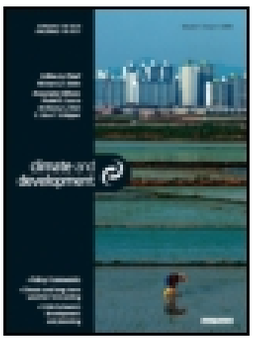

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RESEARCH ARTICLE

Assessing adaptive capacity and adaptation: insights from Samoan tourism operators

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Many of the Small Island Developing States (SIDS) are known to be very vulnerable to climate change impacts. This is particularly so where national economies are highly dependent on tourism-related revenue. Yet, little is known of the adaptive capacities of tourism providers in SIDS and how they respond to climate variability and change. This research uses a case study of Samoa, a Pacific island nation, that is highly dependent on beach tourism and already vulnerable to a variety of natural hazards. The research examines the adaptive capacity of tourism operators in Samoa and the ways in which *Fa'asamoa* (the Samoan way of life) is a fundamental part of how tourism operators plan for and respond to climate variability and extremes. The findings indicate that key components of adaptive capacity for Samoan tourism operators include their past experiences of extreme events, access to resources, social networks, and worldviews. In many cases, Samoan cultural values and socio-cultural governance systems play a critical role in how adaptation takes place. In the Samoan context, this means that an indigenous Samoan tourism operator is rarely one individual, but a part of a wider social network, which influences how a business can or cannot adapt to climate variability and change and hazards.

Keywords: adaptation; small Islands; Pacific; adaptive capacity; cultural values

1. Introduction

The prevailing view of Samoa (like other Small Island Developing States [SIDS]) in standard climate adaptation discourse is that, due to their small geographical size and narrow economies, they are highly vulnerable to the exogenous shocks (be it economic shocks or extreme weather events) (Barnett, 2010; Barnett & Waters, 2016). Indeed, it is widely accepted that Samoa and other Pacific SIDS are facing widespread and increasing risks from climate change, most notably sea-level rise, increased air and sea surface temperatures, in addition to increased climate variability (within the ENSO system that could possibly contribute towards more frequent extreme weather events) (Adger, Barnett, Chapin Iii, & Ellemor, 2011; Barnett, 2010; Kuruppu & Willie, 2015). These climate change-related risks interact with existing vulnerabilities such as degraded or fragile ecosystems, constrained social, health, and educational services to create large challenges for sustainable development as well as human health and well-being (Adger et al., 2011; IPCC, 2014; Kuruppu & Capon, 2016). Yet, exposure and sensitivity are not the sole factors that explain vulnerability; the adaptive capacity of families, businesses, communities, institutions, economies, and ecosystems are key. Thus, this paper is directed at understanding the adaptive capacity of Samoan tourism operators and the factors that contribute towards their capacities in the Samoan context.

Samoa, like most Pacific SIDS, is highly dependent on tourism, and this dependence also increases its vulnerability as weather and climate are the main attractions and risks for the industry (Becken & Wilson, 2013; Klint et al., 2012; Nalau, Becken, Noakes, & Mackey, 2017; Wong et al., 2013). Scholarship highlights that tourism operations around the world are facing increasing challenges posed by climate change and adaptation (Becken & Wilson, 2013; Belle & Bramwell, 2005; Jopp, DeLacy, Mair, & Fluker, 2013). Emergent scholarship focuses on climate change adaptation policies, strategies, and actions within the tourism industry. Many of these studies focus on alpine locations, specifically ski resorts, which are highly dependent on cold climate conditions and regular snowfall (Brouder & Lundmark, 2011; Hughey & Becken, 2014; Scott, McBoyle, Minogue, & Mills, 2006; Scott & McBoyle, 2007). Existing research on tourism climate adaptation in SIDS is, however, predominately focused on large resorts in coastal settings such as Fiji and the Maldives, which contrasts with the Samoan context where small-scale operations are the norm

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(Becken, 2005; Scheyvens, 2006, 2008; Shakeela & Becken, 2015).

Within this body of literature, scholars have identified considerable gaps in current knowledge about the social dimensions of tourism climate adaptation, with a heavy focus on tourism policies rather than actual practices within the industry. More attention, therefore, needs to be given to understanding the socio-cultural factors that enable adaptation within the SIDS tourism industry (Schott, 2010). We address this knowledge gap by examining Samoan accommodation providers' adaptive capacity and the important role Samoan cultural values and social structures play in enabling actions in response to climate and weather conditions.

The paper is organized as follows: Section 2 reviews literature around adaptive capacity and risk perceptions with a focus on the Pacific Islands context. Section 3 introduces the study context and outlines the economic, historical, and socio-cultural processes. Section 4 introduces the study methodology and Section 5 presents the research results and discusses the findings and situates these in the context of existing literature. Section 6 concludes the paper and identifies areas of future research.

2. Adaptation and adaptive capacity

Consideration of climate change adaptation requires addressing four fundamental questions: adaptation to what (variability, impacts, vulnerability), how (adaptive capacity, options), by whom (individuals, communities, businesses, governments), and what are the aims (livelihoods, sustainable development, maintenance of status quo. There are various definitions of the concept of adaptive capacity within scholarly and policy communities (Adger & Kelly, 1999; Brooks, Adger, & Kelly, 2005; Engle, 2011). The Intergovernmental Panel on Climate Change (IPCC) defines adaptive capacity as 'ability of systems … to adjust to potential damage, to take advantage of opportunities, or to respond to consequences' of climate change (2014, p. 1758). It pertains to the components that assist social systems to manage, cope, and adjust to changing socio-economic, political, and environmental conditions. It is often used as a proxy for understanding existing processes of adaptation, and assessments of adaptive capacity also now form an important way of gaining insight into social vulnerability.

Vulnerability is described as a latent state that is a function of sensitivity to risk, exposure to risk, and the capacity to adapt to reduce, avoid, or take advance of risk (Adger, 1999; Adger & Kelly, 1999; Ford, Smit, & Wandel, 2006; Preston & Stafford-Smith, 2009). While vulnerability studies of Pacific SIDS identify important directions for policies, plans, and practical actions, they are heavily critiqued for overlooking local adaptive capacities, resilience, and blanketing complex and diverse socio-cultural, political, and economic realities under a broad definition (Farbotko, 2010; Farbotko & Lazrus, 2012; Gero et al., 2013; Warrick, 2010).

There is a wealth of scholarship examining the determinants of vulnerability, in contrast, the determinants of adaptive capacity are far less studied (Brooks et al., 2005; Engle, 2011; Keskitalo, Dannevig, Hovelsrud, West, & Swartling, 2011). Scholars ascribe this lack of research attention to understanding adaptive capacity to the highly scale- and context-specific nature of the processes influencing adaptive capacity (Adger & Kelly, 1999; Warrick, Aalbersberg, Dumaru, McNaught, & Teperman, 2016). Mortreux and Barnett argue that initial adaptive capacity scholarship was informed by asset-based theorizing that assumed that adaptation actions were linked to the possession of certain capitals (financial, physical, natural, social, human) (Adger & Kelly, 1999; Mortreux & Barnett, 2017; Smit & Pilifosova, 2003). This approach, however, was unable to explain how adaptation was actually undertaken in diverse settings. Significantly some studies found that higher capacity households were not adapting as well as households with lower capacity (Coulthard, 2008; Elrick-Barr, Thomsen, Preston, & Smith, 2016). Newer adaptive capacity research includes an expanded focus to include the ways in which psycho-social factors shape the ways in which assets are used to influence adaptation action, including personal experiences, expectations of institutions, place attitudes, and risk attitudes (Dumaru, 2010; Grothmann & Patt, 2005; Kuruppu & Liverman, 2011; O'Neill & Graham, 2016; Tam & McDaniels, 2013).

In the context of the Pacific Islands, Barnett and Campbell argue that the ways in which adaptive capacity is usually assessed by scholars and practitioners do not necessarily reflect the realities of Pacific island communities (2010). Mainstream determinants of adaptive capacity, Barnett (2008) observes, emphasize technological capabilities, economic resources, and extensive government systems. Thus, such assessments often exclude or diminish the significant 'positive contributors to adaptive capacity in Pacific islands' (Warrick et al., 2016, p. 1041). Pacific communities' successful maintenance of their cultures and peoples' well-being in variable and uncertain environments for hundreds of generations attest to their resilience and capacity to adapt to change. Thus, these societies possess features (kinship, resilient subsistent livelihood systems) that are significant contributors to their adaptive capacity and need to be recognized and included in adaptation planning initiatives (Warrick et al., 2016). Accordingly, it is fundamental that adaptive capacity research takes into account the social, cultural economic, political, and environmental realities of Pacific communities.

The Pacific Adaptive Capacity Analysis Framework (PACAF) is an analytical framework developed by scholars to guide the assessment of community-level adaptive capacity in Pacific communities. The creation of the PACAF, Warrick et al. (2016) notes, was a result of the aforementioned deficiencies in the assessment of adaptive

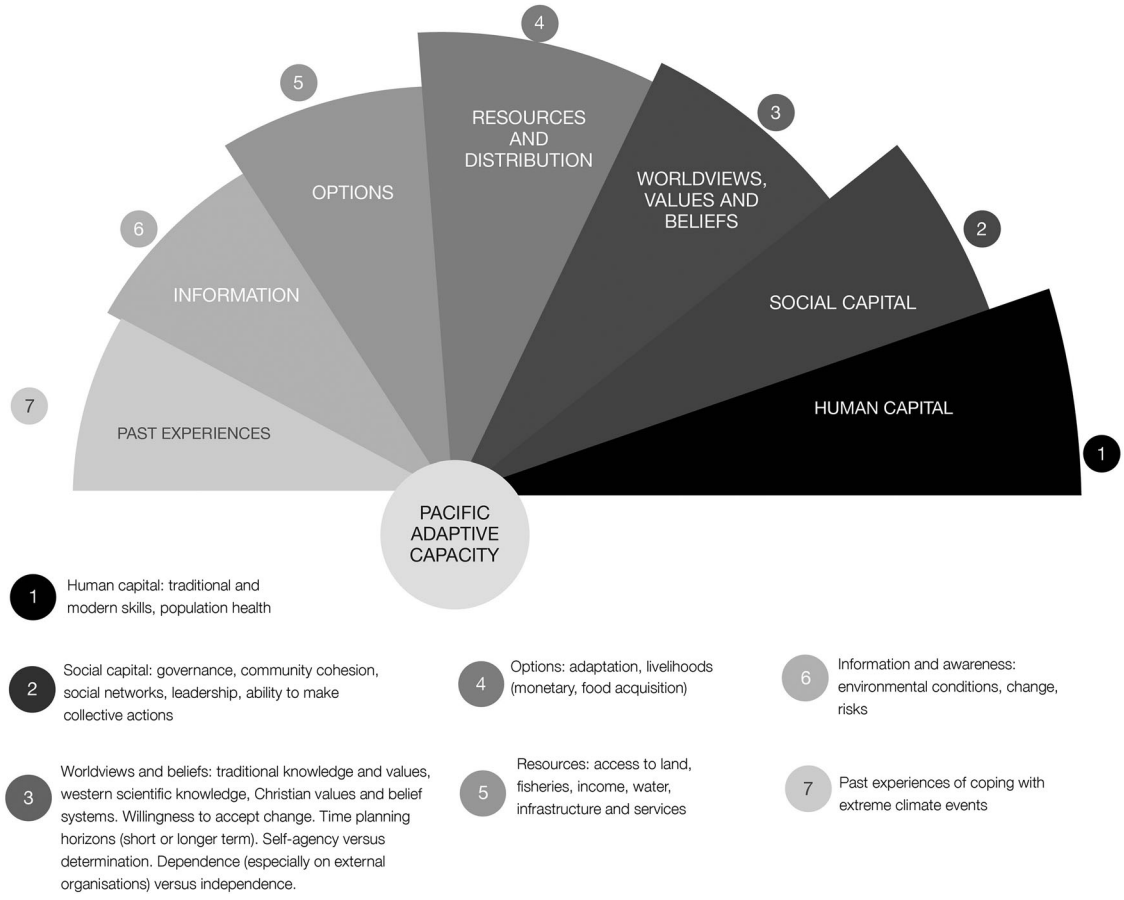


Figure 1. Pacific adaptive capacity analysis framework. Adapted from Warrick et al., 2016.

capacity in the Pacific context. The PACAF determinants of adaptive capacity consist of seven broad categories: human capital, social capital, worldviews and values, resource distribution, information and awareness of climate risks, options, and past experiences of climate stress. The categories also include numerous factors and sub-factors (see Figure 1); whereas other assessments emphasize assets (resources) as the key determinant of the adaptive capacity, the PACAF gives equal attention to socio-cultural factors including communities' experiences of past events, their worldviews, and human and social capitals. This framework was developed to be used to assess communities throughout the Pacific, which differs from our research project which focuses on individual tourism operators. Thus, while we applied the PACAF in our research we ultimately, based on our results, suggest a modified framework, which locates accommodation providers' Samoan values at the central component of adaptive capacity.

3. Case-study location: Samoa

Samoa is a Small Island Developing State composed of two main islands (Savaii and Upolu) and eight other islands. Located in the Pacific (Figure 2), the total land area of Samoa is 2944 km^2. The majority of the population, estimated to be 192,000 in 2014 (United Nations Development Program, 2014; Word Bank, 2014), lives on the islands of Savaii and Upolu. Like its Pacific neighbours, Samoa is considered highly vulnerable to the detrimental effects of climate change because the majority of the population lives and works in coastal locations (Jiang et al., 2015). Moreover, the Samoan economy is centred on tourism operations that rely on 'pristine marine resources and coastal infrastructure', both of which are threatened by changing climate conditions (Wong et al., 2013, p. 136). Indeed, scholars have identified Samoa as a 'climate-tourism hotspot' because the predicted impacts of climate change pose significant risks to its tourism industry (Becken & Hay, 2007; Jiang et al., 2015). In Samoa, there has been increasing focus on developing climate change policies (including the National Tourism Climate Change Adaptation Strategy) (Samoan Tourism Authority, 2012; Word Bank, 2014) and Samoa's climate adaptation policy environment is considered suitably well-established to facilitate tourism industry adaptation (Wong et al., 2013).

Historically, the economy of Samoa was centred principally on agriculture and fishing, with development aid and remittances from relatives living abroad also contributing

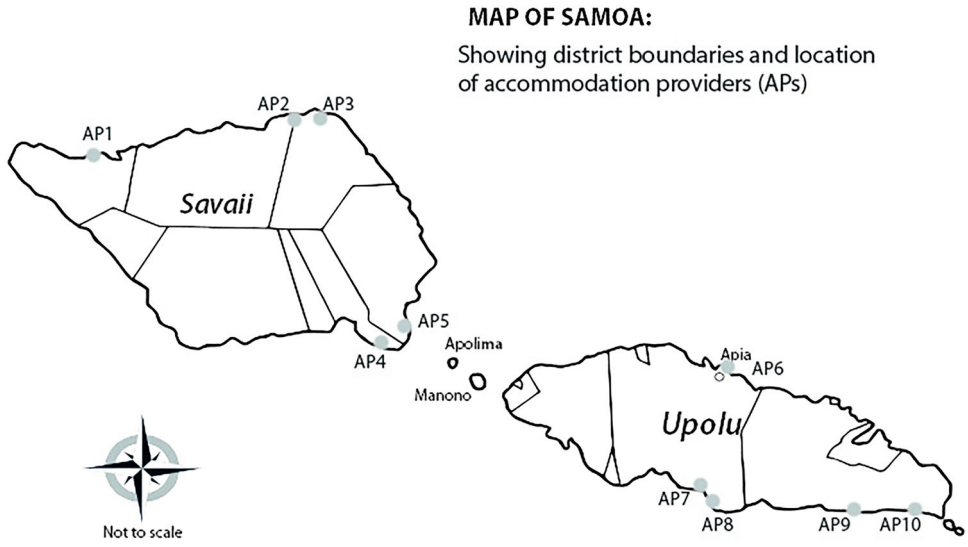


Figure 2. Map of Samoa showing locations of accommodation providers.

to its gross domestic product (GDP). Over the last 30 years, there has been a decline in agriculture and fishing industries in Samoa and the importance of the tourism industry has grown markedly. Tourism now contributes more than 20% of Samoa's GDP and employs approximately 10% of the population (Jiang et al., 2015; Wong et al., 2013). In addition to growing tourism, remittances from Samoans living abroad (mainly in Australia, New Zealand, and the US) have similarly grown and as of 2013 accounted for 22% of Samoa's GDP (Le De et al., 2016, p. 133).

Substantial tourism operations exist throughout the islands of Savaii and Upolu. Most tourism operations are small scale and are owned and operated by local people, unlike the resort-dominated Pacific destinations of Fiji and New Caledonia. Samoan accommodation providers can be divided into three types: Beach *Fales*, hotels, and resorts. Beach *Fales* are the most common accommodation type and are typically small-scale family-run operations, with emphasis often placed on tourists experiencing an authentic *Fa'asamoa* (Samoan way of life) experience (Scheyvens, 2006). Beach *Fales*, in particular, contribute towards the sustainable livelihoods for Samoan families, as the practice of starting a Beach *Fale* a family can diversify their livelihood options and therefore spread their risk (Scheyvens, 2006; Scheyvens, 2005). Tourists often are encouraged to participate in traditional meals and events such as cultural performances (Wong et al., 2013, 2012). A small number of hotels and larger resorts are also found throughout the two main islands. Tourism makes a substantive contribution to Samoa's social and economic development (Jiang et al., 2015), with sustainable tourism seen as an avenue for poverty reduction and expanding human capability (Scheyvens, 2008; Scheyvens, 2005).

Samoa operates under a dual mode of governance that reflects the influence of Western institutional arrangements following colonization and traditional arrangements (Amosa, 2010; Huffer & So'o, 2000). The government of Samoa, consisting of the elected parliament, holds legislative authority at the national level. At the local level, the *Matai* system, centred on *fono* village council made up of *matai* (chiefly titled holders), plays a critical role in governing communities and day-to-day decision-making, including those related to environmental risks (Huffer & So'o, 2000; Meleisea, 2005; Thornton, Kerslake, & Binns, 2010; Vaai, 1999). While it is outside the scope of this paper to give a full account of the role socio-cultural institutions play in adaptation efforts, we do illuminate aspects of the *Matai* system through our focus on *Fa'asamoa* and adaptive capacity.

Fa'asamoa (the Samoan way of life) is the value system (worldview or cosmology) (Kallen, 1982; Meleisea, 1987) composed of both the values and socio-cultural governance structures upon which Samoans base their lives on. The institutions of *qiga* (extended family), the *matai* (chiefs), and Christianity are deeply intertwined with the central principles of *Fa'asamoa* (Figure 3). Each *aiga* is headed by *matai* (chiefly titled holders) who make decisions regarding the collection, allocation, and division of resources within the *aiga* (Thornton et al., 2010). Later in our research results and discussion, we identify how *Fa'asamoa* and *aiga* are key components of Samoan tourism operators adaptive capacity. Indeed, as our case study demonstrates, Samoan accommodation providers' responses to climatic and non-climatic extremes are intricately connected to their value system and socio-cultural governance structures.

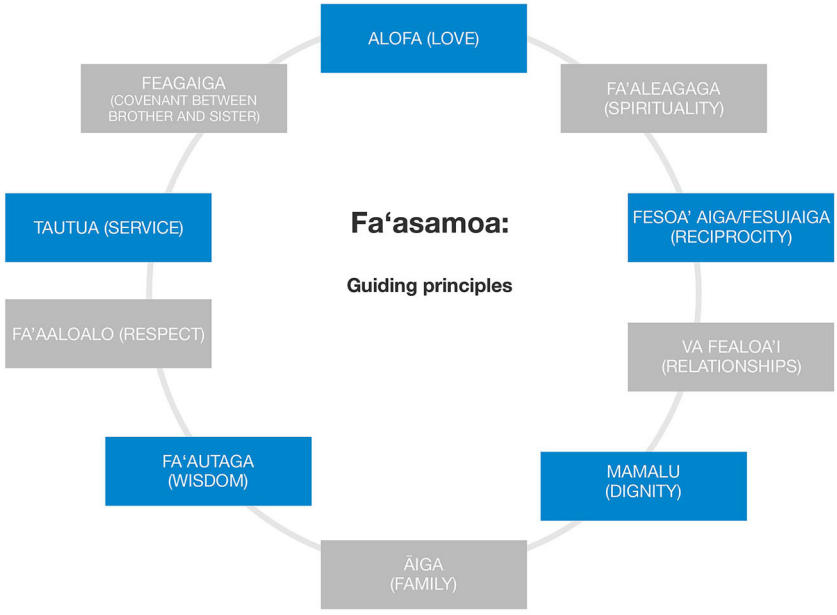


Figure 3. Some key principles underpinning *Fa'asamoa* (the Samoan way of life). Adapted from: Sauni (2011), p. 57; Huffer and So'o (2005).

4. Methodology

This research project employed indigenous and Pacific social science research methodologies to examine how Samoan tourism operators' experiences and responses to climate variability and change. A case-study approach was chosen to explore nuances and identify contextual influences on, and explanations of the context under study (Baxter & Eyles, 1997). The case-study approach is unequivocally multi-causal as it focuses on the diversity of factors that contribute towards the outcomes in the case (Baxter, 2010). The study included Samoa's 2 main islands and included visits and interviews with 10 accommodation providers located in 6 geographical areas: North West Coast, Savaii; North Coast, Savaii; South East Coast, Savaii; Apia Harbour, Upolu; South Coast, Upolu; and South East Coast, Upolu (Figure 2).

We consciously chose to include a diversity of accommodation providers (from Beach *Fales* through to hotel facilities) located through Samoa to allow us to gain insights into the differences in climate variability and climate-related risks. However, we did not directly compare the two islands in terms of vulnerability and/or adaptive capacity (Table 1); rather, the accommodation providers were chosen because their facilities were well established (operating for time periods ranging from 8 to 80 years). In addition, the APs interviewed, who were either owners or managers, were some of the most experienced operating in the Samoan tourism industry (ranging from 8 to 54 years of experience). Thus, the APs included in this study provide us with detailed knowledge about past climate variability and extremes, as well as changing within the tourism industry. The accommodation providers were asked to identify the supporting institutions that assist them in their strategies to adapt to climate variability. Five formal supporting institutions were identified and interviewed as part of this research.

Primary data were generated through qualitative research methods including in-depth interviews and document analysis. Fifteen face-to-face semi-structured interviews were conducted with 10 accommodation providers and 5 representatives from supporting institutions over a six-week period in June 2013 in Samoa (Table 2). The participants, who were all indigenous Samoans, were recruited via snowball sampling where one participant recommends the next. The interviews were approximately one hour each. All the respondents were native speakers of Samoa. Interviews were therefore conducted in Samoa or English, or a combination of both, depending on the preference of each research participant. In addition to notes being taken during interviews, conversations were also digitally recorded (subject to permission from interviewees) and later transcribed. A thematic analysis was then conducted wherein the data were coded based on themes of interest to the study (components of adaptive capacity) as well as new themes that emerged from the data, which involved both inductive (emerging from the data) and deductive (pre-chosen themes) codes (Baxter, 2010; Baxter & Eyles, 1997). This analysis included placing segments of the interview data under key heading and sub-headings some of which were pre-determined and others that emerged from the interviews. The material was then organized under the categories as prescribed by the PACAF.

Table 1. Types of accommodation, location, and brief description of surrounding area.

Accommodation providers (AP)	Accommodation classification[a]	Accommodation location	Description of surrounding area
AP1	Budget	North West Savaii	This area is the driest part of Savaii. It has a harbour, airport, and small village. It has a handful of hotel operators. In the 1990s, this area was heavily affected by two large tropical cyclones (Cyclones Val and Ofa)
AP2	Beach *Fales*	North Coast Savaii	Manase and Fagamalo are located on the northern side of Savaii. They are some of the busiest coastal tourism establishments with accommodation providers ranging from hotels and fales (Samoan for house) on white, sandy beaches. The accommodation providers in this area are primarily beach fales, a few of them being three to four star operations. Over the last few decades (1990s–2010s) large storms caused damage to accommodation providers in this area; however, they were able to cope with these events and repair resulting damage
AP3	Superior standard	North Coast Savaii	
AP4	Beach *Fales*	South East Coast Savaii	Salelologa is the hub of business activity in Savaii. Its main features are the Savaii Market and bus terminal and it is also the gateway to Savaii via the ferry at Salelologa wharf. It is the most common route for tourists to take to Savaii. Storms and cyclones often lead to cancellation of the ferries between the two main islands. Hence, this can be an opportunity for the hotels (such as AP5) in the vicinity of the ferry terminal in Salelologa to gain more guests, as stranded ferry passengers often need a place to stay
AP5	Standard	South East Coast Savaii	
AP6	Deluxe	Apia	Apia is the capital of Samoa. It features the parliament house, banks, the main strip for night life, and Apia harbour. It is home to the majority of the population and is the main business centre for Upolu Island and Samoa. There are many hotels in Apia, ranging from three-star to back packers. We chose one of the most well-established hotels in Apia, which had experienced past damage and closure due to climate events to be part of this study
AP7	Deluxe	South Coast Upolu	The area of Siumu is located on the central, southern side of Upolu Island. The two hotels we selected here were in operation for many years and over that time have needed to be repaired or rebuilt due to climate variability and tropical cyclones. The communities and businesses of the area were badly affected by the 2009 Tsunami and many people lost their lives
AP8	Deluxe	South Coast Upolu	
AP9	Budget	South East Coast Upolu	Lalomanu is a large district on the south-eastern side of Upolu Island. Before 2009 it was one of the most popular and busiest tourist sites with the attraction being beach fales. However, Lalomanu was a key area that was devastated by the 2009 Tsunami where hotels were destroyed and many lives were lost (see Le De et al., 2016)
AP10	Budget	South East Coast Upolu	

[a]Accommodation Classification is from Samoa Tourism Authority website, http://www.samoa.travel/accommodation/

This process allowed us to consider the ways in which our data fitted into the PACAF as well as echoed or challenged existing academic scholarship.

We drew on indigenous and Pacific research methodological approaches in designing and conducting this research (Anae, 2016; Smith, 2013; Suaalii-Sauni & Fulu-Aiolupotea, 2014). The research adopted a narrative approach to interviews that followed on from the works of other indigenous and Pacific researchers (Leonard, Parsons, Olawsky, & Kofod, 2013; Vaioleti, 2006). The research questions were designed, following on from other Pacific adaptation studies, to focus on climate

Table 2. List of interviewees.

Location of accommodation providers interviewed	Accommodation providers (AP)	Role of person interviewed within AP	Accommodation type
North West Savaii	AP1	Owner, Manager	Budget
North Coast Savaii	AP2	Owner, Manager	Beach *Fales*
North Coast Savaii	AP3	Owner, Manager	Superior Standard
South East Coast Savaii	AP4	Owner, Manager	Beach *Fales*
South East Coast Savaii	AP5	Owner, Manager	Standard
Apia	AP6	Owner, Manager	Deluxe
South Coast Upolu	AP7	Manager	Deluxe
South Coast Upolu	AP8	Manager	Deluxe
South East Coast Upolu	AP9	Manager	Budget
South East Coast Upolu	AP10	Owner, Manager	Budget
List of support agencies interviewed		*Institutions*	*Type of Institution*
Samoa Meteorology Service (SMS)		Institution 1	Government of Samoa Ministry
Insurance provider		Institution 2	Private Service Provider
Samoa Tourism Authority (STA)		Institution 3	Government of Samoa Ministry
Electric Power Corporation (EPC)		Institution 4	Government of Samoa Ministry
SFESA (Samoa Fire and Emergency Services Authority)		Institution 5	Government of Samoa Ministry

change as part of wider human–environment interactions, such as experiences of weather conditions, changes in their local environment, extreme events (climate and non-climate-related risks), and adaptation strategies (McCubbin, Smit, & Pearce, 2015; Mortreux & Barnett, 2009). The interviews were designed to allow for informal discussions, the emergence of unanticipated insights, and the pursuit of specific issues that may have remained untouched in more formal research settings. The interview guide included open-ended questions around themes based on the adaptive capacity approach and focused on how (if at all) tourism operators were affected by and responded to climate variability, extremes, and changes in their local environment. Particular care was taken to ensure that key terms about climate change were translated from English into Samoan because the importance of words not only exists in the 'literal translation from one language to another but also in the broader context within which words make sense' (Cameron, Mearns, & McGrath, 2015, p. 254).

5. Results and discussion

In this section, we present our results, identifying the main enablers and constraints to adaptive capacity amongst the accommodation providers in Samoa, and discuss our findings in regard to the wider scholarship. We employed the PACAF as an analytical tool to identify the determinants of adaptive capacity. The PACAF identifies seven key determinants of adaptive capacity; however, our interview results emphasize certain factors (or components) that contribute towards accommodation providers' adaptive capacity. Accordingly, we felt it necessary to present our results in the original framework as a table (Table 3) and provide a more detailed account of components of Samoan accommodation providers' adaptive capacity as a modified framework (Figure 4). We identify five main components of adaptive capacity specific to the Samoan tourism operators: (1) worldview: *Fa'asamoa* value system, (2) social networks, (3) resources, (4) past experiences of extremes, and (5) information and awareness of environmental conditions.

5.1. *Worldview and value system: Fa'asamoa*

Fa'asamoa (the Samoan way of life) shapes how our respondents understand the world around them and what was and is considered acceptable and unacceptable actions (see Figure 4). At the centre of *Fa'asamoa* is the *aiga* (extended family) and their *va fealoa'I* (relationships) between family members, their *nu'u* (village), and their church. Accommodation providers emphasized that their capacity to adapt was underpinned by *Fa'asamoa*, with past experiences of extremes, social networks, and access to resources all allowing them to manage shocks and changes in their lives (be it related to environmental or economic conditions) (AP1, 2013; AP4, 2013; AP2, 2013). Thus, despite concern about climate change, all respondents felt confident in their abilities to adapt to changing climate conditions due to their *alofa* (love), *fa'aaloalo* (respect) for Samoan culture and the *fa'autaga* (wisdom) encapsulated in it. People's sense of belonging (how they connect to plan and how they connect to others) is underpinned by *Fa'asamoa*, which is not static but rather negotiated, reciprocated, maintained, practised, and transmitted on to the next generations through specific practices. At the heart of *Fa'asamoa* therefore are social relations (between individual accommodation providers, their families,

Table 3. Determinants of adaptive capacity as delimited by Pacific adaptive capacity framework.

Factor/sub-factor	Determinants of adaptive capacity
1. Human capital	1. Human capital
(a) Traditional and modern skills	(a) *Traditional/modern skills* Traditional skills include the construction and repair of *fales*. Local knowledge of environmental conditions and changes, most notably about tropical cyclones, and the spread of invasive species of starfish. Accommodation providers access weather forecasting information from Samoa Meteorology Service, and internet weather sites to make decisions (specifically about tropical cyclone preparations). Some accommodation providers draw on scientific knowledge to ensure buildings can withstand cyclonic winds
(b) Population health	(b) *Population health* Several accommodation providers (on Savaii and Upolu Islands) noted the health risks associated with contaminated water following extreme events (heavy rainfall, storm surges, flooding, and tropical cyclones). However, all the affected accommodation providers (AP3, 2013; AP5, 2013; AP7, 2013; AP8, 2013) reported the implementation of adaptive strategies (installation of water filtration system and water tanks) to manage the risks
(c) Change agents	(c) *Change agents* There was some suggestion of the need to involve more local institutions in climate change planning. This was from the perspective and past experience of both accommodation providers and some support agencies that were interviewed. Key things that were highlighted was the use of the *Fa'asamoa* local institutions in lessening the time it took for power to be resurrected after extreme storms during cyclone season. AP1 reported that traditionally local institutions were the key agent in fighting fires in dry fire-prone areas in Savaii. This was prior to the fire service being built on Savaii in the 2000s
2. Social capital	2. Social capital
(a) Community diversity	(a) *Community diversity* All our interviews were indigenous Samoans and our study focused on Samoan perspectives of climate change adaptation so there was low level of cultural diversity as part of the research design. However, both accommodation providers and representatives of supporting agencies emphasized the importance of Samoan way of life and beliefs as central to adaptive capacity. This rearticulates findings from scholarship that highlights that low cultural diversity can be linked to high adaptive capacity due to shared value systems
(b) Leadership	(b) *Leadership* Accommodation providers spoke of the importance of *matai* (chiefs/chiefly tilted holders) as providing leadership about actions to be taken at a local level (both within villages and within families). Supporting agencies indicated the role of government and international development agencies in funding adaptation (be it insurance schemes or practical adaptation actions). All indicated the need for greater co-ordination between local (*matai*) and national governance structures, and emphasized the ways in which collective actions was (or should) be tied to *Fa'asamoa* rather than western principles
(c) Strength of collective action (d) Support services and networks	(c) *Collective action* and (d) *Support services and networks* Most accommodation providers indicated that their actions were linked to *aiga* (family) and *matai* system (*matai* as head of the family and as part of village councils *fono*). *Aiga* (extend family) forms the centre of Samoan social networks, followed by village (*nu'u*) and church connections. Thus, adaptation decision-making and actions (such as the decision to relocate a business away from a vulnerability location) was a collective (rather than individual) process based on deliberations between *aiga* and *nu'u* (AP1, 2013) Government agencies provide support through maintaining infrastructure, but those supporting agencies suggested closer links where needed between *fono* could help them improve their services and built their capacity to adapt. In turn this would enchant AP adaptive capacity by ensuring better/more secure electricity supplies

(e) Governance	(e) *Governance* Accommodation providers indicated the importance of traditional (indigenous) governance, specifying the role of *fono* (village council), and *matai* (chiefs/title holders), and *aiga* (family). Their adaptive capacity was derived, in part, to the strength of local governance structures, with village councils playing a key role in mediating disputes between different people in the village and placing social controls on tourist behaviour to minimize social and environmental issues. Such as tourists' abilities to travel through villages, and the waste disposal for Beach *Fales*. However, both accommodation providers and supporting agencies noted that a lack of recognition and engagement with local institutions (*fono* and associated institutions) by central government and international development agency-led served to impede the development of sustainable adaptation plans and actions
3. Belief systems, worldviews, and values	3. Worldviews and values
(a) Traditional values, knowledge/modern, Western and church	(a) *Traditional values/modern values* Great importance is placed on *Fa'asamoa* (the Samoan way of life) and is seen to be the central enabler of adaptive capacity. However, respondents noted that they did not employ any traditional knowledge to monitor weather conditions or make climate risk assessments. Instead relying on Western knowledge for their sources of climate information (Samoa Meteorology and internet weather sites) specifically in regard to tropical cyclones. Yet the maintenance of *Fa'asamoa*, and the main tenets of the value system (including the importance of family, reciprocity, and relationships), was still seen to be key to how accommodation providers (and other Samoans) can and do adapt to changeable climate conditions (as well as other disruptions be it economic, health, or social). Further *Fa'asamoa* shapes Samoans way of understanding the world around them and what is considered acceptable and unable actions (or inactions). *Fa'asamoa* is a traditional value system; however, it is not one based on accumulated 'pure' indigenous knowledge in a dichotomous relationship to 'modern', 'Western', or 'church' value systems. In Samoa, it is possible to ascribe to *Fa'asamoa* and a particular Christian belief system which is overlaid and interwoven together as hybrid knowledge system. There are multiple Christian denominations; however, it was outside the scope of this research to investigate the role of churches in accommodation providers' adaptive capacity. Values systems guide people's behaviour, shape cultural identity, and build social cohesion. *Fa'asamoa* strongly shapes how respondents view the world, and how they interact and respond to environmental variability, shocks, and changes. At the centre of *Fa'asamoa* is the *aiga* and the connections between family members, also important is the relationship with their *nu'u* (their family's village, even if they themselves no longer live there). Respondents emphasized that their capacity to adapt was inextricably linked to their values, and their family connections (social networks) allowed them to manage shocks and changes in their lives (be it related to environmental or economic conditions). All interviewees report having family members living in other parts of Samoa and internationally (predominately American Samoa, the USA, Australia, and New Zealand), which is an indication of the high level of access to remittances
(b) Acceptance and willingness to change	(b) *Willingness to accept change* Accommodation providers were not averse to new ideas or ways of dealing with problems. However, supporting agencies did express a view that government departments could improve their situation (their delivery of services to accommodation providers and villages) by using local knowledge to deal with existing and emergent problems
(c) Self-agency versus determinism (d) Planning horizons here (and now versus future) (e) Independence versus dependence (especially on external organizations)	(c) *Determinism versus self-agency* Most accommodation providers felt highly confident in their capacity to adapt climate risks, with most specifically references tropical cyclones, inundation. Thus, self-efficacy was high. People's perceptions of their own self-efficacy can shape their motivation to undertake adaptive actions. This was evident in most interviews with AP's as they all expressed that previous experience and being Samoan and knowing how to adapt to climate risks
4. Resources and distribution	4. Resources and distribution of resources
(a) Land access	(a) *Land access* Adaptive capacity is enabled due to good access to land, which is maintained through family connections. Under the *Matai* system, each family has customary land allocated to them, with the village council (*fono*) playing a role in determining what activities were permitted on that land such as agriculture or tourism activities. Accommodation providers indicated they were able to access land and move locations (away from vulnerable locations) if needed due to their *aiga* connections (AP1, 2013)

(*Continued*)

Table 3. Continued.

Factor/sub-factor	Determinants of adaptive capacity
(b) Fisheries access	(b) *Fisheries access* Some accommodation providers expressed that climate variability (heavy rain and storms) and environmental changes (such as the invasive starfish 'crown of thorns') decreased people's ability to catch fish either by inability to access fish (due to dangerous sea conditions making fishing too dangerous) or because there were no fish (due to habitat loss). This affected APs adaptive capacity as they are unable to supply food to themselves and to their guests (who had an expectation of fresh fish as part of their 'tropical island' experience)
(c) Income access	(c) *Infrastructure and services* There is a reasonable provision of infrastructure and services to both islands. Government agencies, including Samoa Water Authority (SWA), Electric Power Corporation (EPC), and the Land Transport Authority (LTA), are responsible for maintaining infrastructure, so accommodation providers rely on those agencies to repair damaged (following extreme events) infrastructure promptly. The length of time to resurrect key infrastructure often collides with the length of time it took to get accommodation providers' operations functioning again. For instance, following an extreme event it took two months for a damaged bridge to be repaired (which connected AP7 to the airport), and thus the provider lost two months of business as a result of the temporary loss of infrastructure. Indeed, many accommodation providers spoke of how insufficient emphasis was being placed on ensuring community infrastructure was maintained (or quickly repaired) by government agencies following extreme events (cyclones, floods, landslides, storm surges). Supporting agencies similarly reported difficulties in ensuring prompt repairs, and suggested that by working with local village councils (through the *Matai* system) services and infrastructure could be repaired more promptly. Accommodation providers' adaptive capacity may be slightly constrained at presented by variable access to infrastructure and services; however, there is the potential to enhance adaptive capacity through improved improvement of traditional governance structures
(d) Infrastructure and services (e) Water resources	(d) *Water resources* All respondents reported good access to clean drinking water (except following extreme events). Freshwater resources are available through the main water supplies on both islands (from Samoa Water Authority), bore water, or tank water depending on the location. Most accommodation providers with water tanks use them for emergency purposes (following flooding, tropical cyclones, and damage to water infrastructure) (AP5, 2013; AP7, 2013; AP8, 2013). Some informal water restrictions are often in place following extreme events, including the use of their 'good' water (from the tank) as their drinking water following a tropical cyclone and use the local river to bath in when main water supplies are damaged (AP7, 2013) In the past, one accommodation provider (AP1, 2013), who did not have ready access to the main water supply, recalled that they were forced to purchase truck-loads of water from Samoa Water Authority (government supporting agency) to bring in to their facility during times of drought. However, in the past couple of years, main water supply to the AP was improved (AP1, 2013) One accommodation provider on Upolu noted that their freshwater bore became saline (due to saltwater intrusion) in 2011 (AP8, 2013). However, the AP (a deluxe hotel) was able to access the main water supply and install water tanks, and so was not completely reliant on bore water. Overall, the wide availability of freshwater resources through the Samoa Water Authority as well as accommodation providers possessing other resources
5. Options	5. Options
(a) Adaptation options	(a) *Adaptations options* This study found that accommodation providers' adaptive capacity is enhanced by the wide availability of adaptation options available. Many accommodation providers already implement a wide range of adaptations (chiefly technical adaptations to tropical cyclones and inundation events). The need to increase technical ('hard') adaptation interventions along the coast is a high priority for government and development agencies
(b) Monetary livelihood options	(b) *Monetary livelihood options* The study found that the decision to adapt and maintain business was due to the fact that local *Fa'asamoa* commitments and *aiga* drove more accommodation providers to seek more adaptation options

(c) Food acquisition options	(c) *Food acquisition options* The study found that most accommodation providers were able to source food despite blocked transport routes (AP9) and effect of extreme storm on fisheries. Most did not think about climate extreme future changes being a threat or problem to their adaptation. For example, the growing threat of crown of thorns on coral reefs due to enhanced climate. Future threats to their businesses are the physical environment demanded by tourists
6. Information and awareness	6. Information and awareness
(a) Access to relevant information for adaptation	(a) *Access to information about adaptation* People expressed high awareness of climate change and adaptation due to media coverage and face-to-face meetings with NGOs, researchers, and officials from international development agencies and government departments (who were raising awareness of, seeking information about, or proposing actions to be taken). However, many APs expressed frustration that they receive no follow-up information from 'experts' and none of the adaptation actions that were proposed were implemented. This inadequate engagement and apparent absence of a participatory process between 'experts' and local people (including local businesses such as accommodation providers translate into accommodation providers' adaptive capacity being constrained by limited information about adaptation options. Yet, at the same time, accommodation providers were highly aware of climate change and understood the causes. They linked the consequences of climate change to a narrow range of impacts (related to sea-level rise, inundation, and coastal erosion). This meant, in theory, that their abilities to make well-informed decisions on adaptation options (to reduce their vulnerability) were lower. However, in actuality, most interviewees (even if their understanding of scientific knowledge of climate change was incomplete) expressed detailed knowledge of their local environment and were well aware of changes
(b) Ability to analyse information	(b) *The ability to analyse information and for people to identify and priorities adaptation options* The abilities of accommodation providers to identify and prioritize adaptation options, and weight up the benefits and weaknesses of each option, is partly constrained by limited knowledge of what adaptation options. This is partly linked to a lack of information and knowledge about the diversity of climate change impacts. This lack of information is a result of media coverage (local and international media continue to represent Samoa as 'sinking islands'), as well as government and international development agency projects being focused on coastal impacts and 'hard adaptations' (sea walls, coastal roads). Thus, the respondents conceptualized climate change as a phenomenon linked to sea-level rise and coastal processes. Adaptation options prioritized by accommodation providers and supporting agencies therefore focused on technical adaptations (mainly related to coastal hazards). A higher-level understanding of the consequences may enhance Samoan accommodation providers' adaptive capacity, as they would be able to make better-informed choices about adaptations. Yet, the role of 'scientific' climate information plays in enabling communities (and in this instance, tourism operators) to make decisions about adaptation is often over emphasized (Warrick et al., 2016). Indeed, despite the imperfect understanding of 'scientific' climate information, accommodation providers and representatives of supporting agencies were also able to identify a diversity of climate adaptation options based on their extensive local knowledge. They identified and prioritized a range of adaptation strategies (which they linked to existing climate variability). These included: • installation of water tanks or water security measures (to ensure water security during times of drought and due to salt water intrusion) • the improvement of the transportation network, including bridges and inland roads. In particular, on the island of Upolo the Cross-Land Road (the main inland road which linked AP7, AP8, AP9, and AP10 to the capital city Apia and its airport and hospital) was regularly impassable due to heavy rain and landslides. The need to ensure that this route was kept open (especially due times when the coastal routes were also impassable due to storm surges) was identified as a high priority by accommodation providers, yet was not mentioned by supporting agencies. • the enhancement of links between government agencies and local village councils (*fono*) to improve delivery and maintenance of lifeline services during climate extremes The capacity to implement these strategies was, respondents noted, dependent on good governance (national and/or local governance) as well as the availability of resources (be it government-funded, or *aiga*-funded)

(*Continued*)

Table 3. Continued.

Factor/sub-factor	Determinants of adaptive capacity
(c) Communicated risks and importance	(c) *Communicated risk and importance* The role of external communication of climate risks was primarily derived from Samoa Meteorology Service. While risk communication for tropical cyclones is advanced, there is (accommodation providers and some supporting agencies noted) a lack of locally cultural appropriate climate risks information (about the diversity of impacts of climate change). This is partly because of the limited involvement of local actors (*matai*, *fono*, and church pastors at a *nu'u* level) and the emphasis on external (non-Samoan) experts who do not recognise or situate risk communication or adaptation in *Fa'asamoa*).
7. History of dealing with climate events (a) Past experience of dealing with climate events	7. History of dealing with climate events (a) *Past experiences of dealing with climate events* Accommodation providers and representatives of supporting agencies all report personal experiences of a wide range of climate- and other environmental problems over the last three decades. In the 1990s, Samoa was severely affected by Cyclones Ofa and Val, which resulted in which spread damage to agriculture and built infrastructure. The experience of these two damaging cyclones prompted AP1 (2013) to relocate their *Beach Fale* business inland away from the beach. Overall, respondents felt that past experiences of extreme events, which includes both climatic and non-climate events such as the 2009 tsunami, enhanced their abilities to adjust to variability and ongoing changes. At the same time, they all acknowledge the difficulties they encountered following extremes, including loss of life, damage to property and infrastructure, difficulty accessing freshwater and food supplies, and the financial costs associated with these events. Many accommodation providers acknowledged that *Fa'asamoa*, which was manifest in sending remittances to family members and the churches, underpinned their capacity to recover from extreme events. Thus, *Fa'asamoa* and the principles of aiga, reciprocity were seen to be key to how Samoans adapted to past climate events, as well as future climate events. The extent to which family remittances can be used long term as a means of adapting to the impacts of climate change remains unknown

villages, churches, and even guests), which can be seen to be social networks linking (or weaving '*ie tōga*) individuals together. Thus, we situate *Fa'asamoa* as underpinning all other components of adaptive capacity (Figures 3 and 4).

5.2. *Social networks: aiga potopoto*

Social networks are one of the key components of Samoan accommodation providers' adaptive capacity. Many accommodation providers' businesses were located on family land, employees were members of the extended family, and the income generated by the business was used to support not only themselves or their immediate (as in the Western-style nuclear-family) but also wider extended family (*aiga potopoto*), village (*nu'u*), and church. The extended family network of *Aiga potopoto*, which translates literally as assembling kindred, is the most important social network for Samoan accommodation providers (and we suggest for Samoans more generally).

The role of *aiga* is particularly notable in times of extremes (be it economic, social, or environmental) (see Figure 5). Accommodation providers recall receiving remittances and gifts (sometimes money, other times food, and other goods) from family overseas to help them cope with the immediate aftermath of disaster events (including tropical cyclones) as well as assist in their recovery efforts (AP10, 2013; AP4, 2013). Similarly, they sent money to family members living outside of Samoa when they needed assistance (AP4, 2013; AP2, 2013). This practice of sending remittances to the family was the norm, rather than exceptional, and was a circular process rather than a one-way transaction. Reciprocity (*fesoa' aiga*/*fesuiaiga*) through the sharing of resources is a fundamental component of *Fa'asamoa*. For family-owned tourism businesses, in particular, reciprocity and family connections were critical aspects of not only their coping mechanisms (following extreme events) but also their capacity to adapt to the impacts of climate change.

Reciprocity (*fesoa' aiga*/*fesuiaiga*) and kinship (*aiga potopoto*) bind Samoans together across time and international borders, and these connections are central (but frequently overlooked) components of adaptive capacity. Indeed, as Tongan scholar Hau'ofa (1994, p. 156) suggests, the existence of these social networks spread across the globe based on kinship and exchange (of goods, money, and skills and knowledges) is one of the key methods by which Pacific people have responded to the modernity (Barnett & Waters, 2016; Jolly, 2007). Previous research emphasizes the significance of the concept of service (*tautu*a) in migration and remittance practices (Le De et al., 2016; Lilomaiava-Niko, 1993; Macpherson, 1994). Macpherson (1994) concludes that the main reason for Samoans to migrate to developed nations (such as Australia, New Zealand, and the US) was to assist their family (to fulfil their *tautua*), with personal interests of lesser concern

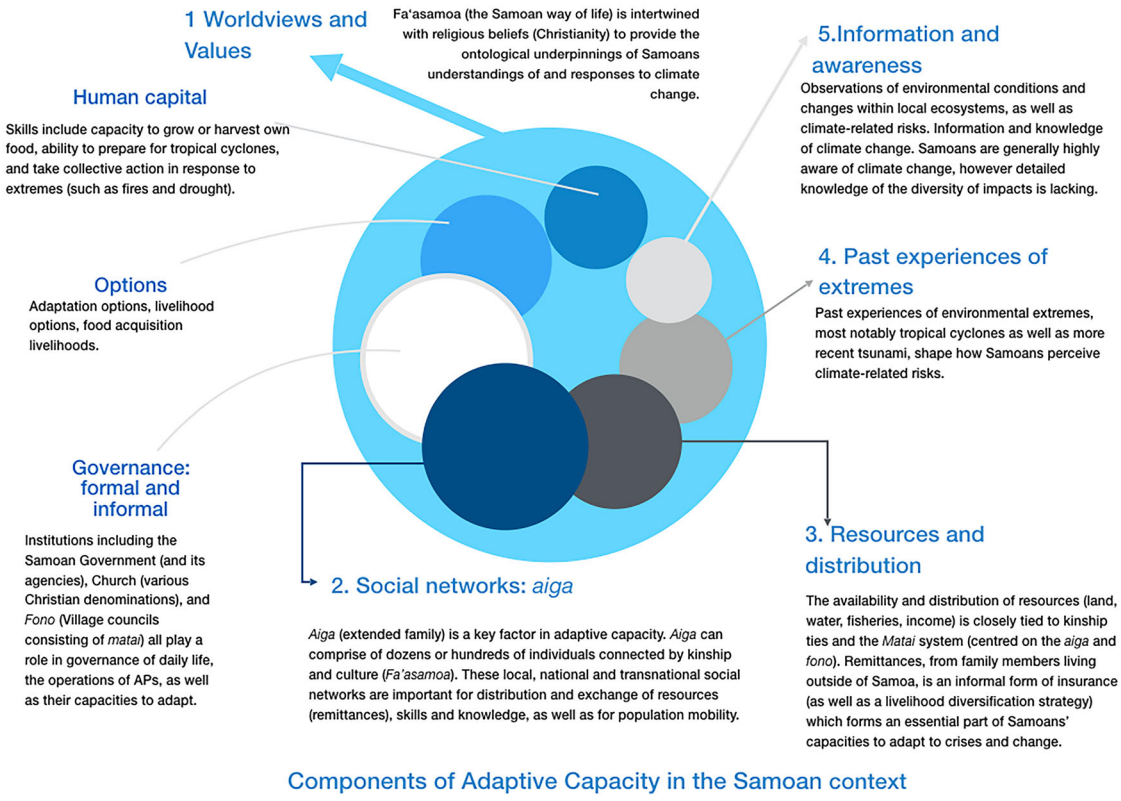


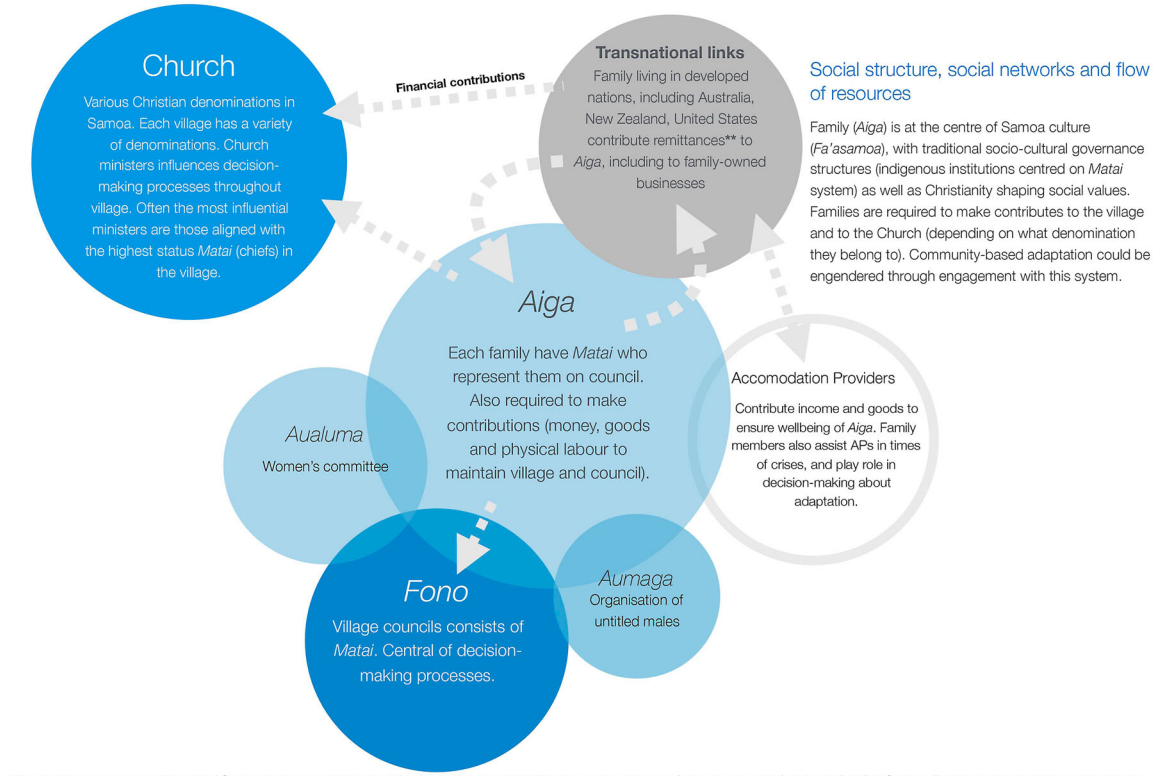
Figure 4. Components of Samoan adaptive capacity.

than those of the family. Indeed, the establishment of a commitment to remit is the norm (rather than the exception) because remittances are regarded as tangible evidence of a person's *alofa* (love) for one"s *aiga* (Macpherson, 1994).

Our results similarly demonstrate that the establishment and continuation of accommodation facilities (despite experiences of disasters and persistent climate risks) were viewed by the accommodation providers as expressions of not only *tautua* but the broader *Fa'asamoa* value system (AP10, 2013; AP2, 2013). AP10, for instance, reported that they did not want to rebuild their facility following the 2009 tsunami. However, family members (including those living outside Samoa) strongly voiced their opinions that they 'need[ed] to rebuild because this is the only source of money we get for our family [to pay] our village commitments, and our church commitments. So that's why we had to rebuild' (AP10, 2014). Ultimately, the decision was made to rebuild in the same location, with the rebuild funded through remittances, a bank loan, and expert assistance in-kind from former accommodation guests.

Family relationships (the social network of the *aiga potopoto*) are overlaid with those of broader cultural identity and Christianity as previously observed by Lilomaiava-Niko (1993). Muliaina (2006) found that many Samoans were willing to keep remitting for the rest of their lives as they perceived it as a fundamental part of their cultural identity and Christian teachings (Muliaina, Kumar, Prasad, & Shuaib, 2007). So too with the accommodation providers we interviewed, who spoke of the ways in which tourism operations in Samoa were inextricably connected to their relationships with family, village, and church (Figure 5). For instance, the decision to rebuild in exactly the same place following extreme events (which includes tropical cyclones Ofa, Val, and Evan and the 2009 tsunami) was made by 9 out of 10 accommodation providers interviewed, despite all acknowledging the risks. One of the owners of AP4 stated that his clientele wanted the experience of staying right by the sea: 'We just build in the same spots. That's what people want. They want to be close to the beach, they don't want to move back 100 yards' (AP4, 2013). Tourist preferences featured in all respondents' responses about their decision to rebuild in the same location, even if relocating elsewhere was a viable option (for example, they possessed land elsewhere and sufficient financial resources to fund the rebuild). Yet this also reflected the economic realities of running accommodation facilities in Samoa, and the socio-cultural pressures to ensure their businesses keep operating (despite risks) so that owners and families could make the necessary contributions (to family, to village, to church).

Only one AP decided to relocate their business following his business being completely destroyed by two



**Remittances are an essential part of Samoan accommodation providers' adaptive capacity. Migrants pay remittances (money and goods) to family (*aiga*) in Samoa. Remittances are made on an ongoing basis to family members as well as churches, but often increase following disaster events (such as the 2009 tsunami or tropical cyclone Evan in 2012). Remittances are also made from *aiga* in Samoa to family members living outside Samoa. Remittances, which are underpinned by the Samoan concepts of love and reciprocity, are a form of livelihood diversification and insurance strategies. Remittances can be seen as an essential part of how Samoan APs, households and communities manage and adapt to climate variability and change. The sharing of resources being an essential part of collectivism embedded in fa'asamoa and village-level indigenous institutions.

Figure 5. Social networks and the role of remittances.

cyclones Ofa and Val in the 1990s (AP1, 2013). AP1 reported that his *aiga* decided not to rebuild in a certain area because of their past experiences with the successive cyclones and instead built inland: '[a]fter cyclones we have been we have been really conscious of building on the sea. So that's why we haven't built anything. We would have loved to' (AP1, 2013). In this rare instance, the *aiga* collectively decided for forgo tourist preferences for sea-side locales and potentially higher income to reduce their physical exposure to cyclones. No mention was made of how this decision impacted on the accommodation provider's ability to make financial contributions to *aiga* (family), *nu'u* (village), and church. However, the AP1 did report that once they relocated they were able (following the introduction of certain adaptation measures) to receive formal insurance on their newly rebuilt property.

5.3. *Resources and distribution: access to land, finance, and insurance*

Adaptive capacity is also linked to people's abilities to access and use resources (Smit & Pilifosova, 2003; Smit & Wandel, 2006; Warrick et al., 2016). Financial resources, as previously alluded to in our discussion of remittances, can allow people to implement adaptation strategies. For instance, the owner of AP6, a Deluxe hotel, was able to afford the expense of pumps to reduce the risk of flooding (AP6, 2013). Whereas other accommodation providers were not able to do so (even if they were of similar risk to flooding) due to financial constraints. Yet, at the same time, lower levels of financial resources do not necessarily constraint individual businesses implementation of adaptation strategies. The owners of AP2, an *aiga*-run Beach *fale* business, employed low-cost strategies to manage tropical cyclone risk, including a safe house (a concrete building away from the beach front used to house guests during storms), and low-cost building materials. *Fales* are made from local timbers, thatch, and mats, which are all sourced from trees held on *aiga* land and constructed by family and village members. This means that when *Fales* were damaged, accommodation providers can more easily afford to repair and replace them (without reliance on bank loans or insurance). Other accommodation providers, such as hotels (Deluxe, Superior Standard, and Standard), are largely dependent on bank loans and formal insurance payouts to cover the costs of weather-related damages (AP5, 2013; AP7, 2013; AP9, 2013).

For many accommodation providers interviewed as part of this study, the resources they possessed and their ability to use resources was related to the type of business they ran

(if it was a large hotel or a small hotel or Beach *Fales*) as well as their connections to their *aiga* (extended family) and *nu'u* (village) (AP1, 2013; AP2, 2013, AP4, 2013). The majority of land is held in customary land title, with family assigned specific parcels of land; however, decision-making about what activities are permitted and where (agriculture, forestry, and tourism) is made at the village council (*fono*) level. Thus, most accommodation providers may possess sufficient land or money to build or rebuild (following extreme events) but ultimately decision-making power rests not at the individual owner/operator level but at the extended family (*aiga*) and also the *fono* levels.

Overall, there was a relatively low level of formal insurance cover (provided by banks) amongst accommodation providers (AP1, 2013; AP4, 2013; Institution 1, 2013). Two AP possessed full insurance cover and another four with partial insurance cover. Partial insurance included underwriting the cost of damage to the kitchen, infrastructure (from rainwater as opposed to seawater), and company vehicles. Respondents spoke of the high financial costs of insurance, the limitations of insurance (policies typically exclude damage caused by storm surges), and the demands of insurance providers (requiring construction of seawalls or new buildings away from coastal locations) which decrease aesthetic appeal of their facilities to tourists (AP1, 2013; Institution 1, 2013). Thus, it was the costs of being insured and the limitations coverage, rather than a lack of awareness on how formal insurance might enhance their adaptive capacity, drove accommodation providers to forgo formal insurance. Instead, the emphasis was placed on informal insurance (through remittances through *aiga* and adaptive strategies to prepare for events).

5.4. *Past experiences of extreme events*

Accommodation providers all reported long personal, family, and village histories of experiencing and responding to extreme events, which form a key component of (and contributor towards) their adaptive capacity (AP1, 2013; AP3, 2013). Tropical cyclones were the most commonly spoken of the event (AP7, 2013). Many respondents recalled the two major cyclone events (Ofa in 1990 and Val in 1991) that devastated Samoa, which occurred at the same as fungal infection (taro blight) destroyed the nation's taro crops (traditionally one of the crops that best survives cyclones) (Campbell, 1997; Colding, Elmqvist, & Olsson, 2003; Fairbairn, 1997; Hunter, Pouono, & Semisi, 1998) and changed how they personally prepared for cyclones, and broader changes within Samoan society (AP1, 2013; AP7, 2013; AP8, 2013; Institution 1, 2013).

The experiences of two tropical cyclones as well as the taro blight prompted changes to the Samoan economy (AP1, 2013; GoS 2, 2013; Institution 1, 2013). Most notably, Beach *Fales*, now the most common accommodation providers, only began to emerge in Samoa in the 1990s (AP2, 2013; AP4, 2013; GoS 2, 2013). Through starting a Beach *Fales* venue (which can consist of a single *fale* or multiple *fales*), an *aiga* (extended family) could, as Scheyvens (2006) previously notes, diversify their livelihood options, thus reducing their risks to shocks (be it climatic-, disease-, or economic-related). Beach *Fales* are recognized by the Beach *Fales* operators we spoke to but also by scholars as being not only economic enterprises that benefit individual families but also entire villages as owners of Beach *Fales* typically maximize the use of locally produced goods and services (AP2, 2013; AP4, 2013). The development of Beach *Fales* in the 1990s (Scheyvens, 2005) attest to how experiences of environmental extremes (and changes linked to taro blight) can contribute towards social learning and livelihood diversification, which can enhance people's capacity to adapt to climate change.

After Cyclones Ofa and Val, accommodation providers (driven by local and national level initiations) began to implement various strategies to reduce the risks associated with tropical cyclones. This includes improvements in building designs to ensure they could withstand cyclonic winds (AP1, 2013; Institution 1, 2013). Others focused on disaster risk reduction strategies, including early warning systems and preparations. Now accommodation providers prepared for 'cyclone season' (between the months of October and May) using a variety of strategies focused on disaster risk reduction. These preparations, especially for Beach *Fales*, involved not only APs staff but also wider members of the wider *aiga* and village (*nu'u*). At the start of the cyclone season, accommodation providers ensured that they listened to the radio, consulted internet weather sites and called the Samoa Meteorology Service for regular updates (GoS 1, 2013). Once a cyclone warning was in effect, preparations were made such as boarding up glass windows (on the deluxe, standard, and budget accommodation) and moving breakable items from exposed areas, and alerting guests (who were given the option of being evaluated or staying at the facility) (AP9, 2013). Just before a cyclone hits, remaining guests were either relocated to 'safety houses' (AP2, 2013). Post-cyclone, depending on the degree of damage caused by the cyclone, guests were either taken to the airport or to alternative accommodation. Accommodation providers report that such strategies are now the norm in Samoa as a consequence of past experiences of damaging tropical cyclones (AP1, 2013; AP2, 2013; AP9, 2013).

All accommodation providers possessed high self-efficacy. Many expressed the view that they could initiate necessary actions to ensure their businesses continued to operate into the future, despite the climate extremes and the impacts of climate change, due to their past experiences. AP8 (2013) stated: 'After being here for so many years, you have been through a lot every time you learn

from it. So yeah, I feel quite comfortable being here and what to do if any of those happen again.' This quote on the one hand may be interpreted as evidence of a downplaying of potential risks, on the other hand can be interpreted through Samoan ontologies (encapsulated in *Fa'asamoa*), whereby connections to family, ancestors, and God are the key to resilience and adaptation (past, present and future). Indeed, *Fa'asamoa*, Lima (2004) notes, includes recognition of historical practices and actions of ancestors, and spiritual dimensions. Thus, Samoans' knowledge and perceptions of extreme events are a connection to not only their own past experiences, but also those of their ancestors and God (prior to colonization there were a pantheon of Samoan gods) (Lima, 2004; Va'a, 2001). The accommodation providers' individual experiences of past events, as well as their attitudes towards (anticipated) future events, are interwoven with family and village histories of disruption, change, resilient, and adaptation (AP1, 2013; AP2, 2013).

Social learning from past events and the development of strategies contributed towards feelings of confidence in their capacity to adapt. The manager of AP7 considered personal experiences, Samoan traditions, and access to new Western technologies as key:

> For us Samoans we know there are cyclone season[s] … [so] when we get close to the cyclone season we have to get all these materials [ready] so that we can prepare ourselves … we [at AP7] have a back-up generator … so it will last for a few months after the cyclone. So yeah, we top up everything until after the cyclone season, so we not going to worry about it. (AP7, 2013)

This ongoing exposure to a wide range of climate-related hazards did enhance adaptive capacity and the introduction of some adaptive actions. Experiences of Cyclones Ofa and Val, for instance, contributed to new ways of thinking to address the socio-economic problems, including the diversification of livelihood options.

Over-confident beliefs and the underestimation of risks, as other scholars (Grothmann & Patt, 2005; Kuruppu & Liverman, 2011; Lata & Nunn, 2012; Tam & McDaniels, 2013) note, could be a form of cognitive bias that impedes longer term adaptation of the accommodation providers. This could be due to their confidence in their own coping strategies, lack of perceived necessity to seek new information or overlook deficiencies in existing strategies. At the same time, our research highlights the necessity of thinking beyond Western-centred understandings of adaptive capacity and adaptation to consider the ways in which different cultures and communities interpret and respond to risks in a way that does not privilege Western values and scientific knowledge. Indeed, our results (as outlined in Section 5.5) highlight that Western models of climate change adaptation awareness-raising and adaptation planning fail to adequately inform accommodation providers of not only of the diversity of climate change impacts, but also of the different adaptation options.

5.5. *Information and awareness*

Awareness of climate change and engagement with climate change 'experts' in theory should translate into enhanced adaptive capacity. Many of the accommodation providers spoke of being interviewed previously by various organizations (government departments and NGOs) working on climate change adaptation and disaster risk reduction projects. Accordingly, accommodation providers made frequent references to climate change, and strategically employed the language of climate change (using key terms such as 'sea-level rise', 'resilience', and 'adaptation') to highlight their awareness of the issue. Yet on closer inquiry accommodation providers expressed concerns about their engagements with 'experts'. Many were still waiting to hear back from organizations that assured them of external funding to support their adaptation efforts. Others reported fatigue from ongoing workshops and visits by foreign experts who wanted to tell them about climate change, assess their vulnerability, and determine potential solutions. Indeed, there was no mention of partnerships or community-based adaptation, instead emphasis was placed on expert-led (often facilitated by government agencies) emphasized large-scale coastal infrastructure as the 'solution' to sea-level rise. Such results are not unique to Samoa, but rather a feature of the dominant adaptation paradigm that favour external (Western) or local, scientific over traditional, and short-term over long-term participatory processes and fail to give sufficient time appreciation of local knowledge and adaptation needs (Barnett, 2010; Buggy & McNamara, 2016; Parsons, 2015).

Many accommodation providers we interviewed reported a feeling of concern about local level changes in weather and other environmental conditions they observed over the last decade. The manager of AP8 reported increasingly variable and unpredictable weather patterns.

> We've definitely noticed a change in the weather patterns — it just seems everything is sort of more acute, more severe. When it rains it really really buckets down. And its sort of not as it used to be. Of course, we have always had the torrential rains but it seems a lot more concentrated. (AP8, 2013)

Such observations about environmental changes often focus on increased variability in weather conditions and the risks of coastal flooding. Three out of the 10 APs interviewed also reported that sea-level rise, worsening coastal erosion, and inundation events were affecting their properties. However, most APs did not attribute drought and fire events to climate change or make note of other impacts of climate change. Rather their focus was almost entirely on coastal hazards (AP4, 2013; AP8, 2013).

All interviewees, be it officials from government and private institutions or APs, expressed concern about other changes within their local environment, which they did not necessarily relate to climate change (AP1, 2013; AP3, 2013; GoS 4, 2013). One AP, for instance, was concerned about the impacts of untreated septic waste being discharged (by other accommodation providers) into local waterways and the potential negative impacts on the marine environment (AP3, 2013). Another accommodation provider was very worried about the spread of an invasive species of starfish called *alamea* in Samoan and 'crown of thorns' in English (*Acanthaster planci*). The starfish is spreading throughout Samoa's coral reefs and causing widespread damage (effectively it eats coral and thereby reduces marine biodiversity). The owner of AP1 said that the starfish was a more immediate and pressing concern than climate change because it was destroying the coral reef outside his property and threatening the viability of his business. The crown of thorns, he suggested, may result in him losing business as tourists choose in another location where the coral is unaffected by the outbreak (AP1, 2013). AP1 argued that changes in land and water use in the area might be the cause of the invasive starfish outbreak.

Our inquiries into the history of environmental changes in the bay of Asau in Savaii (where AP1 is located) and the spread of 'crown of thorns' throughout reefs in the Pacific region support AP1 (2013) suggestion that land use change (logging, agriculture, and now tourism) may be a contributing factor linked to terrestrial nutrient run off and warming sea temperatures (Brodie, Fabricius, De'ath, & Okaji, 2005; De'ath & Moran, 1998; Kamya, Byrne, Mos, Hall, & Dworjanyn, 2017; Moran, Bradbury, & Reichelt, 1988). The crown of thorns example highlights that while accommodation providers do not possess detailed 'scientific' knowledge, they do nonetheless hold valuable local knowledge about their local environment, which can enable adaptive capacity. Furthermore, the crown of thorns outbreak in Samoa offers the potential for community-based ecosystem-based adaptation projects to be created that address this immediate issue while simultaneously increasing the long-term resilience of the reefs.

6. Conclusion

This paper draws on the PACAF and the work of indigenous and Pacific scholars to present a Samoan-centred analysis of adaptive capacity. We suggest in this paper that while a definitive framework such as that provided by the PACAF is important and vital for climate adaptation planning, it is nevertheless critical that further attention be devoted by both scholars and practitioners the deeper and less tangible elements of adaptive capacity as well as the practical measures. In particular, the ways in which worldviews underpin adaptive capacity and the importance of social networks (and by extension socio-cultural governance structures) remain underexplored. Our examination of the adaptive capacities of Samoan accommodation providers working within the nation's tourism industry highlights a diversity of capacities. Adaptive capacity was for our research participants based primarily on: their information and awareness of environmental issues and appropriate responses; their past experiences of extreme weather events; and their social cohesion and connection (between family, village, and church).

The conceptualization of climate change as being almost entirely related to sea-level rise (McLean & Kench, 2015), rainfall, and coastal conditions, rather than other climatic conditions and biodiversity is particularly pertinent to climate change adaptation planning and ecosystem-based adaptation in particular. However, as with other studies (Kuruppu, 2009; Leonard et al., 2013), our research reveals that other environmental changes (linked to but not necessarily driven by anthropogenic climate change) are of equal or more pressing concerns to Samoan accommodation providers.

These providers employ adaptive measures as part of an overall strategy to protect their business interests, and report a greater sense of agency than is often assumed. For example, the decision to rebuild in locations that have been affected by multiple flood or extreme climatic events were linked to meeting tourist expectations (proximity to beaches), balancing the costs of relocation against reconstruction rather than a lack of awareness of risk, and the *aiga*-centred decision-making process. In our study, we note the importance of remittances to tourism operators' responses to extreme weather events, a form of informal insurance that is inextricably connected to Samoan worldviews and socio-cultural governance structures.

The importance of reciprocity and social relationships extending beyond Samoa were found to be crucial in supporting accommodation providers to recover from extreme events, and potentially support adaptive measures as well. This has a clear link to high self-efficacy in adaptation and offers a potential further research area, which could investigate how remittances in non-disaster times are being used to support the increase in adaptive capacity. We also suggest that future research needs to examine the complex institutional arrangements for decision-making on land use and environmental management through the *matai* system in Samoa.

We suggest that worldviews underpin all aspects of Samoan life and decision-making designed to understand the existing and potential capacities within Samoan individuals, businesses, and communities to adapt to climate change (alongside other socio-ecological changes). This perspective emphasizing Pacific capacity rather than latent vulnerability, and furthermore recognizes that adaptation is underpinned by social, political, economic, and cultural structures and processes, and thus individual

actions should not be viewed as separate from wider responses to climate change (Eriksen, Nightingale, & Eakin, 2015). Hence, by situating climate change in a multi-stressor context, this research provides an opportunity to consider how knowledge, social processes, and structures shape vulnerability/adaptive capacity.

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