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CLIMATE CHANGE ADAPTATION IN FIJI

Local adaptation strategies to enhance national policy

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Introduction

Human activity has already warmed the planet by 1.0°C above pre-industrial levels, with severe consequences for climate-vulnerable communities around the world (IPCC, 2018). Among climate-vulnerable communities, those living in Pacific Island countries face large-scale climate change risks ranging from sea level rise to extreme weather events, warming temperatures, and changing rainfall patterns (Oppenheimer et al., 2019). These persistent and worsening risks present a need for climate change adaptation planning, finance, and implementation across all levels of government and society.

Following the Intergovernmental Panel on Climate Change (IPCC), in this study adaptation is understood as "the process of adjustment to actual or expected climate change and its effects" (IPCC, 2014). To reduce risks from any specific environmental changes, individuals and communities often adapt by implementing reactive actions that are mostly driven by local experience and not guided by governmental or other institutional programs or planning (Adger et al., 2003; Mersha and Van Laerhoven, 2018). This is referred to as 'autonomous adaptation', implying that local communities undertake actions to adapt to climate-related risks based on local resources and traditional knowledge (Bawakyillenuo et al. 2016; Eakin et al., 2014; Fenton et al., 2017). The local perception of actual or potential climate change impacts is essential in the undertaking of autonomous adaptation measures. In contrast, 'planned adaptation' refers to strategic actions taken by government, development agencies, or other actors to reduce the vulnerability of a target population (IPCC, 2014). Whether planned or autonomous, adaptive actions and strategies may range from short-term coping mechanisms to long-term incremental adaptation and even transformation (Fedele et al., 2019; Marijn et al., 2023; Pelling et al., 2015; Termeer et al., 2017), and may be effective and successful (Adger et al., 2005; Owen, 2020; Singh et al., 2021) or maladaptive (Juhola et al., 2016; Maruna & Bajec, 2015; Schipper, 2020; Webber & O'Neill, 2010).

The United Nations Environment Programme (UNEP) Adaptation Gap Report (AGR) states that it is relatively easy to track large-scale adaptation projects implemented by international

DOI: 10.4324/9781003356837-29

donors and development partners (UNEP Adaptation Gap Report, 2021). Although sub-national and local projects play a significant role in mitigating local climate risks, they are often autonomous efforts that lack documentation (Kinoshita et al., 2018; Rahman et al., 2021). Indeed, the UNEP AGR (2021) highlights a gap in local data availability that hampers the development of sub-national and sectoral adaptation planning instruments. Moreover, even less is known of how adaptation at different levels can complement one another or negatively interfere (d'Armengol et al., 2018; Galappaththi, 2024; Gero et. al., 2011; Mersha & Van Laerhoven, 2018).

With the intention to enhance policy approaches that provide better responses to local needs, in this chapter, we document current autonomous adaptation measures in local villages and compare them with planned national adaptation measures, identifying tensions and synergies. Our study was conducted in Fiji, an archipelagic country in the South Pacific consisting of over 300 islands. Fiji represents an excellent case study for comparison of local and national adaptation plans for at least two reasons. First, the Fijian government has been playing an active role in the global climate change arena (Betzold & Nunn, 2019) as Fiji was the first country in the world to ratify the Paris Agreement in 2015, the first small island state to assume presidency of the United Nations Framework Convention on Climate Change (UNFCCC) in 2017, and one of the only 20 countries in the world that has submitted a National Adaptation Plan (NAP). The NAP process was established under the Cancun Adaptation Framework and allows parties to adapt it to national context as means for achieving the global adaptation goals under the Paris Agreement. The Fijian government published its first NAP in 2018, which is intended to serve as a holistic guide to comprehensively address climate change in Fiji. The NAP was formulated with the support of the NAP Global Network and resulted from national consultation workshops and key informant interviews with civil society, regional bodies, and leaders of pioneering adaptation programmes.

The NAP is aligned with pre-existing national policy plans, including the National Development Plan (NDP), the National Climate Change Policy (NCCP), the Green Growth Framework, the Disaster Risk Reduction Policy, and the Nationally Determined Contributions (NDCs) to the Paris Agreement. Moreover, the NAP was thought of as a "continuous, progressive, and iterative" approach to adaptation in government decision-making. The second reason why the island nation of Fiji is an excellent case to study interactions between local and national adaptation measures is because residents of Fiji, including the three villages selected for this study, face extreme risks from the impacts of climate change (Janif et al., 2016; Nurse et al., 2014). In view of this, Fiji's administrative structure allows for vertical integration of climate change adaptation initiatives, thus enabling practical opportunities to implement actions at various scales. Primary data collected through our study is a timely intervention to support the next phase of Fiji's adaptation plans, which focuses on data collection by any entities that have implemented NAP actions at the local level.

Study site

There are 14 provinces and 1 dependency in Fiji (Sharma et al., 2021), divided into 197 districts. Ba Province, in the northwest of Viti Levu, is the largest province in Fiji, comprising 21 districts and 107 villages (Census of Population and Housing – Fiji Bureau of Statistics, 2017). This study was conducted in three *iTaukei* villages in the district of Ba, in the Province of Ba. The Indigenous villages selected for the study site are Votua, Nawaqarua, and Natutu (Figure 24.1), which have a combined population of approximately 1,000 individuals. These villages are positioned on the

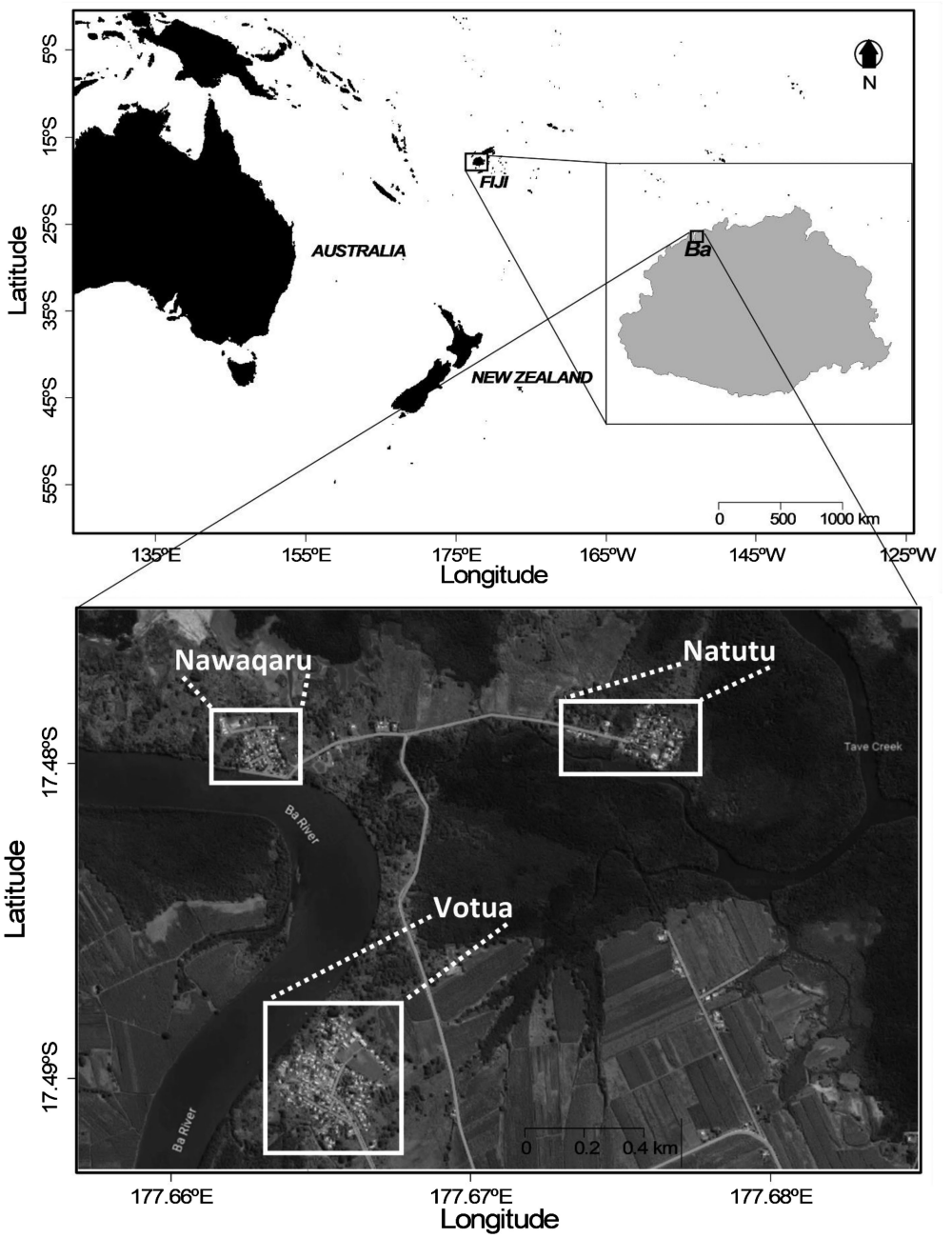

Figure 24.1 Location of Votua, Nawaqarua, and Natutu village in the Ba Province on the main island of Viti Levu, Fiji.

banks of the Ba River that connects to the seas of the Yasawa Islands, an archipelago of about 20 volcanic islands off the coast of Western Viti Levu. The main sources of income in the studied villages are fishing and employment in the nearby towns. A few households are engaged in sugarcane farming, while others practice small-scale subsistence farming of yam, *dalo* (taro), and cassava. Some villagers also engage in pig and cattle farming. Votua is the largest village in size and has an extensive *qoliqoli* (traditional fishing ground) boundary, which is shared amongst those in the Ba Delta villages, including Nawaqarua and Natutu. *Qoliqoli* in Fiji presents a remarkably well-established system of traditional fishing grounds, officially referred to as customary fishing rights area, which extend to the outer reef slope. These areas benefit from some legal recognition and community custodianship, enabling local villagers to oversee fisheries management policy implementation and monitoring.

Aquatic ecosystems such as the Ba River and the coastal and marine areas provide a great diversity of resources that sustain local livelihoods. These resources provide more than just food supply. They are integral parts of the *iTaukei* culture, particularly related to recreation and unique traditions valuable to the *iTaukei* way of life. Today, the rich cultural and environmental diversity in Fijian coastal villages is at risk of succumbing to changing climate and an increasing number of natural hazards. According to a survey report by Brown et al. (2017), flooding is the greatest local threat in the Ba River catchment and the most common natural disaster after tropical cyclones. The Ba River basin is located on the leeward side of Viti Levu, which also makes it vulnerable to prolonged periods of drought. Climate change-induced temperature rise and ocean acidification further harm marine ecosystems already suffering from varied sources of local pollution and overharvesting (Baxter et al., 2016; Oppenheimer et al., 2019). The villages have a low average income, which, when coupled with property damages, decline of agricultural crops, and loss of fishing days due to natural disasters, affect the capacity of community members to adapt to the changing climatic conditions (Singh et al., 2022).

Methods

We used an ethnographic research approach to better understand the natural setting of the *iTaukei* coastal fishing community. Culture shapes the way people experience and respond to the world around them. Thus, it is important to understand the impacts of global and climate change through cultural lenses (Kaijser and Kronsell, 2014; Marks et al., 2022). Prior to the commencement of field activity, a research permit was acquired from the Ministry of *iTaukei* Affairs, the government department responsible for overseeing development activities related to the welfare of the *iTaukei* people. In addition, the authors followed the ethical guidelines of the LICCI protocol as outlined in Reyes-García et al. (2023), including free, prior, and informed consent with village leaders and study participants who kept the right to withdraw their consent at any moment.

We used both primary and secondary data sources. Primary data on climate change impacts and autonomous adaptation measures were collected via in-depth semi-structured interviews and focus group discussions (FGD) following the protocol developed by Reyes-García et al. (2023). Through semi-structured interviews, we tried to understand local climate change impacts and the applied response measures. The FGD served to understand group consents on the direction and drivers of experienced impacts (beyond climate change). Semi-structured interviews and FGD were audio recorded with the permission of the interviewees. The secondary data used for this study consist of the Republic of Fiji's NAP (2018).

Semi-structured interviews

Twenty-five in-depth semi-structured interviews were carried out. Quota sampling was applied to select participants across three categories: gender, age, and livelihood. The first five participants included village leaders and chiefly family members who had good knowledge of people's livelihoods and of the recent local events. The rest of the interviewee list included ten women and ten men participants ranging from 25 to 75 years of age. Some selected women were engaged in subsistence farming and fishing, while some sold handicrafts and food products in the local market. The selected men were involved in offshore fisheries, subsistence farming, and paid employment. Most of the participants had attended secondary school, whereas very few young women and men had a trade or tertiary qualification. Elderly participants from age 55 to 75 had completed primary education.

In semi-structured interviews, we asked informants to report changes and impacts observed in their local environment (hereafter environmental changes and impacts). The participants were encouraged to think of atmospheric, physical, and biological changes they had observed since they were young and to provide examples of changes in their livelihood system, particularly with regard to fishing, livestock rearing, crops, and diseases. Each observation of change described by a participant was followed by questions on the potential drivers of the reported change. For changes and impacts that were attributed to elements of the atmospheric system, for example, temperature and precipitation (hereafter climate change impacts), the participants were then asked to describe how the community, or the affected households, were responding to the changes (hereafter local adaptation). Responses were noted verbatim.

Focus group discussion

Two FGD were conducted to validate the changes reported during semi-structured interviews. Due to the patriarchal nature of the villages within the study site, there was a strong preference for gender-based group discussions. One group consisted of nine women and the second group consisted of ten men. All participants ranged from 25 to 75 years of age. We used convenience sampling to recruit participants for FGD. The participants were selected from all three villages where we had conducted semi-structured interviews. The groups included participants engaged in fishing, farming, paid employment, and other professional activities, such as church or women's groups.

We used a guide to keep the discussion focused. The focus group discussion turned into a *talanoa*, an informal open conversation that shares stories, thoughts, and feelings. This seemed effective for the *iTaukei* because of the group dynamics that exist within the closely knitted communities. The participants felt at ease and shared comprehensive answers in a storytelling mode. The environmental changes extracted from the interviews were validated through the group discussion. We also asked the participants to explain how they respond to those changes. For instance, we wanted to know if people have changed or are in the process of changing any activities and what they are doing in response to the changes reported. This helped us to better clarify interlink between adaptation measures and local observations of climate change impacts.

National Adaptation Plan

The Republic of Fiji's NAP is a high-level action plan for climate change adaptation. This document is to be reinforced in three additional stages to ensure effectiveness: development of a monitoring and evaluation system, formation of communication strategy, and development of financing plans. Based on climate change projections and impacts, as well as on resolvable adaptation barriers, NAP stakeholders (i.e., government, private sector, civil society, faith-based organizations,

professional and academic institutions, and actors representing low-income and otherwise vulnerable groups) reached consensus on around 160 priority adaptation action points (thereafter NAP planned adaptation). These adaptation action points are sorted into ten categories throughout the NAP, called "systems and sectoral components" (Table 24.1). Systems component actions are designed to enable and increase investment flows for adaptation as well as climate-resilient development. Sectoral component actions are relevant to vulnerable components of society and the economy. Detailed definitions of each component are provided in the NAP, which is available on a public government website (https://bit.ly/3m2wGXN).

Data analysis

Information on environmental changes reported during semi-structured interviews and FGD were tabulated and classified according to the hierarchical classification proposed by Reyes-García et al. (2023) that distinguishes between changes observed in the atmospheric, the physical, and the life systems. Each coping or adaptation action described by the villagers was grouped into Local Adaptation to Climate Change Impacts (LACCI) identified using the classification proposed by Schlingmann et al. (2021) that distinguish between changes in timing, location, livelihood product, practices and techniques, capacity building, resource input, and practiced (main) livelihood system. For the categorization of the NAP, we used the existing organizational structure of the document, considering all 160 adaptation measures across all 10 systems and sectoral components.

Using a hybrid deductive and inductive technique for thematic analysis (Fereday & Muir-Cochrane, 2006), three researchers independently compared the reported local adaptations (i.e., LACCIs) with corresponding categories from the NAP. After discussion between the coders, each distinct LACCI identified in the primary data was linked in a spreadsheet to all possible relevant adaptation measures from the NAP. The results were compared to identify the linkages between LACCIs and NAP and common themes where synergies and gaps have manifested. The comparison constitutes the basis for our discussion.

Results

Local observations of environmental change

The villagers at our study site observe numerous changes in the atmospheric, physical, and life systems and attribute many of those changes to climate change. We categorized local observations in 31 indicators of environmental change: 9 referred to changes in elements of the atmospheric system, 8 to elements of the physical system, and 14 to elements of the life system (Table 24.2).

Observations of changes in elements of the atmospheric system referred to changes in temperature, precipitation, and air masses. Nearly all 25 participants reported higher temperatures in the day and at night (100%), fewer cold days (92%), higher humidity (100%), longer lasting periods of droughts (92%), irregular rainfall patterns (96%), frequent flooding (100%), and stronger cyclones (100%). Regarding the physical system, participants observed changes in marine, freshwater, and terrestrial subsystems. All of the participants described widening of the Ba River (100%) and frequent river flooding (72%). Approximately 60% of the participants reported an increase in sea water temperature and a rise in sea level. Most participants noted that the village is increasingly being inundated with saltwater, gradually contaminating the soil (92%). About 80% of the participants expressed their concern with regards to soil salinity (76%) and almost all the participants reported changes in soil fertility and productivity (92%). A few participants also stated an increase in frequency of king tides (32%) (Table 24.2).

Table 24.1 Breakdown of prioritized adaptation actions in Fiji's National Adaptation Plan (2018) – system and sectoral components (adopted from Fiji's National Adaptation Plan, 2018)

Systems component	*Definition*	*Number of adaptation actions*
 Climate information services and management	Actions for climate information services and management will improve capacity to generate, manage, disseminate, and use climate change information.	10
 Horizontal integration	Actions for horizontal integration will mainstream climate change issues into national-level development planning processes.	11
 Vertical integration	Actions for vertical integration will integrate climate change issues into subnational development planning processes.	10
 Climate change awareness and knowledge	Actions for climate change awareness and knowledge will enhance understanding of climate change by increasing the flow of relevant information to relevant adaptation stakeholders.	11
 Resource mobilization	Actions for resource mobilization will improve the amount of resources available and the way available resources are utilized.	13
Sectoral component	*Definition*	*Number of adaptation actions*
 Food and nutrition security	Actions for food and nutrition security will improve capacity to anticipate and reduce environmental and climate risks and support sustainable food production efforts.	23
 Health	Actions for health will improve systems and infrastructure to manage the negative impacts caused by future climate variability and change.	10
 Human settlements	Actions for human settlements will reduce vulnerability to major assets, infrastructure, and population centres, providing the ingredients for resilient growth.	12
 Infrastructure	Actions for infrastructure will help to ensure the full life span of investments can be reached by addressing environmental and climate risks.	44
 Biodiversity and the natural environment	Actions for biodiversity and the natural environment will support the maintenance of vital ecosystems and the services they provide.	16

Table 24.2 Local indicators of environmental change reported by iTaukei villagers (n = 25)

Observation [Nº of interviewees]	Local Indicator of Climate Change Impact [direction of change]	Impacted Element	Subsystem	System
'Higher temperatures as compared to 10 years ago' [25] 'Increase in temperature at night as compared to 10-15 years ago' [25] 'Fewer cold days as compared to 10 years ago' [23]	Changes in mean temperature (not further specified) [increase] Changes in the temperature during the night [increase] Changes in the frequency of cold days [decrease]	Mean temperature	Temperature	Atmospheric system
'Increase in humidity as compared to 10 years ago' [25]	Changes in air moisture/humidity [increase]	Moisture/humidity, dew and frost	Precipitation	
'Increase in drought events as compared to 10-15 years ago' [25] 'Increase in length of drought season' [23]	Changes in the frequency of drought events [increase] Changes in the length/duration of drought [increase]	Drought		
'Increase in the number of flash floods and higher flood water levels' [25]	Changes in the intensity of flash floods [increase]	Precipitation Extremes		
'Decrease in rainfall' [24]	Changes in mean rainfall [decrease]	Mean precipitation		
'Increase in strength of tropical cyclones' [25]	Changes in the intensity of cyclones [increase]	Cyclons	Air masses	
'Increase in temperature of sea water' [15]	Changes in the sea surface temperature [increase]	Sea temperature	Marine physical systems (ocean & sea)	Physical system
'Increase in sea level' [15] 'Increase in frequency of king tides' [8]	Changes in the sea level [increase] Changes in the level of tides [increase]	Sea-level rise		
'Widening of the river' [25] 'A lot of soil erosion along the river bank' [15]	Changes in the frequency of river or pond bank erosion [increase] Changes in the intensity of river or pond bank erosion [increase]	River bank/pond erosion and sedimentation	Freshwater physical systems (continental waters)	
'Frequent river flooding' [18]	Changes in the frequency of river/lake floods [increase]	River and lake floods		
'Soil quality is deteriorating, increase in difficulty of crop cultivation, e.g. cassava' [23]	Changes in soil fertility [decrease] Changes in soil productivity [decrease]	Soil fertility, structure and biology	Terrestrial physical systems (soil & land)	
'Increase in soil salinity' [19]	Changes leading to soil degradation [increase]	Soil degradation		

Observation [Nº of interviewees]	Local Indicator of Climate Change Impact [direction of change]	Impacted Element	Subsystem	System
'Marine fish breeding season is changing' [25]	Changes in the timing of mating or reproduction of marine animal species [more irregular]	Marine spp reproduction	Marine biological system	Biological system
"Decreasing numbers of some fish species' [16]	Changes in the abundance of marine fish [decrease]	Marine spp abundance		
'Decline in productive crop growing seasons' [25] 'Decrease in crop yield, e.g. breadfruit' [23] 'Decrease in size of food crops' [18] 'Some crops are less tasty as compared to 20 years ago' [9]	Changes in the frequency of successful cropping seasons [decrease] Changes in crop productivity / yield [decrease] Changes in cultivated species' fruit size [decrease] Changes in the taste of crop species/products [modified]	Cultivated spp productivity and quality	Cultivated plant spp (crops, orchards)	Human system
'Flowering times of important crops are changing' [18] 'Flowering time of some fruits and crops has changed, e.g. mangoes' [18]	Changes in crop flowering time [more irregular]	Cultivated spp phenology and reproduction		
'Decrease in farmland' [15]	Changes in crop suitable cultivation areas [decrease]	Cultivated spp suitable areas		
'Increase in cases of crop weeds' [14]	Changes in the frequency or occurrence of weed species states as invasive[increase]	Crop Weeds		
'Food shortages after natural disasters and flooding' [25]	Changes in the frequency of famine/food shortage episodes [increase]	Hunger	Human health	
'Increase in infectious diseases' [10]	Changes in the incidence of human vector borne and waterborne diseases [increase]	Diseases		
'Increase livestock parasites' [10]	Changes in the frequency of parasites in livestock [increase]	Livestock disease/pest/ mortality	Livestock	
'Decline in reproduction rate of livestock' [8]	Changes in the number of pups or offspring in livestock/raised animals [decrease]	Livestock/raised animals phenology, reproduction and behaviour		

Reports of changes in elements of the life system included changes observed in marine biological subsystems, as well as changes in health, agricultural, and socioeconomic systems. Thus, participants reported a decrease in the numbers of some fish species (64%) and changes in fish breeding season (100%). Informants also reported an increase in infectious disease (40%) in both humans and pests, a decline in crop productivity (100%), with a consequent loss of income. The informants also reported change in the flowering time of some fruits and crops (72%), as well as a decrease in livestock reproduction rate (32%). An increase in the frequency and severity of cyclones and flooding events reportedly led to increasing cases of infectious diseases, destruction of crops, and disruptions to fishing schedules that adversely affect livelihood security.

The synergistic effects of climate and other drivers of change were also highlighted by the participants. Most of the observations were directly linked to climate change, such as a decline in productive crop growing seasons and changes in fish breeding patterns. However, others were put in the context of multiple drivers, including climate change, socioeconomic, and technical drivers. For example, flooding was associated both to increases in heavy rainfall events and to poor drainage systems. Similarly, villagers noted a decline in freshwater and marine shellfish, which they linked to pollution from a nearby sugar mill industry, and they attributed the decline in marine fish catch to both climate change and overharvesting activities over the past four decades.

Local adaptation to climate change

The villagers anticipate, to a great extent from their own observations, that climate change will continue to cause multiple and potentially compounding changes. In response to the reported climate change impacts, *iTaukei* villagers are implementing changes in their agriculture, livestock farming, fishing, and ways of living. These changes are often based on their Indigenous knowledge as well as on their local social networks. The reported measures include efforts that range from short-term coping strategies, including sharing of products that help cover basic necessities, such as food and water, during and in the aftermath of disaster, but also incremental long-term adaptation measures, such as planting trees around riverbanks and shifting plantations away from coastal areas, and even transformative adaptations, such as livelihood diversification (Table 24.3).

Agriculture and food security appear to be key areas in which respondents have implemented most autonomous adaptation measures. Local autonomous adaptations mostly rely on local resources. For example, incremental adaptation measures to prolonged periods of dry weather include planting drought-resistant crop varieties and adopting agronomic measures such as multicropping. Villagers also reported the use of natural pesticides such as the addition of ash and worms to counter pest infestation, measures related to reciprocity and sharing and those related to livelihood diversification were implemented autonomously. In contrast, most of the local adaptation measures related to climate information and services (e.g., access to weather forecast from Fiji Meteorological Service) were planned adaptation by the government. Adaptation measures in the study site that were implemented by the government were termed as local planned adaptation.

Some of the local adaptation measures could not be purely classified as either autonomous or planned adaptation, but they resulted from a collaborative effort in which the adaptive measures initiated by the communities were, in some form, assisted by government's planned activities. So, while not a direct result of government interventions, these local adaptation measures by the communities were informed to some degree by government programmes, especially those related to prior awareness campaigns. We classified these as multiscalar adaptations. Most common forms of multiscalar adaptation measures include technological changes such as diversification of crop grown, including drought-resistant varieties, changes to the farming techniques, and

Table 24.3 Local adaptations to climate change impacts by iTaukei villagers

Sector domain type	*Adaptation measure reported*	*LACCI*
Agriculture		
Livelihood product Composition	1 Planting of drought-resistant crop varieties in consultation with Dept of Agriculture	Changes in crop variety/landrace composition
	2 Planting two or more crops at the same time within same farm area in consultation with Dept of Agriculture	Changes in multiple cropping practices, incl. Agroforestry
Resource input (pesticide) Demand (natural pesticide)	3 Addition of ashes to prevent pest infestation	Changes in the quantity of pesticide (natural pesticide)
Practices and techniques Methods & technology	4 Addition of worms to prevent pest infestation	Changes in soil (structure) conservation practices [not further specified]
Location Relocation (close-by)	5 Soil management: Use of fallowing practices	Changes in the rotation of cultivated plots (incl. fallow practices)
Livestock		
Practiced livelihood system Livelihood systems	6 Mixed farming approach – backyard gardening, livestock farming, and yaqona plantation	Changes in practicing livestock husbandry as a livelihood
Fishing		
Time management Timing	7 Change in harvesting/gleaning times to allow for mussels and prawns to rejuvenate	Changes in the timing of seasonal fishing activities Changes in the sustainable use of natural resources (e.g., access regulation) in fishing activities
Living		
Practiced livelihood system Income/financial capital	8 Income diversification – women engaged in selling of traditional handicrafts, herbal medicines, tailoring, and bakery business.	Changes in other (low) natural resource-dependent income
	9 Some households are engaged in paid employment as laborers, e.g., Carpenters/security officers to ensure consistent income	Changes in other non-natural resource-dependent income, including diversifying [not further specified]
	10 Villagers have been receiving remittances from relatives working abroad for quite some time now	Changes in the financial support, remittance, loans, credits, borrows
Practices and techniques Built construction	11 New houses are built on raised platforms	Changes in the housing/shelters
Natural ecosystems/ ecosystem-based	12 Riverbank protection – planting of woody trees and mangrove rehabilitation to fortify coastal areas	Changes in re-/afforestation/tree & grass plantings, other than Agroforestry
Location relocation (close-by)	13 Relocation of plantations to higher grounds	Changes in the relocation (close-by) of other activities, persons, or materials

(*Continued*)

Table 24.3 (Continued)

Sector domain type	*Adaptation measure reported*	*LACCI*
Resource input (water) Storage	14 Investing in tanks for storing safe drinking water	Changes in the storage of water in other activities, incl. rainwater harvesting
Resource input (food) Storage	15 Preservation of food	Changes in the storage of processed/purchased food
Practices & techniques Observation, monitoring, & planning	16 Use of traditional knowledge to forecast weather and relying on past experiences	Changes in the use of weather observation, monitoring, & forecast, incl. early warning
	17 Villagers have access to weather forecast from Fiji Meteorological via their mobile phones/TV/radio	Changes in the use of weather observation, monitoring & forecast, incl. early warning
	18 Disaster management – evacuation strategy prepared in consultation with local government	Changes in the planning & preparation of future actions/ decision
	19 Formation of community fisheries committee to monitor fisheries activities in the area led by Dept of Fisheries	Changes in other observation, monitoring & mapping
Methods & technology	20 Behavioral changes in livelihood practices – Destroying mosquito breeding sites and boiling water, especially during times of disaster in consultation with Ministry of Health	Changes in protective measures against diseases (e.g., use of mosquito nets, sun cream. filtering water)
Capacity building Human capital (Knowledge & gender role)	21 Capacity building exercises – climate change awareness workshops and conservation projects in consultation with NGOs and relevant government agencies	Changes in education, information & knowledge sharing, awareness training
Social capital (social networks & relations)	22 Sharing of items such as food during times of disaster/aftermath of disaster	Changes in social relationships & household/individual-based reciprocity

ecosystem-based adaptation. There are fewer numbers of local planned adaptation measures in these communities compared to local autonomous and multiscalar adaptation.

Linkages between local and NAP adaptation measures

The comparison of local adaptation measures by coastal *iTaukei* communities (numbered from 1 to 22 in Table 24.3) and the measures proposed in Fiji's NAP (Table 24.1) revealed key synergies, but also gaps (Table 24.4). The local adaptation measures are classified under the system and sectoral components of NAP in Table 24.4. The number of local adaptation measures under the systems component of the NAP is noticeably lower than under the sectoral component. For example, NAP sectoral component "Food and nutritional security" is well covered by local adaptations, while there is a lack of evidence of vertical or horizontal integration as well as resource mobilization in the local adaptation measures. Adaptation measures identified under the system's components are important for climate-resilient development to occur. We find that several important sectors such

Table 24.4 Comparison of synergies, discrepancies and gaps between local adaptations (i.e., autonomous, planned and multiscalar adaptation) in the study site and Fiji's NAP, structured around the different system and sectoral components of the NAP

	Local autonomous adaptation[a]	*Local planned adaptation*[b]	*Local multiscalar adaptation*[c]
National Adaptation Plan systems components			
Climate information services and management	16	17, 18, 21	
Horizontal integration			
Vertical integration			
Climate change awareness and knowledge		18	
Resource mobilization			
National Adaptation Plan: sectoral components			
Food and nutrition security	3, 4, 7, 13, 15	19	1, 2, 5, 6, 12,
Health		21	20
Human settlements	11		12
Infrastructure		14	12
Biodiversity and the natural environment		21	12
Gaps in the local and NAP planned adaptation			
Reciprocity and sharing	22		
Reducing dependency from environment	8, 9, 10		

The numbers stated here refer to numbers listed beside adaptation measures in Table 24.3.

[a] Local autonomous adaptation: adaptation measures implemented by the *iTaukei* community members uniquely.
[b] Local planned adaptation: adaptation measures implemented by the government in the study site.
[c] Multiscalar adaptation: Local adaptation measures implemented in cooperation by both actors, *iTaukei* villagers and the government.

as health, human settlements, infrastructure, biodiversity, and natural environment are also inadequately addressed by local adaptation.

The results from interviews also indicate that income diversification (LACCI 8, LACCI 9, LACCI 10) is an important strategy for some villagers to cope with climate-related shocks. In addition, *iTaukei* communities have a communal way of living, according to which resources are shared between families, which often supersede individual interests. This is reflected in the way communities are choosing to adapt to food shortages, with many communities sharing food during and in the aftermath of a disaster (LACCI 22). Sharing, reciprocity, and income diversification, especially pertaining to non-nature-based jobs were identified as important local adaptation measures but were found to be lacking in the NAP adaptation actions. Food and nutrition security appear to be a key focus of adaptive action for the local communities in this study and could easily be regarded as one of the main criteria for evaluating adaptation efficiency at local levels.

Discussion

While villages at the study site are prone to sea-level rise, coastal inundation, and riverbank erosion, these climate-induced threats have not diminished the spirit of the villagers who are making efforts to reinforce their coastal areas, protect food security, take precautionary health measures,

and safeguard their place of birth. The autonomous adaptation activities documented cover sectors that are vulnerable to the impacts of climate change in an effort to reduce risk and enable villagers to cope with the changing conditions. The autonomous adaptation strategies documented for *iTaukei* villagers largely focus on improving food and nutrition security as well as practiced livelihoods through initiatives ranging from changes in crop-livestock systems to changes in fishing behavior and storage of food. For instance, an increase in the occurrence of coastal flooding has prompted some villagers to relocate their plantations to higher farmlands. However, such autonomous adaptations are not without risks. In the case of farm relocation, for instance, if the new plantation site falls within the village's customary boundaries, then there are no complications. However, if the plantation is moved to a land that belongs to a different clan, then tensions may arise if proper negotiations and legal procedures are not followed (Gharbaoui & Blocher, 2016, 2018). This example shows that autonomous adaptations might face a myriad of challenges derived from different prioritization of place-based attachment and new livelihood opportunities, signaling the need for a robust participatory decision-making process (Singh et al., 2020).

Many autonomous adaptation measures are also oriented to income diversification, as communities move away from reliance on natural elements that are being threatened by climate change impacts and towards non-nature based jobs and remittances. The community members have diversified their income through low resource-dependent activities with women selling handicrafts and establishing small businesses such as bakeries and tailoring businesses. Some members are even increasing their household income by getting paid jobs. But there appears to be a gap in planned adaptation with regards to how community income can be diversified. For instance, Fiji's NAP livelihood diversification measures focus on enhancing communities' capacity within practiced livelihoods and through the use of local resources available. Examples of these strategies include promoting the diversification of agricultural products for subsistence consumption and market sales or encouraging aquaculture and non-extractive cultured fisheries. In this line, NAP prioritizes increasing support to enterprises, including microenterprises, to enable people to better address and manage environmental and climate risks. The climate change awareness and knowledge and resource mobilization system components of NAP include strategies that can further increase the adaptive capacity by increasing flow of climate information and resources. If implemented, these planned adaptation strategies, which include increasing access of local communities to greater levels of public consultation, improving financial literacy, and access to financial services products can greatly support locals in their attempts to diversify income.

This study also demonstrated the deep connection villagers have with their environment and the importance of this connection in dealing with climate change impacts. For instance, villagers use their local knowledge to predict weather and to plant crops or to fish. Women also use traditional food preservation skills to ensure food is available during times of disaster. Similar findings have been reported by McNamara and Prasad (2014). While the essence of this knowledge system is appreciated by all villagers, there are concerns regarding its potential loss, in particular, traditional ways of growing food, managing pests, preserving food, and conserving fish and other marine resources (Janif et al., 2016). The threat of this potential loss may be exacerbated by the location of our study sites on Viti Levu (the largest island in Fiji and economic hub of the Pacific region), where the influence of globalization may interrupt intergenerational transmission of Indigenous knowledge.

The community also displayed strong kinship relations, which became prominent during the COVID-19 crisis. One of the important frameworks of Fiji's planned adaptation strategies through NAP is the promotion of Indigenous knowledge and practices and, while this national strategy has identified several options that focus on the use of these (e.g., traditional ways of protecting freshwater aquifers from saltwater intrusion, traditional use of food preservation, traditional

seed varieties), social networks and kinship components are largely unaddressed. This neglect contrasts with autonomous adaptation measures documented, among which social networks were prominent. We have identified this as a gap in the NAP and currently implemented planned adaptation. There are opportunities for NAP to learn and incorporate the autonomous adaptation options which are being carried out by the communities to improve the likelihood of sustaining livelihoods during difficult times. Indigenous knowledge and lived experience of adaptation solutions that are, or are not, working at the community level must flow into a feedback loop that connects with and informs policy, programs, and projects at the sub-national and national levels. These feedback loops must be continuous and iterative.

While most of the autonomous adaptive measures were initiated and completed by the community members, some were also influenced to a certain extent by previous awareness and training sessions conducted by government agencies or through assistance from them, which is also reflected in the NAP's strong focus on awareness raising. For instance, the villagers have been practicing ecosystem-based adaptation approaches (also a priority in the NAP), such as mangrove rehabilitation and planting of trees around the riverbank to increase their adaptive capacity and to continue living at their village site. In this aspect, the NAP is aligned with local priorities and recognizes managed retreat as a last resort. The NAP focuses on strengthening coastal boundaries through hybrid or nature-based solutions to reduce risk and stave off the need to relocate communities and infrastructure. This observation also aligns with the timescale of the Fijian government's increased participation in national, regional, and international climate change dialogues (Government of Fiji, 2018). Ecosystem-based approaches have the potential to build resilient coastal systems, but local adaptation measures must closely align with NAP to evade maladaptation (Mfitumukiza et al., 2020). Ecosystem-based adaptation measures must fully account for social complexity, such as community leadership, kinship and hierarchy, implementation, monitoring, and/or evaluation, in their vulnerability analysis to be able to offer adequate protection.

Villagers in the study site have been planting more drought-resistant crop varieties. This measure was adopted after the Department of Agriculture created awareness and the village committee consulted the Department about potential options. The NAP promotes the integration of climate-smart agriculture practices into farming, training, and extension services. In view of this, the extension and advisory services embedded within the agriculture and even the fisheries sector can play a major role in boosting the autonomous actions to improve food security and connect the villagers with established local and export markets. The extension officers are best positioned to act as intermediaries and create connections between local communities, local markets, and various agencies, including government departments. However, to achieve this goal, the role of extension officers needs revamping to enhance monitoring and evaluation of autonomous and planned adaptation strategies and actions at different levels. This is particularly important as the Fiji government works on implementing an effective communications strategy to support the awareness, adoption and implementation of the NAP principles by all relevant stakeholders (Hidalgo et al., 2022). The communities are one of the major stakeholders of the NAP.

Recommendations and way forward

The adaptation measures considered at the national level can have their largest impact at the community level, thus making stakeholder participation and consultation in the identification and prioritization of adaptation options necessary. To be successful, planned adaptation measures must be acceptable to those who are to implement them, including local government and communities.

The exclusion of community members from the decision-making process means that community buy-in will be difficult to achieve. While engaging every individual member of an entire community is logistically complex, community consultation processes may be strategically designed to carefully take into consideration which types of interactions carry the most benefit for specific communities. For instance, traditional leaders have significant influence over community development plans and local governance policies and programmes. So, do religious leaders, such as church pastors, who bring a powerful voice to issues of importance (Singh et al., 2022). Engaging these authoritative community members in all local adaptation planning processes up to the national level could offer a strong foundation for vertical integration in the evolution of the NAP. We recommend in-depth local consultation and the preservation of Indigenous knowledge to avoid the erosion of climate resilience from cultural loss. This would also ensure that communities' voices are heard and their experiences incorporated in the way national adaptation plans are designed and implemented (Nunn et al., 2014). A participatory approach is also important for understanding the traditional and local knowledge and kinship that forms the basis of any adaptation strategy at the community level (Remling & Veitayaki, 2016).

International donors, development partners, and national governments play important roles in channelling adaptation resources and technical support from the top down, but effective adaptation will eventually take place via the dynamics of local government, non-government organizations (NGO), and communities. Apart from gathering quantitative data on climate change and its impacts, qualitative social research can play a crucial role in autonomous adaptation to understand local observations of risk, explore the adaptive capacity of individuals and groups, harness local knowledge, and enable tailored engagement. Investing in qualitative social research may enable the government to garner support for and participation in its adaptation activities. This resonates with findings from McConney et al. (2024) who emphasize the role of local knowledge in creating and operating complete, multi-level sargassum policy cycles in the affected countries. We recommend further research in important dimensions that influence adaptation in Pacific Island Countries, namely food security, income diversification, resource use (or non-use) and implementation, local knowledge, participatory policymaking, and monitoring and evaluation.

Fiji's NAP is a broad, high-level climate change adaptation policy that lays out an overarching action plan for the country. Several actions outlined in the NAP are beyond the scope of what villagers can do, for example, building climate-resilient infrastructure, establishing flood management activities, and managing waterway resources. However, such actions can be enhanced to incorporate co-management and be integrated at different levels. Successful co-managed adaptation by actors at different levels is found for example in a fishery context in the Canadian Arctic (Galappaththi, 2024). D'Armengol et al. (2018) identified a supportive legislative framework with clear operational rules and power symmetries as key conditions for successful co-management in small-scale fisheries.

For the Fijian government to mobilize resources to avoid maladaptation, it must establish mechanisms to successfully implement the actions outlined in the NAP. The revised version of the NAP should have some key performance indicators. Climate change adaptation is a complex process that requires equal effort by communities, civil society, private sector, and the government. Thus far, the lack of coordination among these different actors has resulted in an ad hoc implementation of NAP at the local level. Our findings suggest a clear delineation of roles and responsibilities for the monitoring and evaluation plan that is stipulated as the next stage in the NAP implementation. This includes responsibilities for sharing monitoring information with relevant stakeholders, such as NGOs and academic institutions that could take responsibility for conducting community-based surveys and communicating the data to sub-national authorities.

We also recommend formulation of a local or sub-national adaptation plan that may offer a pragmatic way to evaluate what people practice in response to the opportunities and constraints they face in the context of climate change, and to integrate adaptive measures into local planning. Autonomous adaptation alone might not be sufficient to address future climate change and meet sustainable development goals. Thus, a good interplay between autonomous and planned adaptation is crucial. Local or sub-national adaptation plans may bridge the gaps observed between local and national adaptation measures, affording a pathway to reconcile autonomous and planned adaptation and perhaps even to encourage communities to continue implementing multiscalar adaptation measures. Considering that many Pacific Island Countries are still developing NAPs or have only recently developed one, it may take some time before a subnational adaptation plan materializes. Nonetheless, it is a way forward and necessitates further research to establish what may work (or not) and why (not). Several coastal communities in PICs are highly vulnerable to climate risks. These communities do not have time to wait. Prioritizing the development of a local or a sub-national adaptation plan may bridge central planning and local priorities, fast-tracking implementation processes by channelling resources into the hands of those who need them most.

Acknowledgements

Research was funded by an ERC Consolidator Grant (FP7-771056-LICCI). We are grateful to all the participants, village leaders, and Ba Provincial Council who made important contributions to this study.

Declaration of interest None.

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