of the island in Fig. 2). Community members also reported changes in water quality, saying that the river was once clear but is now usually opaque. There were also reported changes in the river after an agricultural research station (Koronivia) draining into the Toga River was opened several years ago along the Kings Road. Reported increased skin diseases from the river were attributed to Koronivia and pollution. Some people said that although their parents and grandparents drank from and bathed in the Toga River, they would not permit their children to swim over concerns about pollution. Although concerns were reported about water quality, no one reported reducing or changing eating *kai* and *moci* from the rivers.

Most *kai* and *moci* are collected in the Toga River and are an important local food source (Fig. 3). 72% of people agreed with the statement that there are more *kai* and *moci* now than there used to be. There are a number of potential reasons for this perceived increase, including hydrological changes induced by the culvert's restriction of flow, shallower water depths making harvesting easier, or changes in nutrients and nutrient availability from runoff and river flow reductions.

2.2. The Vanua

In addition to being essential for food and livelihoods, the land (and river) is an essential part of being part of Tikina Toga for Toga's people. *Vanua* refers not only to the land but also to the people, and connections between people, and between people and the land. The concept of *Vanua* is a core concept in Fiji (Ravuvu 1987; Farrelly 2011; Nainoca 2011). Relationships are important part of Fijian life, and living life according to *Vanua* "requires that an individual encourages and maintains social harmony and social solidarity." (Ferrelly 2011:824). Identity in Fijian villages is strongly tied to the village and traditional culture, and observation of *Vanua* is important for experiencing *sautu* (Ravuvu 1987). *Sautu* is health and wealth, where wellbeing includes physical, spiritual, emotional and psychological health. Although wealth includes material things, more importantly wealth includes a diversity of strong relationships and social networks (Nabobo-Baba 2006).

When asked to rank what is most important for maintaining *sautu* in the vanua, respecting elders and leaders was ranked highest, with keeping the land and river clean and healthy closely following (Table 1). Respect for others and listening to elders and community leaders is an important part of village life in the

strongly communal environment of a Fijian village. The item scores in Table 1 are a sum of the scores given to each item in the questionnaires. Some aspects of the *vanua* are evident in the Table 1 rankings; the top three items reflect respect for elders and leaders and the cultural institutions they represent, as well as respect for the land and river resources that make up the physical parts of the *vanua*.

Table 1. Maintaining *sautu* in the vanua. *Although participants ranked the items from 1-7 in the questionnaire, with 1 being the most important and 7 the least, these scores were reversed to obtain an overall score to determine the final ranking.*

Rank	Score	
1	729	Respecting elders and leaders.
2	538	Keep the land (plantations, trees, soil) free from rubbish and pollution, producing good food.
3	520	Keep the river and river resources (water, kai, prawns) clean and free from rubbish and pollution.
4	472	Participating in meetings, clean ups and other mataqali, village, and vanua activities.
5	433	Jobs and economic opportunities.
6	417	Infrastructure (e.g. roads, footpaths) that makes access to church, town, schools, etc. easier and safe.
7	388	The way people dress.

Village governance is based both on traditional hierarchical structures, the chiefly system, and recently created positions, the *Turaga ni Koro* (appointed or elected headman). The *Turaga ni Koro* acts a liaison between the government and the village to organise village activities, such as village meetings, aiding in enforcement of government regulations (e.g. digging pits for rubbish disposal), and organising village clean ups. In Navatuyaba, a modified governance structure has been proposed and is under discussion. This structure includes committees to spread the responsibility of managing cultural, economic, spiritual and other issues in a large village beyond a single individual. This will potentially encourage greater participation, as there will be more opportunities to involve different people in the various committees.

2.3. Climate

Fiji regularly experiences interannual and decadal variability in rainfall, droughts, flooding and storms due to fluctuations in the SPCZ[3] and ENSO[4] (Feresi et al. 2000). Fluctuations in ENSO are strongly associated with droughts or significantly higher rainfall (SPREP *no date*). There are also large interannual sea level fluctuations (+/- 0.25 m), an average of 1.28 cyclones[ii] per year, and inundation and storm surge during cyclones (Feresi et al. 2000). Many communities are used to short-term natural variability (e.g. flooding or cyclones) and are also reporting long-term changes in temperature, rainfall and sea level.

Toga is located in the southeast of Viti Levu, one of the rainiest areas of Fiji, and limited experience with drought was reported during interviews. Flooding and erosion during and following high rainfall events are a constant part of life in Toga; flooding's greatest impact is on plantations and erosion reduces available land. Toga experiences a rainy season (November - April, also cyclone season) with average daytime temperature of 29.9°C, and a dry season (May - October) with daytime average temperature of 27°C (1970-2000 average). Annual rainfall is highest in March and lowest in July.

3. Current Challenges and Climate Change

3.1. Climate Change Projections

Climate change impact projections in Fiji include increased air temperatures (Fig. 4), sea level rise and associated increases in storm surge and coastal erosion, flooding, warmer and acidifying oceans and impacts on marine and coastal species, changes in rainfall (highly dependent on the location of the SPCZ,

[3] South Pacific Convergence Zone
[4] El Niño Southern Oscillation

which could result in significant increase or decrease depending on how climate change affects the SPCZ; Walsh et al. 2012; Fig. 4), increased overall inter-annual variability, and increased intensity in storm events (Mimura 1999; Feresi et al. 2000). These impacts will vary in their temporal and spatial scales, as well as be potentially cumulative in their impacts on human systems (e.g. two years of low rainfall and severe storms and increased air temperatures will likely result in more severe impacts on human systems). There may be potentially positive opportunities due to climate change as well. For example, in several decades the water may become saline enough for mangrove growth, which will provide erosion control. Although there will likely be negative consequences for current aquatic species, new fisheries like mud crab may become locally available. However, planning for changes is difficult as although there is high agreement in climate models about future temperature increases, changes in rainfall are much less certain (Fig. 4).

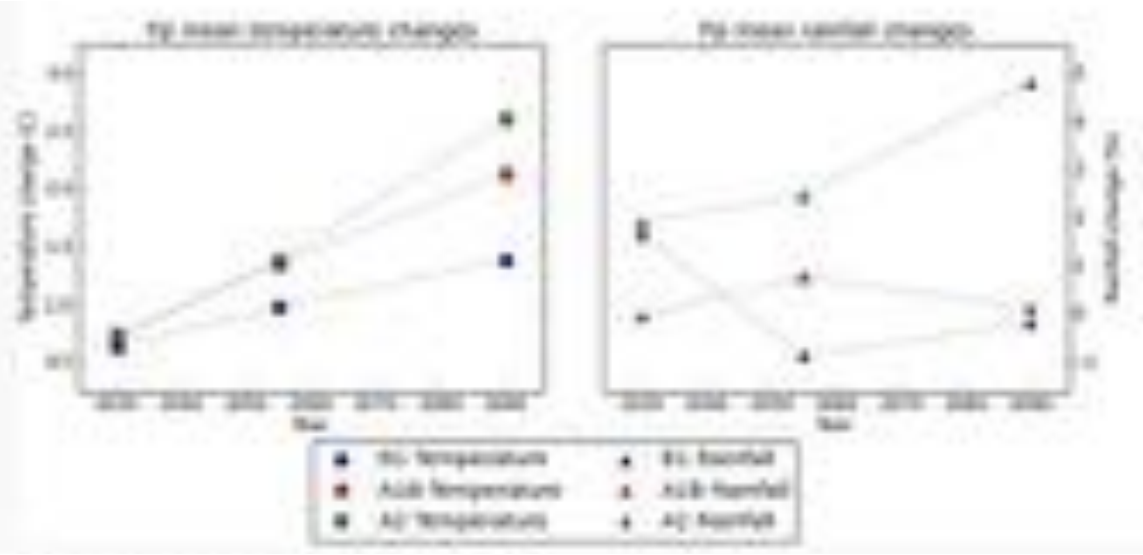

Figure 4. Temperature and rainfall changes from 2030-2090 relative to 1980-1999 for Fiji. The projections for temperature increases indicate the higher agreement in climate models than rainfall projections. The differences in the rainfall projections demonstrate the uncertainty in forecasting the direction and magnitude of rainfall changes for this part of the Pacific. *SOURCE: Clarke et al. 2011; Whetton et al. 2012; Pacific Climate Futures 2014)*

3.2. Current Threats and Vulnerabilities

Although Toga's primary food and income sources derive from agriculture, easy access to Nausori and Suva present both advantages and disadvantages. There are more job and educational opportunities in these urban areas as well as easier access to medical and government facilities. However, this also means that new ideas and behaviours are also easily accessible. Not all new behaviours are necessarily negative. However, in interviews the distinction between young (i.e. less than 30) and old(er) people in terms of behaviour and erosion of cultural norms was frequently identified as a major concern for village life. In interviews, declining participation in village activities (e.g. meetings, clean ups) was frequently cited as a one of the main issue facing the community and in the questionnaire declining participation was identified as one of the top five problems facing the vanua.

Threat Perceptions

The questionnaire evaluated threat and problem perceptions. An initial list of items was drawn from interviews in Navatuyaba, and participants in all three villages were asked to select and rank five of the most serious issues or threats, first for themselves and their household, and then for the vanua. Table 2 presents the final scores, with the 5 highest scoring problems in red (there are 6 for the vanua since the lowest score is tied). Only two threats were identified as serious problems at both the household and vanua level: the erosion of Toga Island and rubbish in drainage systems exacerbating flooding. Unsurprisingly the two most serious issues at the household level are rising food prices and loss of

job/income. These events have great impact on individual household ability to meet everyday needs. At the vanua level, all threats but one, lack of participation in village activities, are related to land/food resources. However, given the communal nature of village life, participation is related to the others: not putting rubbish in drains/river and cleaning up drains to mitigate flooding is linked to participation in these kinds of village activities (e.g. village clean ups, calls from village leaders to properly dispose of rubbish).

Table 2. Top threats/challenges to households and the vanua. The scores are sums of all ranked scores given to each item (1 was highest, 5 was lowest and these were then reversed for the purposes of summing scores to create this ranking of the original 17 items). The five highest scores are in red.

Threat/Challenge	Household Score	Vanua Score
Toga Island is eroding.	**175**	**212**
Flooding in homes.	81	60
Flooding in the plantation.	**133**	94
Rubbish in the drains causing blockages that make flooding worse.	**131**	**171**
People not participating in village meetings, clean-ups, etc.	40	**162**
The price of food has become too high.	**250**	77
There is not enough land to support all the children now when they grow up and want to plant.	73	**102**
Pollution in the Toga River is worse and may affect the kai, prawns and fish.	94	**159**
It rains differently at different times of year than it used to. *	11	18
It is hotter now than it used to be. *	44	39
Water comes up further with high tide now than it used to. *	37	42
Fruits become ripe at different times than they used to (like breadfruit). *	30	13
A strong hurricane. *	39	28
Losing your job.	**224**	81
That Toga Island will be too small for everyone to live here in 20 years because of erosion.	51	**102**
That Toga Island will be too small for everyone to live here in 20 years because of population growth.	45	88
The river is less clean and people could get sick (e.g. skin diseases) from being in the river.	74	86

** Indicates threat linked to climate change*

Climate Change

The five threats that are demonstrative of climate change impacts (changes in rainfall, increased heat, increased river level, changes in fruit seasons and hurricanes) were among the lowest ranked threats for both the household and vanua. Although climate change does pose a risk to Toga, these rankings reflect the prioritisation of immediate needs (e.g. food prices) as well as recognition of problems that are present in more obvious and everyday ways. Climate change impacts, such as increased temperatures and changes in rainfall patterns have been observed, but the changes are small when compared to erosion or increased food prices. Climate change impacts are presenting as incremental changes in long-term temperature, rainfall and seal level trends and it is logical that the concern over these changes is less of a priority when also dealing with challenges in meeting daily requirements. However, in interviews many people expressed serious concern about observed long-term changes in temperature, rainfall and sea level and what was learned from media and school about climate change. They spoke of concern for the long-term viability and quality of life in Toga if things were not done to address current and future vulnerabilities.

Flooding

Flooding in plantations was one of the top five threats for households, and rubbish blocking drains and exacerbating flooding was listed as a threat for both households and the vanua. 69% of Toga reported at least some flooding (water sitting on the plantation for at least two days) on their plantation in the last three years, while 28% reported flooding 4-10 times and 5% reported flooding more than 10 times in the last 3 years. When crops such as cassava are underwater for more than 2-3 days they will start to rot, so even though less than 70% experienced frequent flooding that could cause damage to crops, over two-thirds did experience potential crop destruction. This has serious consequences for the ability of households to meet daily food requirements. Depending on the scale and severity of the flooding, government and/or family and *mataqali* (clan) provide assistance. However, it is at least several months before new plants are able to produce food again. The flooding appears to be concentrated in low-lying areas of the island, not necessarily along the riverbanks, and is likely linked to slow or inappropriate drainage. Some farmers build up their planting area with soil and this method can reduce crop destruction during flood events. However, it is labour intensive and requires maintenance as high-intensity rainfall events can wash away the built up soil. Of the 91% of people who noticed changes in flooding, 85% linked the changes to dredging patterns in the Rewa River and 26% linked changes to upstream tree clearing.

Erosion

Erosion was the highest ranked threat for the vanua, and third highest for households. One of the other top five threats for the vanua was a shortage of land due to erosion as well as concerns about land availability for coming generations. Land in Toga is important for two reasons; it is a vital source of food and income, as well as being a vital part of the identity of Toga's people. Some of the areas of high concern for erosion are along the west and south sides of Toga (Fig. 5). Although a majority of people (88%) recognise that erosion is a constant process in rivers, the prioritised threats indicate recognition and concern of increased pressure put on the land as erosion continues. Land is owned by *mataqali*, and some *mataqali* own more land than others, while some *mataqali* populations are larger than others. During interviews some people were much more concerned with land availability than others, often citing limited land availability in their *mataqali* as one of the primary reasons for their concern. Additionally, increased siltation connected to upstream land use change (e.g. clearing forest for farmland in Naitasiri) resulting in shallower water depth was reported multiple times. Of the 77% of people who have noticed changes in erosion linked those changes to Rewa River dredging (43%) and upstream land clearing (50%).

Figure 5. Erosion around Toga. Areas of bank undercutting and rubbish along riverbanks on the Toga and Rewa Rivers. *PHOTO: C. Shelton*

3.3. Observed Climate Changes

Interview respondents reported noticing changes in the weather and climate, including shifts in rainfall patterns, higher river levels and increased heat. Rainfall was reported to be more sporadic, with more rain

falling during the dry season. Overall more variability in daily weather patterns was reported, and although not many impacts of this increased variability were reported, some did say that this variability impacted daily activities like drying laundry. Warmer temperatures were reported year round, and especially during the wet season and at night-time. Some temperature impacts on crop growth and the timing and length of fruit seasons were also reported.

4. Current Threats and Future Impacts

There is uncertainty in climate change projections for the region (especially regarding rainfall) as well as the uncertainty around how other drivers of change will impact Toga in the future. However, climate change will have negative impacts on quality of life and the ability of Toga to continue meeting current food-security and livelihood needs. Flooding, erosion and other current threats to Toga will be compounded by climate change impacts. Climate change will bring higher sea levels, which will increase salt water intrusion impacting the health of the *kai* and *moci* that are essential for both household food security as well as an income source for many (especially women). Changes in rainfall (amounts and intensity) and higher sea levels, will potentially exacerbate current erosion and flooding. Higher temperatures will affect crop growth as well as have health consequences for sensitive groups (e.g. the very young and the elderly). Given the high concern over food prices, addressing current erosion and flooding also addresses food and livelihood security concerns. The adaptation options in the following sections reduce vulnerability to current threats as well as build resilience to future climate change.

4.1. Land Availability

Actions to address erosion should be a priority given the high concern over erosion, land availability for future generations and its importance for both livelihoods and food security. There are a number of options to address erosion in Toga. These range from simple and (relatively) inexpensive such as planting grasses and trees along eroding riverbanks to complex and expensive projects such as grading steep riverbanks and planting grasses, building retaining walls or discussion of ultimately moving away from Toga. Questionnaire participants were asked about their preference for three options (concrete walls, planting trees/grasses, or a combination including grading steep banks and building erosion barriers from natural materials), and concrete walls were the most preferred, followed by planting and then a combination approach. The reasons for choosing these options varied, however cost, effort and length of effectiveness were some of the primary factors people gave for their decision. Although concrete walls would slow down erosion in some areas, they could also have negative consequences on aquatic species, depending on where and how they are constructed. Some riverbank planting of coconut trees and grasses has occurred, however coconuts have very shallow root systems so are less effective at bank stabilisation than other more slow growing species (e.g. vutu rakaraka, *Barringtonia asiatica*).

Other ways to address erosion may include removing the culvert at the north end of the island and building a bridge instead. This would both increase reliability of access to/from Toga and increase the flow of the Toga River. This may also increase erosion or increased flow would deepen the river and provide additional space for high intensity river flows after high rainfall. The culvert's removal will change the hydrology of the Toga River, which will potentially impact important food species, such as the *kai* and *moci*, as well as erosion. Upstream land cleaning and land use decisions also impact Toga, and working with upstream communities to address the reasons for land clearing and introduce measures to mitigate downstream impacts may be beneficial. Additionally, the government has periodically dredged the main Rewa River. Some people reported remembering fewer floods following dredging. Working with the national government to discuss dredging plans is another option to address some of the factors affecting erosion and flooding. This list of options is not exhaustive and evaluation and discussion between Toga, hydrologists, ecologists and other relevant experts is recommended prior to deciding on a course of action.

4.2. Food security

Given the importance of the land and river in meeting daily food needs, it is also essential that these resources be given priority. Actions that address erosion will meet some of these needs, however other actions include addressing flooding and water quality concerns.

Flooding on Toga is often on low-lying areas and plantations. Currently some people raise soil beds to protect crops, however, it is also important to work with agricultural experts to find additional alternative methods or crops to reduce flooding's impact on food and income. Some farmers reported planting different hybrids bred to produce better in water-logged soils or higher heat. Additional actions could include families who lose crops to frequent flooding planting rows of cassava or dalo near their house to meet some of their food needs after flooding (if their house is not in a flood prone area). Evaluating drainage near these flood-prone plantations for new channels or other improvements to drainage on Toga will also address flooding due to poor drainage.

The rivers are the other important source of food and income. Some of the actions mentioned above (addressing upstream land use concerns and replacing the culvert with a bridge) will positively impact water quality. Working with the agricultural research station to address runoff concerns, and working with the Ministry of Health to routinely monitor water quality are some additional ways to address water quality. As Fiji's population grows and more people move into the greater Suva/Nausori areas, there will be increased pressure on the river, including runoff and pollution. Toga is downstream of some of that development, but there may be ways to work with upstream communities to enforce environmental regulations. The *kai* and *moci* fisheries are reported to be producing enough without noticeable declines in size or number. In discussions about the state of these fisheries, using the Fijian tradition of *tabu*, restricting resource harvesting, was suggested by most people when any mention of noticeable declines in the fisheries were mentioned.

Additionally, the people of Toga are a "river people" and being from Toga includes the connection between Toga's land, water and people. Conserving and taking care of the land and water will permit continued and improved quality of life, including fulfilling basic food and livelihood requirements as well as maintaining the connection between the land, water and people essential to Toga's identity in an uncertain future.

5. Conclusion

Drivers of change on multiple scales impact Toga. Managing development and maintaining quality of life while navigating these is a challenge for communities everywhere, and Toga has qualities that create resilience. These include strong traditional family-, *mataqali* and church-based social networks that provide safety nets for times of need as well as cultural knowledge (e.g. *tabu*) about managing local resources. Toga's resourceful nature is demonstrated in the solutions found when faced with problems, for example the proposed new village governance structure. Although the communal nature of village life is challenged by new ideas and distractions in the form of technology and the need to work away from the village to earn cash to support families, the communal way of doing things still contains a sense of community and identity that is strength of communities like Toga.

There is no correct approach to adapting to climate change or development, and any project will need to start having potentially difficult conversations about the long-term future of land availability in a dynamic river system. Investing in large-scale improvements (e.g. erosion control measures) will have to take into account the lifetime of the project, as well as a timeline for the people of Toga. There is high uncertainty over how climate change will impact Toga, especially how it will affect other factors that in turn impact Toga. Although there is no way to know what these will be, the community can start thinking about what its future needs and goals are and how those could be met in a potentially very different future.

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[i] Further analysis will be available over the next few years in the form of a PhD thesis and academic journal articles.

[ii] Hurricane and cyclone are used interchangeably as hurricane is used in the community while cyclone is the term used by Fiji's Meteorological Service.