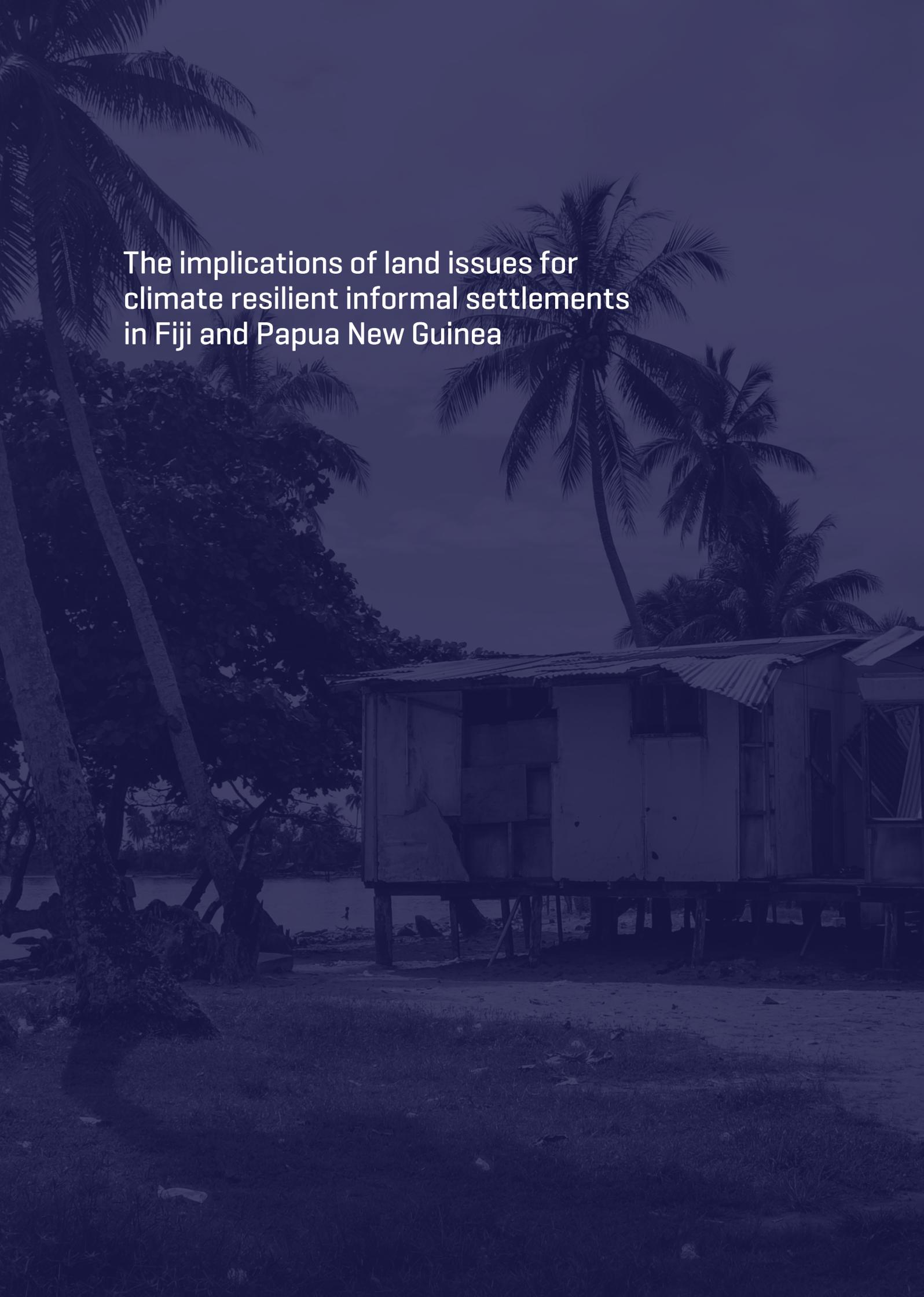




March 2016

The implications of land issues for climate resilient informal settlements in Fiji and Papua New Guinea



A photograph of a coastal settlement, likely in Fiji or Papua New Guinea, featuring several stilt houses with corrugated metal roofs. The houses are built on wooden stilts and are situated on a sandy beach. In the background, there are several tall palm trees and other tropical vegetation. The entire image is overlaid with a dark blue filter. The text is positioned in the upper left quadrant of the image.

**The implications of land issues for
climate resilient informal settlements
in Fiji and Papua New Guinea**

Report for Royal Institution of Chartered Surveyors

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Executive Summary



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Future climate change is considered to be one of the most pressing challenges for the Pacific Island Countries (PICs) given their already high levels of exposure to natural hazards, limited capacity to respond, and significant geographical challenges. PICs have a long history of experiencing earthquakes and associated tsunamis, as well as climate-related extreme events such as cyclones. Climate change will act to intensify a range of natural challenges into the future.

Sea level rise, in particular, will be critical to the future of low lying atolls in the Pacific (Tuvalu, Marshall Islands and Kiribati being most at risk due to their low elevations), however a heightened sea level will also increase other hazards for nations such as Papua New Guinea (PNG) and Fiji through coastal erosion and land degradation, increased storm surges, and salinization of valuable water supplies.

One in four Pacific Islanders is now an 'urban' resident with many of the new rural migrants locating in informal settlements in peri-urban environments. These settlements tend to develop on the least desired land such as hazard-prone areas, mud flats or poor quality land subject to drought. They often have limited infrastructure and access to services, limited security of tenure, low levels of adaptive capacity, and are vulnerable to being evicted from their dwelling or losing their access to land and livelihoods after a disaster. This combination of factors makes informal settlers particularly vulnerable to shocks and stresses.

While resettlement of hazard-prone people is a potential option, great care is needed as there is a risk of increased conflict related to migration and resettlement in the Pacific Islands. This project aimed to understand the implications of land issues for the climate resilience of informal settlements in Fiji and PNG. A related aim was to better understand the implications of decisions about resettlement of informal settlements. Findings from the research are intended to inform people in the land and property sector about existing land issues and the complexity of resettlement in the context of land tenure arrangements, and the issues that need to be addressed in the process of resettlement in order to protect the rights of people in informal settlements, and improve their abilities to adapt to current climate variability and future climate change.

Field work was undertaken in selected informal settlements in Lami in Fiji, and in Wewak in PNG. Interviews and questionnaires were carried out in both case studies and were designed to question existing approaches to climate change adaptation, the respondents' perception of climate risks, and the security of tenure of people in the informal settlements. It also sought the opinions of households on the advantages and disadvantages of resettlement. The research was supported by a review of the key literature on land tenure security and climate change adaptation in the Pacific Island Countries, with a particular focus on Fiji and PNG.

Findings: Fiji

The Fiji settlements surveyed were *Tamavua-i-wai* and *Vunimoli*, *Wailekutu* and *Kalekana*, and *Lami*. Each settlement had distinct differences in terms of population density, geographic location or distance from coastal areas; land ownership and infrastructure. The major climate-related impacts in these settlements are strong winds, flooding, storm surges and sea-level rise, and coastal erosion.

Most people in the Fiji settlements indicated that their tenure was either very secure or secure, and that they were not vulnerable to eviction and land grabbing. Informal settlers were also more inclined to consider themselves 'not vulnerable', highlighting that the term "vulnerability" is subjective and invokes multiple perspectives. The perception of vulnerability also depended on where they were located.

Recognition of land rights for informal settlements by the community and government is an important aspect of tenure security and the legitimacy of tenure rights. More than half of the settlements indicated that their property rights were recognised by others, and that they had access to land protected by government. This reinforced their perception of tenure security.

The majority of respondents in all the Fiji settlements did not consider that their household should be resettled. Most (slightly more than half) strongly agreed that any form of resettlement would affect their livelihood and land tenure relationships. Many people in the Fiji settlements considered they "felt safe", even though some settlements were at risk of the impact of disasters. Most of the Fiji respondents agreed that they would welcome a resettlement group or groups if they were given the choice or opportunity. Given the general friendly and congenial nature of the Fijian culture accepting settlement groups or refugees is quite commonplace in terms of assisting, helping or building relationships. A smaller portion of the respondents disagreed that they would be happy with a welcoming resettlement group, mostly based on current tenure relationships, family ties with existing settlement groups, and fear or mistrust of new groups. A still smaller proportion strongly disagreed, based primarily on their current tenure relationship and their reluctance to accept "unknown" settlement groups from outside.

Findings: PNG

The PNG settlements surveyed in Wewak District were *Basis Mengar Settlement*, *Nuigo Settlement*, and *Saksak Compound*. The three communities selected in the case study area all have different land tenure arrangements.

Climate-related risks vary across these three PNG settlements. The respondents of Basis Mengar settlement were most concerned about the impacts of coastal erosion, storm surge and sea level rise. Basis Mengar settlement is the most exposed of the three settlements to sea level rise and flooding. In Nuigo settlement over half were most concerned about drought.

Despite the majority of respondents in each of the settlements having lived there for more than 20 years, a key factor in their perception of tenure security is whether the community perceive the government will protect their rights to land. However, only respondents in Nuigo (formerly Mission land, now State land) considered that they had secure tenure and were not vulnerable to eviction. The majority of people in Basis Mengar settlement and Saksak compound did not consider their tenure to be secure, and felt that they were vulnerable to eviction and land grabbing. Most respondents in Basis Mengar Settlement considered that their property rights are recognised by the community, but that the government would not protect their land rights. The local perception in Wewak is that informal settlers are temporary residents who are given limited rights as to the activities they undertake on the land. They are restricted to conducting business activities and to accessing resources from the nearby bushes and mangroves.

Most respondents in the PNG settlements have land in other areas to which they could be resettled; however this was not seen as something that would improve their tenure security or vulnerability to climate related risks. Of all the settlements studied, only respondents from Saksak thought that they should be resettled. Respondents in all three PNG settlements considered that resettlement would affect their tenure and access to livelihoods.

Discussion and conclusions

Any decisions about potential resettlement, therefore, would need to take great care in ensuring that existing livelihood options were maintained and accessible, or suitable alternative livelihood options developed close to the resettlement site. Resettlement must also provide for tenure security so that legitimate rights to land are protected. Another factor that further complicates the concept of resettlement in PNG is that most respondents did not consider that they would welcome a resettled group, indicating that great care would be required in selecting land for resettling communities.

Resettlement involves many complex cultural, economic and social aspects that must be addressed for the resettlement to be sustainable e.g. protecting livelihood options and tenure security, ensuring the resettled land is safe, and the provision of adequate infrastructure and services. The conclusions of this research include:

- The results broadly confirm the dialogue in international literature that tenure security is closely linked to resilience.
- The perception of each of the Fiji communities was that tenure was generally secure apart from some people at Tamavua-i-wai, and they were generally less vulnerable to the threat of eviction.
- In PNG, however, only two of the settlements considered their tenure to be secure, with no-one in Saksak considering their tenure was secure. Households in two of the settlements considered they were very vulnerable to eviction or land grabbing.
- The results broadly were consistent with international literature in that:
 - **(i)** providing tenure security is considered a necessary element of the resettlement process by landholders.
 - **(ii)** resettlement is a complex process and is best undertaken on a voluntary basis as a partnership between government and the resettled and host communities.

The protection of tenure security requires that the government records, recognises and respects the tenure rights of all people affected – at both the resettlement site and the new site. However, effective recording of land rights for people in informal settlements is a process that can test the capacity of land agencies in both countries. At present Fiji has a greater capacity to undertake the land administration required. However, it is argued that the approach of using ‘fit-for-purpose’ land administration offers opportunities for this to be done in both countries on all areas covered by informal settlements.



Image source: © Georgina Numbasa, RMIT University

1.0 Introduction

Future climate change is considered to be one of the most pressing challenges for the Pacific Island Countries (PIC) given their already high levels of exposure to natural hazards, limited capacity to respond, and significant geographical challenges. Situated in the 'Ring of Fire', PICs have a long history of experiencing earthquakes and associated tsunamis, as well as climate-related extreme events such as cyclones. Climate change will act to intensify a range of natural challenges into the future.

The projected impacts of climate change vary from country to country but sea level rise will be one of the most critical threats to development in all nations, either through inundation of low lying areas, increased coastal erosion or intrusion into sources of drinking water. In the most serious cases, the impacts may lead to the need for forced migration between countries (for instance, Kiribati has purchased land in Fiji). Heat and drought are also areas of concern for many PICs, particularly when amplified by the El Niño phase of the ENSO climate cycle which brings warmer and drier conditions as part of a natural cycle. The interaction of climate change and human influences arising from increased urbanization will also result in increased incidences of extreme events such as flooding.

However, it is not just the hazard that is changing; local exposure and sensitivity to these hazards are also dynamic. The Pacific Island Countries are increasingly becoming urbanised, with one in four Pacific Islanders an urban resident (Jones 2012a), and many of these living in informal settlements. Many informal settlements or communities in coastal Fiji and Papua New Guinea (PNG) are in the front-line of coping with climate-related impacts; today considered as one of the most pressing challenges of these vulnerable Pacific island countries. It poses considerable challenges to sustainable development and puts many vulnerable communities at risk; with potential displacement of people, loss of land and livelihoods.

In this report we argue that the impacts of natural and climate-related hazards are particularly acute for people in informal settlements with limited land tenure security. Informal settlements tend to develop on the least desired land such as hazard-prone land, mud flats or land subject to drought (high levels of exposure). They often have poor security of tenure and low levels of adaptive capacity and are therefore more vulnerable to being evicted from their dwelling, or losing their access to land and livelihoods after a disaster (highly sensitive).

A complicating factor is that land disputes are frequent in the Pacific Islands. Factors such as the complexity of tenure relationships, overlapping land rights, migration due to economic and environmental factors, and cultural differences can often lead to land disputes and violence if care is not taken. According to AusAID (2008) much of the Pacific Islands is covered by customary land, especially Fiji (88 per cent) and PNG (97 per cent), and the constitution in both countries provides significant protection for the owners of customary land. Customary groups therefore need to be key stakeholders in disaster risk reduction and climate change adaptation decision-making.

People in informal settlements are among the poorest members of PICs and generally settle on state land or customary land (leading to the potential for conflict). In some cases they settle on freehold land (such as church owned land). This means they don't have secure tenure and are vulnerable to forced relocation either by the state or by customary groups. In many cases, informal settlements also tend to be located in hazard-prone areas with housing materials and construction that are not suited to the natural hazards they face. There is the issue of internal resettlement and relocation being discussed as an adaptation response and in some cases high risk communities have been relocated. However, it is also important to recognise that these processes are not without challenges - there is a long history of resettlement that has led to serious land disputes and isolation for the resettled communities.

This project aimed to understand the implications of land issues for climate resilience of informal settlements in Lami (Fiji) and Wewak (PNG), as well as decisions about resettlement of people in hazard-prone informal settlements. The findings from the research are intended to inform people in the land and property sector about the complexity of resettlement in the Pacific context, and the issues that need to be addressed, in order to protect the rights of people in informal settlements and improve their abilities to adapt to current climate variability and future climate change.

The research was undertaken in three phases. The first phase involved a review of the literature that focussed on climate vulnerability, land tenure and implications for climate resilience of informal settlements in both Fiji and Papua New Guinea (PNG).

The second phase involved field work in Fiji and PNG, and a case study approach focused on selected informal settlements in Lami Town (Fiji), and Wewak Town (PNG). The methods included semi-structured interviews with land and climate change institutions and experts, and questionnaires with the communities in informal settlements Lami and Wewak.

The interviews and questionnaires were designed to ask questions about existing approaches to climate change adaptation, local perception of climate risks, and the security of tenure of people in the informal settlements. It also sought the opinions of households on the advantages and disadvantages of resettlement. This addresses the issue of the vulnerability of people living in informal settlements by providing knowledge to inform decisions

about their climate change response and their resilience to natural disasters. Improved knowledge about the suitability of resettlement and about climate change adaptation options for informal settlements will enhance future projects by government and international agencies.

The third phase involved data analysis of the interviews and questionnaires. The data analysis for the Fiji research was carried out in Fiji using SPSS software. The PNG data analysis was carried out at RMIT University in Australia using nVIVO software. While the data analysis approach was similar for both countries, the outputs vary slightly in format due to the different software used.



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2.0 Climate vulnerability

It is widely recognised that the PICs are highly vulnerable to a changing climate, a consequence of high levels of exposure and sensitivity to climate-related hazards, and low levels of adaptive capacity needed to respond. As a consequence of this vulnerability, climate change adaptation actions, as well as disaster risk reduction, have been identified as urgent priorities for governments in the region. The Pacific Islands Framework for Action on Climate Change 2006-2015 is one important initiative that was supportive of the climate change adaptation agenda, with the Secretariat of the Pacific Regional Environmental Program (SPREP) acting as the lead coordinating agency for the region's response to climate challenges (Secretariat of the Pacific Regional Environmental Program, 2011). As this is due to end in 2015, a new integrated 'Strategy for Climate and Disaster Resilient Development in the Pacific (SRDP)' is under development aimed at strengthening the resilience of Pacific Island communities to the impacts of slow and sudden onset natural hazards. This emphasizes more effective and integrated ways to address climate and disaster risks, within the context of sustainable development (Secretariat of the Pacific Community, 2015).

Another important initiative with a presence in the Pacific is UN-Habitat's 'Cities and Climate Change Initiative' (CCCI). This has an urban focus, with particular emphasis paid to informal settlements, and is similarly moving towards an integrated action plan that considers current day extremes as well as longer term stresses, at the same time as acknowledging development needs. State-of-the-art scientific climate projections for each of the PICs have also recently been developed in support of the adaptation agenda as part of the Pacific Climate Change Science Program (PCCSP). This was a collaborative research partnership between Australian Government agencies and 14 Pacific Island countries and East Timor, carried out in collaboration with regional and international organisations. Updated Pacific country reports were published in 2014 (Australian BoM and CSIRO, 2014).

At the national level, both PNG and Fiji have identified adaptation as a priority response in their National Communications to the United Nations Framework Convention on Climate Change (UNFCCC). These include the Papua New Guinea Initial National Communication under the United Nations Framework Convention on Climate Change 2000; and the Pacific Islands Climate Change Assistance Program, 2005.

Both countries also listed land tenure issues as crucial in economic development while Fiji has taken a step forward under its adaptation plans to prioritize "land-use policies encouraging settlement away from low-lying coastal areas, consistent with cultural practices and land tenure systems" (PICCA, 2005: p.10).

2.1 Climate vulnerability in Fiji and PNG

As previously noted, climate vulnerability is determined by four main influences. These include the climate hazard itself (both current and future, and involving both shocks and longer term stresses), exposure and sensitivity of different elements at risk to the hazard, counterbalanced by the adaptive capacity of local communities and individuals. Each of these variables, in the context of Fiji and PNG, will now be discussed in turn.

Current climate hazards [Australian BoM and CSIRO, 2011; 2014]:

The current climate impacts faced by both countries are reasonably similar. Tropical cyclone landfall and nearby path tracking is variable, but normally occurs between November and April. Fiji typically experiences 1-2 cyclones per year on average, whereas Port Moresby in PNG averages slightly less at 6 per decade. Seasonal variations in temperatures are weak with warming trends evident in both capital cities in recent decades (Port Moresby and Suva). Trends in annual and seasonal rainfall are inconclusive, though variability in rainfall in both countries is heavily influenced by ENSO, with floods and droughts influenced by La Niña and El Niño conditions respectively. Satellite imagery also suggests similar rates of sea level rise, with Fiji subject to 6mm per year since 1993 and PNG 7mm annually over the same time period. This is double the global average and will bring considerable challenges for these geographically constrained islands.

Future climate projections [Australian BoM and CSIRO, 2011; 2014]

The confidence on projections for changes to cyclone behaviour means that considerable uncertainty remains, though there is projected to be a decrease in cyclone frequency for both Fiji and PNG, however this may be accompanied by an increase in the maximum speed of winds. There is high confidence that temperatures will continue to increase over the coming decades, with ocean warming and acidification contributing to a breakdown in coral reefs. The rainfall signal is less clear-cut but will continue to be dominated by the high levels of seasonal (wet-dry) and inter-annual variability (ENSO cycle). Sea level rise will continue to affect both countries as a slow onset hazard over the coming decades.

More generally, the IPCC Fifth Assessment Report (2014) warns that an increase in the intensity and frequency of extreme events will increasingly test the resilience of local communities in both countries.

Exposure:

Climate impacts, and as a consequence adaptation actions, are context and geographically specific. A key component of vulnerability is being exposed to the hazard. As noted, the Pacific region is already subject to climate-related and natural hazards. Furthermore, in many instances, settlements are either located on the coast or by rivers (historically for trade purposes and access to resources such as water). Any increase in the hazard risk will therefore have serious consequences for these exposed communities in the future. This has particular implications for informal settlements which are often located in the most 'at risk' areas, e.g. alongside river banks, and are typically the worst impacted by events. Adaptation through addressing exposure will therefore require consideration of moving communities at most risk, as well as the implementation of more effective land use planning systems to restrict new development – a challenge for all PICs due to a current lack of institutional capacity.

There has been a marked increase in urban growth in the Pacific over the last few decades, where one in four people live in urban areas, and 12 out of 22 countries and territories in the region have higher urban than rural populations. PNG is the least urbanised of the PICs (approximately 12.5 percent of its population was urban in 2010) but has the largest urban populations in the Pacific

Region (ESCAP and UN-Habitat 2010, Jones 2012b). PNG has the highest estimated growth in urban population to 2020 with 331,000 people and a growth rate of 38 per cent, with strong urban growth in Fiji (an additional 58,000 people and a growth rate of 13 per cent). (ESCAP and UN-Habitat 2010, UN-Habitat and ESCAP 2015).

Throughout the Pacific, high demographic growth has led to migration from smaller outer islands to larger islands, and from rural areas to urban areas, especially national capitals (World Bank, 2000). The push-pull factors in the significant rural-urban migration include: the effects of weakening rural customary authority, increased desire for urban lifestyles, and greater access to employment and public services such as education and health care. ESCAP and UN-Habitat (2010) noted that although there had been a substantial shift to cities in Fiji since 2000 as a result of the expiry of land leases for Indo-Fijians and issues of security following the 2000 coup, resulting in a rapid growth in informal settlements, especially in Suva and Lautoka.

Pacific Island cities and towns often develop around traditional villages, and in some cases, urban expansion enveloped traditional villages, creating a mosaic of unplanned and planned urban development. Identity and association with their rural places of origin remain important in these villages (Jones, 2011).

Table 1

Urbanization in the Pacific Subregion 1990-2020

Country	Urban Population (1,000s)				Percentage Urban (%)			
	1990	2000	2010	2020*	1990	2000	2010	2020*
Asia	1,002,731	1,360,900	1,757,314	2,168,798	31.5	36.8	42.2	47.2
Pacific	19,037	21,932	25,167	28,406	70.7	70.4	70.2	70.4
Australia	14,596	16,710	19,169	21,459	85.4	87.2	89.1	90.6
New Zealand	2,869	3,314	3,710	4,058	84.7	85.7	86.8	86.9
Melanesia	1,093	1,329	1,614	2,110	19.9	19.0	18.4	19.9
Fiji	301	384	443	501	41.6	47.9	51.9	56.4
New Caledonia	102	127	146	169	59.5	59.2	57.4	58.5
Papua New Guinea	619	711	863	1,194	15.0	13.2	12.5	14.1

Source: Adapted from ESCAP and UN-Habitat, 2010

Given the rapid pace of urbanization and limited availability of State and freehold land, most people are being forced to live under informal arrangements on customary land with poor services and infrastructure, and low levels of tenure security. As demand for new urban areas increase, settlements are developing outside local government urban areas and on land that is either of poor agricultural quality (e.g. mudflats) or hazard-prone land.

Sensitivity:

A second constituent part of vulnerability is the sensitivity of communities and individuals to the impact of individual or multiple hazards. Although increased urbanisation can have benefits it also comes at a cost, particularly if urban infrastructure and services do not keep up with increased demand. Some of the problems related to Pacific urbanisation include poor housing and an increasing number of informal settlements, limited access to land, inadequate basic infrastructure, and increased hardship for vulnerable groups (e.g. youth, women and people with disabilities). Informal settlements can be considered particularly sensitive principally because of poverty. The poor typically have few assets and therefore have a limited ability to either prepare for, or recover from, the impact of extreme events (Ensor and Berger, 2009).

Urbanisation is resulting in a rapid emergence of informal settlements, where people often lack formal tenure rights to occupy the land they have settled. Pacific urbanisation, by its nature, features pronounced changes in:

- the structure and form of existing urban areas, and permanency of settlements;
- social values, norms, attitudes, and expectations;
- population and demographic patterns;
- a duality of community control systems operating alongside formal (state) rules and regulation, and
- lifestyle and family relations (Jones, 2012b).

A large percentage of land is still under customary tenure and this limits the ability of the government to intervene. Sometimes the occupancy is illegal, in some cases 'extra-legal' (not against the law, but not recognised by the law). In 2008, AusAID stated "Unfortunately, some governments in the region have been slow to acknowledge the reality of rural-urban migration and the growth of informal settlements. A common view is that informal settlements are temporary and that residents in these settlements will eventually return to their customary lands and, if not, they should be sent home" (AusAID, 2008). In recent times some PICs have taken steps to recognize informal tenure and provide improved basic infrastructure and services, where the community has existed for some time. A good example is in Fiji where the current government is supporting existing squatter settlements to establish permanently, and working with communities to improve infrastructure and services.

Adaptive capacity:

Adaptation is influenced by a 'ladder' of considerations which comprise risk awareness, individual perceptions and tolerance of risk, willingness to adapt, and finally actually having the capacity to respond. Whilst many members of communities across the Pacific rely on the land and sea for their livelihoods and are therefore aware of local environmental changes, the science of climate change is much less understood. Communication of climate risks, in formats for suitable for local audiences, is therefore an important part of the adaptation agenda. As an example, Nunn and Lata (2011) studied the densely populated Rewa River Delta in Fiji; where environmental changes resulting from shoreline retreat and floods are expected to increase over the next few decades and entail profound societal disruption. The numbers of people living in the Rewa Delta who knew of climate change and could correctly identify its contributory causes were few, although many rank its current manifestations (floods, riverbank erosion, and groundwater salinization) as among their most serious environmental challenges facing local communities. In the Pacific context, it is also important to consider other possible barriers to adaptation action including spiritual beliefs, traditional governance structures, and complex land tenure issues.

Having the capacity to respond not only relates to having the necessary resources but also having adequate knowledge to inform effective adaptation responses. Understanding adaptation as a 'process' and promoting spaces for 'learning to adapt' (including the integration of traditional and scientific knowledge) can underpin successful adaptation planning. However, it needs to be recognised that abilities to adapt to changing circumstances (and adapt to different livelihood strategies) is limited in informal settlements because they often have little access to knowledge, limited opportunities for learning new skills, no capital to cover the cost of moving, or being able to take up alternative livelihoods.

3.0 Urbanization and squatter or informal settlements in Fiji and PNG

In the last half of the twentieth Century, the pressure for urban land in Fiji has increased dramatically compared to historical levels. Between 1956 and 1986 the urban population grew from 18 per cent to 39 per cent, with much of the urban population living in Suva. Informal (squatter) settlements appeared on the fringes of Suva, and market gardens were established on hilly customary land between Suva and Nausori. Much of this land has since been covered by informal (or extra-legal) settlements (Ward, 1995). Other settlement has occurred on reserved native land such as the 'permissive occupancy' granted to members of the mataqali who leased the land to Indian residents.

Squatter settlements continue to develop around the urban centres throughout Fiji, particularly in Suva and Lautoka. Although not allowed under Department of Lands and Survey policy, vacant crown lands are occupied by squatters who have created informal settlements. These have resulted from migration to the cities from rural areas and islands.

The country had an estimated 182 squatter settlements in 2003, having risen by about 73 per cent since 1996 (a growth rate of over 10 per cent per year). It is estimated that almost 10 per cent of the national population of 850 000 residents now live in squatter settlements (Lal et al, 2009).

Internal migration from the outer islands and from rural areas to urban centers, is one of the main contributing factors (ESCAP and UN-Habitat, 2010). Push migration factors reflect the loss of opportunities in rural areas, such as the termination of land leases, lack of government and institutional support, and low rural wages.

With the expiry of leases after 1997, the majority of land leases were not renewed to sitting Indo-Fijian tenants. Looking for alternative sources of income, these Indo-Fijians migrated to urban centres, only to end up in squatter settlements. The pull factors reflect the attraction to the city of the modern sector's expanding opportunities-the so-called 'bright lights' phenomenon. Displaced farmers also migrate to urban areas and settle in informal settlements at the expiry of their farming leases.

With respect to PNG, it is estimated that by 2030 approximately 35 per cent of the population will be living in urban areas, nearly half of these living in informal settlements (Storey, 2010). As most of this land is customary land, with scattered pockets of freehold and customary land, the National Urbanisation Policy states that a principal challenge for urban planners and managers will be to facilitate access to customary land for affordable urban development. It is anticipated that the bulk of future urban growth will be on customary

land, and most migrants will live in informal peri-urban settlements on land leased or rented from customary landowners (Numbasa and Koczberski, 2012).

Numbasa and Koczberski (2012) argued that as urban problems have escalated since the 1990s, anti-urban sentiments and negative portrayals of informal settlements have intensified. They noted that over the decade since 2012, informal settlement evictions and police raids had occurred in most major towns and cities.

Under customary principles all people in Papua New Guinea are considered land owners, however the general perception is that all squatter settlers in urban areas should return to their place of origin. However, the complexities of both the pull and push factors make this impossible. Many people migrate to towns and cities because the government has failed to deliver basic services to the majority of the population in the rural areas. Much of the interior of PNG is very rugged with high mountains and is subject to high rainfall which makes it difficult to build roads. The roads built in such terrain needs constant upgrading and maintenance, and it is very costly to build roads to all the villages. More problematic is the fact that villages in the remote areas of the country are scattered in hamlets following their hunting and gardening cycles. It is not feasible to build roads that cost millions to only a few people who will not make full use of it. Similarly schools and hospitals and other services cannot reach everyone. People have to move to access these services in a more central location. On the other hand in some places people are forced to live their original home to flee from natural disasters, tribal fights and the fear of sorcery.

Much of the urban areas were formerly customary lands accessed by the colonial government and the Missions for urban development and service provision. The original customary land owners of the land still reside on portions of their land that were not alienated within the town or city. Hence, the urban areas in PNG comprise the formal settlements, the informal settlements, and the urban customary land owners (referred to as the urban villages in PNG).

The urban local government is committed to providing services to the formal settlements, but in many cases not to informal settlements and the customary urban villages. In the case of Wewak, the customary urban villages often feel they should be prioritised ahead of the informal settlements for basic environmental and social service provision. They often consider that they are the legitimate land owners of the town, while the informal settlements are temporary residents only.



Image source: © Georgina Numbasa, RMIT University

4.0 Land tenure in Fiji and PNG

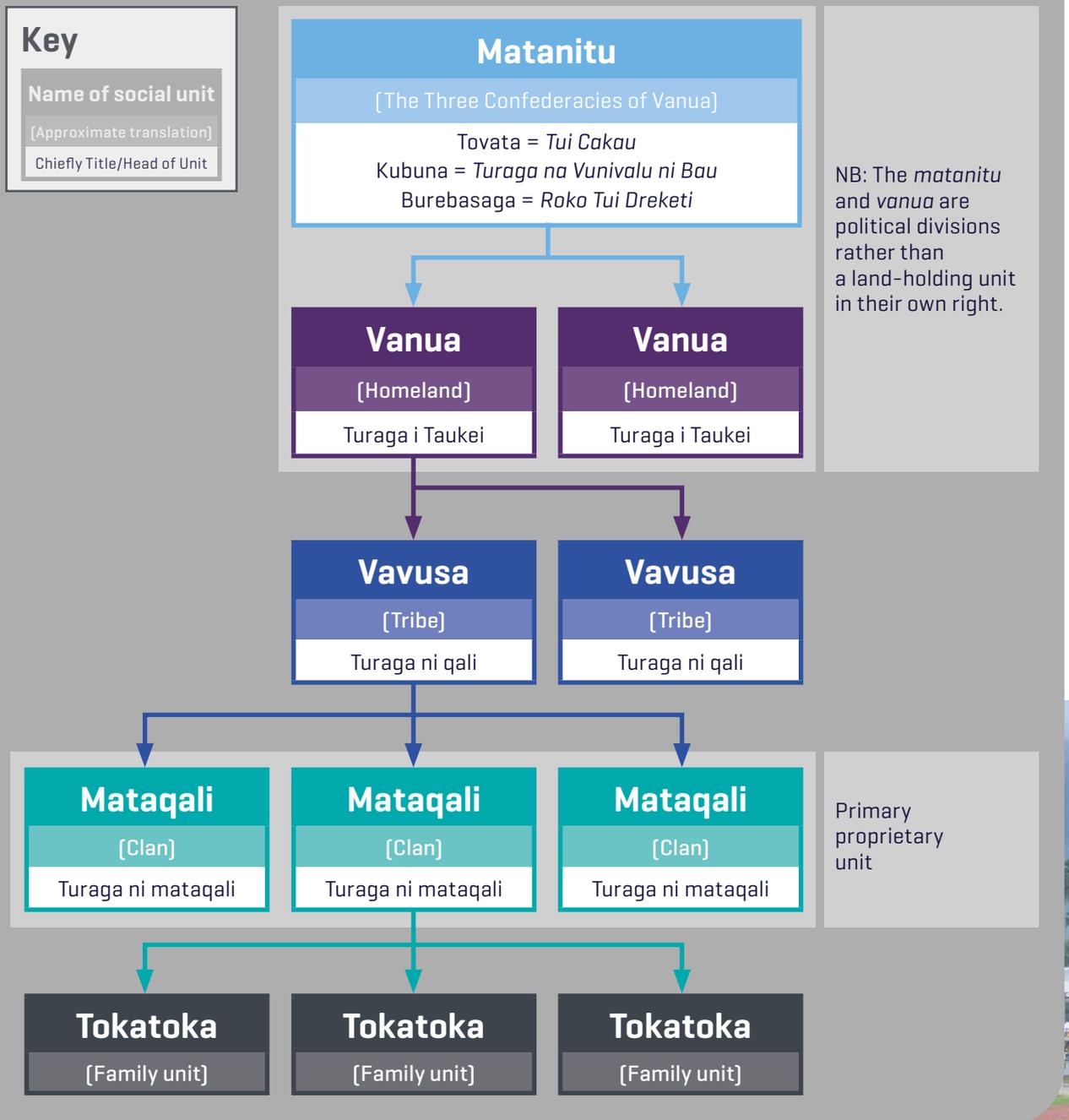
Land tenure arrangements in many Pacific Island Countries (including Fiji and PNG) are unique as customary land tenure predominates, and yet the formal legal framework, and land records are biased towards freehold and leasehold land creating a degree of duality with the informal customary system of land administration. The following section explores the way the land tenure system has developed in both countries, the impact of colonial heritage on customary tenure and the potential for conflict over land.

4.1 The land tenure system

4.1.1 Fiji

In 1874 Fiji became a Crown Colony under a Deed of Cession signed by the leading Chiefs. This Deed stated that all surplus land (i.e. not alienated as freehold or actually used as customary land) was to be Crown land. Colonization had a powerful impact on customary tenure, as diverse customs were marshalled into a rigid orthodoxy by a series of governors. Fiji Native Lands Commission was created in 1880 as an initial step, and recording of actual occupiers of native land proved to be cumbersome, so a system was devised that assigned exclusive possession of contiguous blocks of land to social groupings or land owning units (Land-owning units). The commission introduced the Vola ni Kawa Bula (VKB) to record the hierarchy of relationships and members of every social unit in Fiji. By 1915, the Fiji Native Lands Commission had produced a definitive model of Fijian social structure (Figure 1) that persists to the present.

Figure 1 Orthodox Fijian social structure post 1915



Source: Dooda, 2013, Figure 1, p.6

Image source: © Georgina Numbasa, RMIT University

In 1936, after a long debate on the issue, the Great Council of Chiefs resolved that lands not required for the maintenance of Fijian owners be made available for national development through an independent Native Land Trust Board (NLTB). However, relatively little land was not deemed to be occupied by Fijians, and now more than 80 per cent of land still remains as 'native' (customary) land. Although this can be misleading as much of the land is not suitable for intensive agriculture, settlement and development. By 1940, the modern system of iTaukei tenure emerged, and the VKB was largely completed having been filled by evidence gathered on field visits. Most all iTaukei land boundaries had been very roughly surveyed and recorded on iTaukei Land Commission

maps that covered approximately 90 per cent of the country. Mataqalii were legally entrenched as a central proprietary unit, although there were also yavusa and tokatoka that are Land-owning units' in their own right.

In 1959, as much as 35.6 per cent of prime arable land and 17.7 per cent of prime pastoral land were either freehold or leased Crown land. The bulk of arable land is covered by customary villages or on sugar cane crops under lease (Kamikamica et al 1987, Ward 1995).

As illustrated in Table 2, Fiji has four main types of land holdings: state lands, freehold lands, native leases and vakavanua native lands, with the majority as customary land (87 per cent).

Table 2 Land tenure types by percentage in Fiji in 2006

	Type of Tenure			Total
	Freehold	State Land	iTaukei Land	
Percentage	8 per cent	5 per cent	87 per cent	100 per cent



These land holdings can be further classified into two different types of land tenure systems: as ‘western’ land tenure system, and a ‘customary’ land tenure system. Freehold lands, state lands and the portion of native land that are leased out as ‘native leases’ operate under the ‘western’ land tenure system; while the communally held native lands operate under the ‘customary’ or vakavanua. The indigenous Fijians (iTaukei) comprise 56 per cent of the population, and communally own almost 89 per cent of land. The remainder of the land is owned by the state (3.9 per cent) or under freehold tenure (7.9 per cent).

Today the majority of Land-owning units are mataqalii with an average of around 60 members, although this varies greatly by province (Dodd, 2012:6). The current administration of land is based on an interpretation of the de facto hierarchy of social groups that existed before colonisation and can be described as the ‘orthodox’ model of customary land tenure. This hierarchy comprises a vanua (ancestor of ancestral god) at the top, each with one or more yavusa (who are related on the fathers side). These yavusa often have several mataqalii (who are the descendants of a son of the yavusa founder). Each mataqalii may have one or more extended families whose core members have similar links to the vanua. People without that line of descent can be accepted and included in the extended family in practice (Ward, 1995).

4.1.2 PNG

Prior to colonisation in 1883, all the land in PNG was held under customary tenure. During the colonial period the German, British and Australian colonial governments pursued policies that protected land for the indigenous people. Under these colonial regimes there was controlled alienation of land for public or private purposes, resulting in much of the early urban areas.

In the time since independence most of the land in PNG (97 per cent) has remained under customary tenure,

with 2.5 per cent owned by the State, and approximately 0.5 per cent owned by private persons as freehold (See Table 3). The remaining 2 per cent is owned by customary groups, owning social units leased to private enterprises as business and agricultural leases (National Research Institute, 2012).

Inheritance of land ownership is paternal in some areas and maternal in others. Land and property in Wewak is passed on through the patrilineal descent and is a very strong male dominated society. Even though Wewak is a paternal society; customary norms and obligations require that women receive a share of access to land. Under these customary arrangements, in principle, everyone is allocated a piece of land, and their ownership is recognised by the customary group.

In paternal societies, such as in Wewak, women are the most vulnerable in terms of land ownership. Access to land is through their husband or male relatives. However, women are now more outspoken and this can lead to conflicts when it comes to land sharing and equity. There are also land disputes in Wewak caused by disagreements amongst family where the children are taking over from their maternal uncles (this was observed from an interview with the Division of Lands Customary Section in Wewak).

People with weak tenure status are often the most vulnerable in society. Their vulnerability is reinforced by their insecure tenure and lack of access to productive resources. Women commonly faced this cycle of marginalization. The poorest cannot contribute to development or enjoy its benefits without secure and sufficient access to land and natural resources. A high level of inequity exists for those people who settle on state land in the urban centres. The Land Act of 1996 provides for vulnerable people to access land but is not practically implemented by the custodian of the Act. Many of the people who have squatted on vacant state land for more than 10-20 years are still regarded as illegal, and are therefore at risk of eviction and land grabbing.

Table 3

Tenure types in PNG by percentage

	Type of Tenure				Total
	Freehold	State Land	Customary Land	Leased customary land	
Percentage	0.5 per cent	2.5 per cent	95 per cent	2 per cent	100 per cent

Source: National Research Institute, 2012

Table 4 Fiji Population Census demographics

Population	1996	2007
<i>iTaukei</i>	393,575 [50.8 per cent]	475,739 [56.8 per cent]
Indian	338,818 [43.7 per cent]	313,798 [37.5 per cent]
Other	42,648 [5.5 per cent]	47,734 [5.7 per cent]
Total	775,077	837,271

Source: Fiji Islands Bureau of Statistics, 2007

4.2 Land disputes and dispute resolution

4.2.1 Fiji

Fijian's land is of paramount importance. It is so important in fact, that conflict over proposed land law reform has been the cause of four coup d'états in Fiji since 1970 (Dodd, 2012). First as a colony of Britain, then as a fledgling democracy, Fiji has attempted to develop a land system that can meet the conflicting needs of a population that is ethnically divided approximately evenly between *iTaukei* and Indo-Fijians or Indians. Table 4 illustrates the notable ethnic divide in Fiji and the vast extent of *iTaukei* landholding.

The rule against alienation of *iTaukei* land has had a huge impact on the political development of Fiji. The centrality of land and ethnicity in Fijian politics means land reform is fraught with difficulty and provokes bitter reactions. A quick survey of the relevant statistics reveals why: *iTaukei* land makes up 87 per cent of the area of Fiji. But 49 per cent of the population is of Indian or another non-indigenous ethnicity. Because they cannot belong to a land-owning *mataqalii* and *iTaukei* land cannot be sold, their access to land is limited. This is a fundamental source of political instability and conflict between Indians and *iTaukei*.

The three main organisations that administer customary lands are:

1. The Native Lands and Fisheries Commission (NL and FC) – commonly known as Native Lands Commission (NLC),
2. The Native Land Trust Board (NLTB) who administers indigenous land not occupied by *mataqalii* members and can lease land without consent of the clan; and
3. The Fijian Affairs Board (FAB).

However, although these statutory bodies manage customary lands, the customary landowners have significant powers over the management of their land. Their decisions regarding proposed developments on their land can be crucial to the economic development of the country (Fonmanu et al, 2003).

Native Lands can be officially leased with the consent of the *mataqalii* through the NLTB. Under the Native Land Trust Ordinance of 1940, the NLTB administers all native land, for the benefit of Fijian owners. It approves new and extended leases, collects and distributes rent, and deals with landlord-tenant relations. Leases are regulated by the Agricultural Landlord and Tenant Act of 1976 and are granted for a minimum of 30 years (May, 2007). Once leased, they come under the formal (western) land tenure system (Fonmanu et al, 2003).

There are many disputes over Customary (*vakavanua*) leases. In most cases the arrangement is made with the senior person of the land owning unit on behalf of the *mataqalii*, who accepts the traditional request for land but is not bound by statutory laws. The head of the *mataqalii* may demand money or goods from his tenants. Disputes occur when these agreements are abused (for example when the *mataqalii* head requests an exorbitant amount of money or goods for the use of land). Squatting in urban areas based on a *vakavanua* lease occurs in many forms. In rural areas informal arrangements allow for redistribution of land resource opportunities (Fonmanu et al, 2003). Another source of disputes can occur where a village exists but has not yet been reserved as a 'village reserve'. If the land is not reserved for the village, then the *mataqalii* holds the ownership powers in the village, conflicting with the social system where the head of the *yavusa* is the only recognised chief in the village. Conflicts may arise between the village site land owners, the head of the *mataqalii* and the chief of the village (Fonmanu et al, 2003).

4.2.2 PNG

Land disputes are common in all the provinces of PNG and cause significant social and economic disruption. There is increasing conflict over land between landowning groups and those who were allocated the land many years ago and have worked the land ever since. The latter group can be left landless if their uses are extinguished (UN Habitat, 2011). Disputes may go back several generations and solving them is a complex issue.

The process of urbanization also increases tensions. Actions such as mobilising land in areas of urban growth pressures and rising land values can effectively alter the land tenure systems, and trigger disputes with landowners and landowning groups (Jones, 2012b).

The agency responsible for land administration is the Department of Lands and Physical Planning (DLPP). The DLPP is responsible for land surveying, land valuation, recording and administer land titles. The DLPP is also responsible for the administration related to land development through releasing state land onto the market.

There are four different approaches of administering customary land. Compulsory Acquisition of land by the government for public purposes is a common practise related to the administration of customary land. Customary land can also be alienated by the process of Land Tenure Conversion – a process that emanated from the Land Tenure Conversion Act 1963. The Land Act 1996 also allows for rural leases for agriculture and business purposes through a Lease-Lease-Back (LLB) arrangement, administered by DLPP in collaboration with the customary land owners. A recent fourth mechanism involves the registration of Incorporated Land Groups leading to the issue of a land title.

The three-tiered dispute resolution structure involves mediation, arbitration and appeals is based on both Melanesian cultural norms and formal colonial law. However, the system is not operating effectively and there have been calls for improvements to the approaches to disputed settlement.

4.3 The challenges associated with resettlement in Pacific Island Countries

There has been considerable discussion in the literature on the history of resettlement in PICs and the problems that can occur. Resettlement is not a new phenomenon in the region. While there have been several examples of successful integration of resettled communities in the long term, many of the resettlement attempts have resulted in disputes over land.

Movement of Pacific Island communities and villages to another location is part of the history of the Islands. Many of these resettlements have proven difficult in the short-term with the more vulnerable groups facing the greatest difficulty in being accepted at the new site. AusAID (2008) argued “Migration, urbanisation, population growth and commercial developments on customary land present risks for women in customary groups”. Such developments lead to changes in land use, which can leave women with fewer rights and less access to land than they previously had. The control men have over customary land can be increased during negotiations with outsiders because of the greater role men generally have in customary decision making. These risks to women can be addressed in part by ensuring that the rights of women are formally



Image source: © Georgina Numbasa, RMIT University



Image source: © Dan Orcherteron, Fiji National University

acknowledged in any dealings involving land tenure and use. Resettlement should be considered carefully against a range of legal, environmental, cultural and social criteria before the decision is made.

In recent years there have been examples after a disaster where the national government has decided to resettle the most exposed communities. A recent example was the resettlement of people away from the coast following the 2009 earthquakes and tsunami in Samoa. Following the tsunami, decisions were made to resettle vulnerable coastal communities to higher land further from the coast. A challenge was to find suitable land that did not cause a tension with the customary owners of the land. There was also a strong pull-back to pre-disaster lands for people forced to resettle as they sought to protect their land from others and resume livelihoods. Some people spontaneously relocated inland in another land parcel owned by their community, but the relocation of some other people required pressure from the authorities, and these people returned later to their land of origin. Factors that lead people to return to their coastal land included ocean-based livelihoods, extended family ties, strong community structures, concerns over tenure security, powerful links to the village church, and emotional ties with ancestral grave sites on traditional land. All these factors complicated the resettlement decisions (Government of Samoa, 2009).

Decisions about resettlement are complex and have many implications including access to livelihoods, land availability, the provision of infrastructure, and the location of informal urban settlements in areas of hazard risk (e.g. Campbell et al 2005, Correa et al 2011, Connell 2012). It requires thorough consultation both with the affected communities and the entities responsible for the provision of services, so that integrated planning can be prepared before government commits the significant resources required to support relocation efforts. We also argue

that it requires the government to record and recognise land tenure rights of both the disaster affected land and the resettlement site, and also for a host community. Resettlement is contentious during a disaster response or recovery process as it is difficult to undertake the consultation necessary to avoid later land conflicts.

If resettlement is contemplated in Fiji or PNG long-term sustainability of the decision will require effective coordination between the government agencies and the customary groups. If a decision is made to resettle people or a community then voluntary schemes often are the most effective. The resettlement of communities must include consultation with customary groups and also look to reduce hazard risk and protect livelihoods. In the example from the Solomon Islands a challenge was to find suitable land that did not cause a tension with the customary owners of the land. For this reason many countries attempt to resettle people on public land if suitable areas are available. In some cases land acquisition may be needed but this is problematic in many Pacific Island Countries with a history of disputes over compensation. Improvement in the capacity of government to value land (especially customary land) is needed.

Whether people are resettled to public land or on customary land (or indeed freehold) some lessons from previous disasters are that government need to recognise the property rights at the new location otherwise they are at risk of land grabbing or generating conflict over land (Mitchell, 2014). This does not necessarily need to be land titles and could be in the form of land use certificates or leases. The important aspect is the government endorsement. For permanent resettlement investment in infrastructure and facilities is needed to provide adequate services at the new location. This includes roads, water, electricity, and sanitation as part of the resettlement planning process.

5.0 Fiji Case Study Analysis

The following case studies were selected to illustrate the impact of informal development on climate resilience at the village level, and the community perceptions of vulnerability and security of tenure.

5.1 Fiji Case study areas

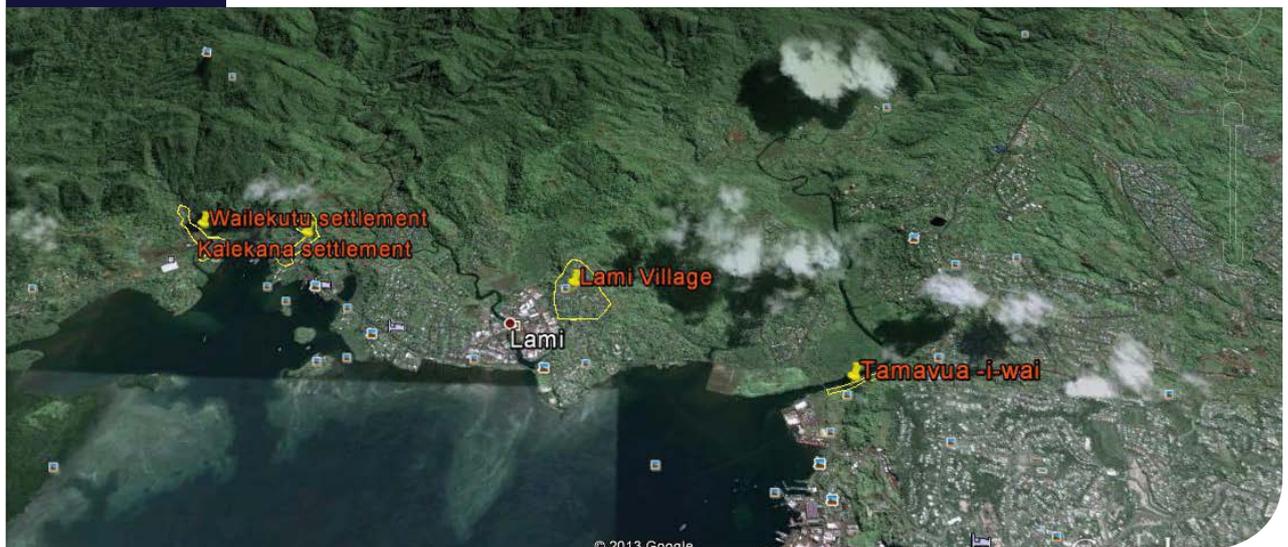
In October 2013 a preliminary reconnaissance survey was undertaken of three communities in coastal and inland areas near Lami, in the south eastern Fiji Islands. Using a series of selection criteria, the main community-sites were chosen. The selection criteria were based on previous stakeholder consultations in Lami with social – cultural leaders in the communities.

Each village visited had distinct differences in terms of population density, geographic location or distance from coastal areas; land ownership and infrastructure (roads, schools, churches, etc.) Commonalities included: poverty levels; livelihood strategies, general climate-related risks and vulnerabilities, as well as other social economic factors or considerations.

The settlements chosen were *Tamavua-i-wai* and *Vunimoli*, *Wailekutu* and *Kalekana*, and *Lami*. Across these settlements the majority of people interviewed had lived at their respective site for more than 2 decades (65 per cent) and their land was either inherited, leased or given to them through customary arrangements. Interviews were with the head of households and the majority were men (87.5 per cent), and the majority of the households comprised more than 4 occupants (71.7 per cent).

Figure 2

Location of study sites in Lami (South-eastern) Fiji islands



Source: Google Earth, Fiji Islands, 2015

Access to the land was through customary arrangements (29 per cent), by private means (22 per cent); by informal arrangements (20 per cent) and via the state or government (19 per cent). Access through customary arrangements (mataqali-lands or work/family related kinship arrangements) remains a common practice even in settlement areas outside of their ITaukei (Fijian) traditional villages. Most customary land relationships in Fiji are historically based and supported by strong kinship ties, and are strongly patrilineal.

Tamavua-i-wai village and Vunimoli settlement

Tamavua-i-wai village is a relatively isolated squatter settlement made up of approximately 40 to 50 families situated along a river (See Figure 3). The cultural groups present are mostly ITaukei, but there is also Indo-Hindi-Fijians living in relatively poor conditions in the village. There was no evidence of churches, health clinics, or schools.

Livelihood strategies include fishing, home gardening, casual employment, and mangrove harvests for fuelwood. Traditional practices that indigenous people in the area have used to forecast seasonal variability in order to increase their resilience has been documented by Nunn and Lata (2010) who indicate that local predictive systems are relevant to climate change research, and point to the salient parameters and normative frameworks of seasonal variations. In general these patterns show a general trend that strong winds, flooding, sea-level rise, and storm surges are fairly common in terms of their impact on settlements. This is consistent with our research findings that almost half of the Vunimoli settlement respondents (Fig 4) considered storm surges and sea level rise (40 per cent) as the greatest impact, whereas approximately 32 per cent indicated that strong winds were a major impact in the community. A smaller proportion approximately 15 per cent , indicated that coastal erosion was a major problem and a smaller percentage said the storm surges and sea level rise as well as coastal erosion were important impacts.

Figure 3

Tamavua-i-Wai village



Source: Google Earth, Fiji Islands, 2015

Kalekana village and Wailekutu village

The Kalekana community has a slightly larger population, with 50 to 70 families in this village situated closer to the coast (See Figure 5). The community is a mix of iTaukei and Indo-Hindu-Fijian's. There is a small elementary school reported to be functioning. However, there were no health clinics, or other services. Some water tanks were visible and health and sanitation facilities minimal or non-existent. The main livelihood strategies include fishing, mangrove harvests for firewood, crabs, crustaceans, small home garden and casual employment in local or roadside markets. However, there has been a decline in economic opportunities with many young people moving to Suva in search of employment.

There has been a decline of economic based activities in this community which has typically led to reduced employment opportunities, with more young people and young families moving to Suva in search of employment.

There has also been a decline in stores and retail services and loss of quality local healthcare. Most buildings are constructed on stilts as an adaptation response to hillside erosion, and have electricity and tap water supply.

Wailekutu village is slightly further inland than Kalekana settlement, and has approximately 70 families situated on mudflats. The main livelihood strategies include fishing, mangroves for fuelwood and crab harvests, small-scale storefront (informal) shops (sale of noodles, beer, some vegetables), casual employment, and roadside markets. There was limited or no infrastructure for health, churches, schools, water and sanitation. The informal settlement area encroaches onto a Forest Reserve, and community members are extracting some timber and non-timber forest products, impacting on the sustainable management of the reserve.

Figure 4 Wailekutu and Kalekana villages



Source: Google Earth, Fiji Islands, 2015

Figure 5 Construction materials and building designs seen at the settlement



Image source: © Dan Orcheron, Fiji National University



Image source: © Dan Orcheron, Fiji National University



Image source: © Dan Orcheron, Fiji National University

Figure 6

Shows the hilly landscape of the settlement which is prone to hillside erosion



Image source: © Dan Orcheron, Fiji National University

Figure 7

Density of development and houses situated in Wailekutu settlement on low stilts built on mudflats



Image source: © Dan Orcheron, Fiji National University

Lami Village

Lami Village is one of the larger settlement areas and is more established with respect to infrastructure and amenities, with primary schools, high schools, health clinics, churches and evidence of reasonable infrastructure, health and sanitation facilities.

Residents in Lami settlement area have been living there between 20 and 30 or more years, and higher levels of education. In general, this indicates stability which is an element of adaptive capacity and resilience.

Slightly more than half the respondents in Lami settlement indicated they accessed land through customary arrangements. The remaining means of access was evenly divided between open access, private access, and informal arrangements.

Approximately 15 per cent of households in the Lami settlement were permanent and they identified as being 'homeowners'. A minority (12 per cent) of the homeowners indicated that the materials were semi-permanent (aluminium corrugated roofing, thin wooden walls, lower-end, cheaper materials). As can be seen in the image below there are various types of materials used for construction, including corrugated iron, weather board (timber) and bricks along with a tarmac road access to the village.

Figure 9

Access to land in Lami settlement.

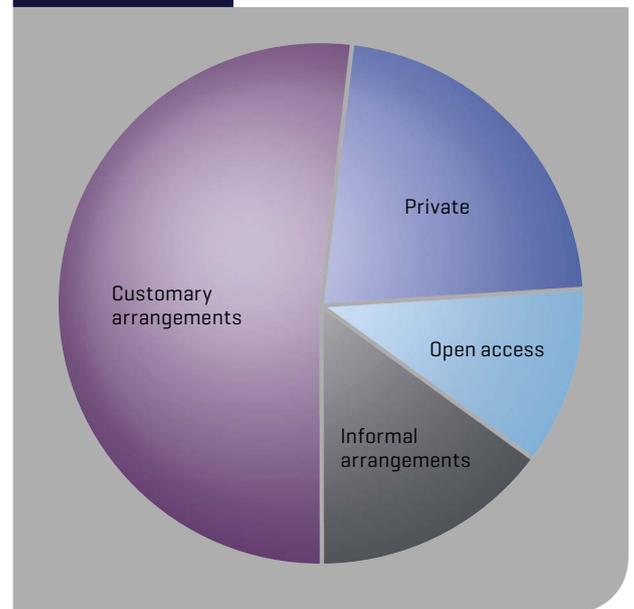
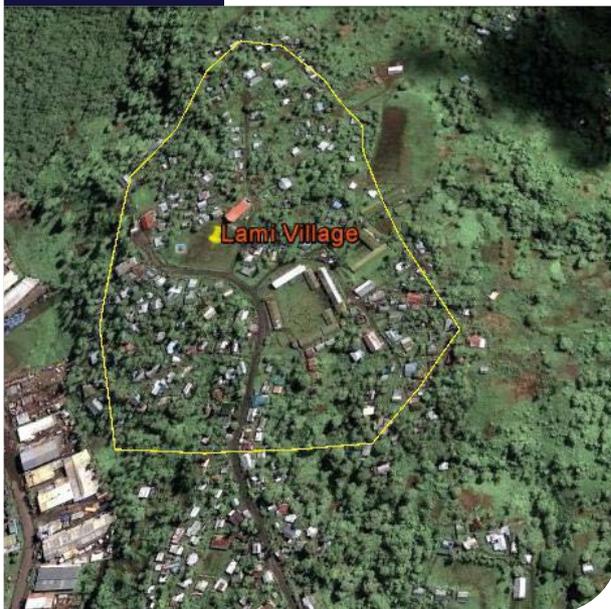


Figure 8

Lami village



Source: Google Earth, Fiji Islands, 2015

Figure 10

Typical housing construction in Lami



Note the condition and proximity of houses to the road, potential flooding and exposure to high winds

Image source: © Dan Orcheron, Fiji National University

5.2 Perceptions of climate vulnerability in Fiji settlements

Local perception of climate-related risks is strongly influenced by people’s experience of events; therefore there is a strong emphasis on whether a settlement is already exposed to different types of current day hazards (common to all case studies). Understanding current day vulnerabilities (expressed through exposure, inherent sensitivity of groups and individuals, and levels of adaptive capacity) is however a useful starting point for assessing vulnerability before introducing the implications of future climate change. Indeed, addressing current vulnerabilities is likely to resonate better with local communities, i.e. dealing with their immediate concerns, rather than considering the longer-term time frames that are more typical with adaptation planning.

More than half the respondents for all settlement communities commented that they were most affected by strong winds. Approximately 25 per cent were affected by flooding, storm surges and sea-level rise, coastal erosion, and a combination of flooding and strong winds associated with cyclones. Lesser combined percentages related to a combination of other events, depending on where the settlement was located and its exposure to climate-related hazards.

These major climatic events have devastating effects and impacts on the community and community livelihoods particularly for women (as caregivers and providers) and children. Also, while livelihoods are socially and economically impacted, there are other impacts that have a ripple effect in the community; impacting across a range of activities at the household level (schooling, care-giving, education, health, exposure to disease, availability of casual or full-time workers/labourers, income generation, accessibility by roads, etc).

Most of the respondents in Lami were most concerned about strong winds (82 per cent). Other climate impacts mentioned included drought and flooding (9 per cent), storm surges and sea level rise (9 per cent), and a smaller proportion cited coastal erosion (10 per cent), as shown in Figure 11. Although the village itself is situated higher up, in some locations they are more exposed to strong winds (as a result of cyclones etc). The small response to flooding is mainly due to the fact that Lami is located higher up and away from coastal areas. Respondents did comment that there were problems with gully erosion, landslides and surface soil slippages depending on the duration and intensity of rainfall.

Tamavua-i-wai and Vunimoli Settlements are very vulnerable to storm surges, floods and exposure to strong winds.

Figure 11 Major climate change impacts [Lami settlement]

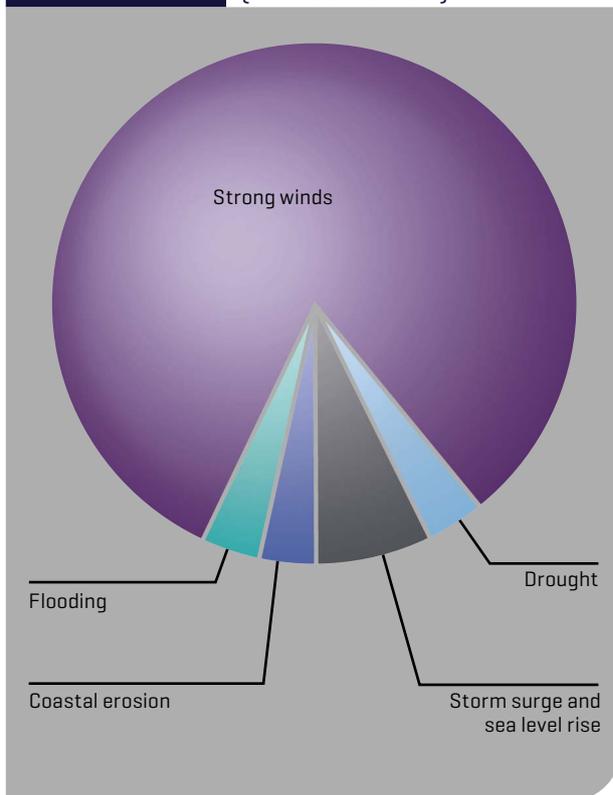
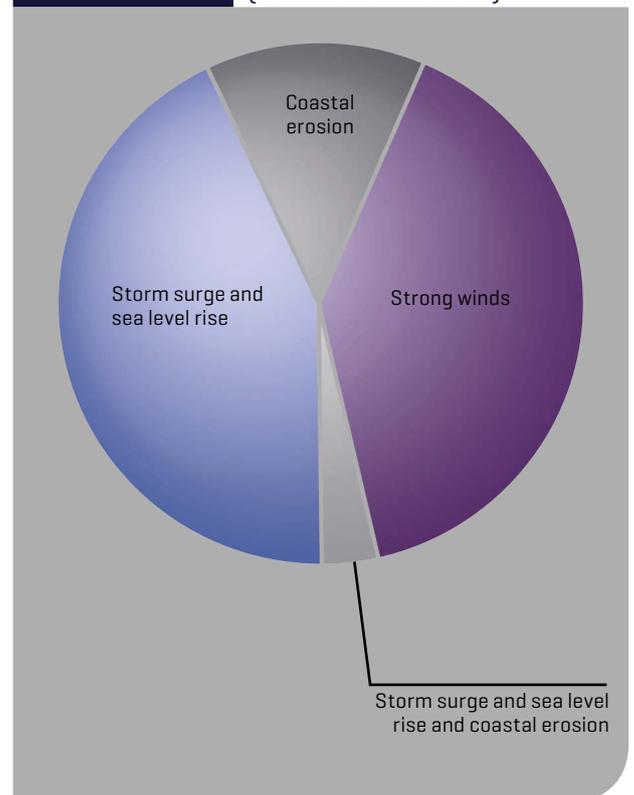


Figure 12 Major climate change impacts [Vunimoli Settlement]



Respondents in Tamavua-i-wai were mostly concerned with floods, while those in Vunimoli were more concerned with storm surges and strong winds. In the past, there has been a history of frequent flooding in the area, hampering its abilities to reduce vulnerability to climate hazards, or efforts to build adaptive capacity and actions to increase resilience.

As illustrated in Fig. 13 illustrates that strong winds were the major climatic impact (80 per cent) the Kalekana community faces followed by drought (9 per cent), and a combination of other events such as storm surges and sea level rise, coastal erosion and flooding (11 per cent). There was also evidence in the settlement to suggest that some of these areas were highly exposed to the effects of natural hazards.

The majority of the respondents considered themselves to have medium levels of adaptive capacity and that the settlement itself was deemed 'not vulnerable' to the effects of flooding. This is mainly due to its geographical location, and other exogenous factors outside the scope of this study. However, the respondents did comment that there are problems with landslides and road availability/access when rainfall duration and intensity's increase, as well as high winds during the cyclone season. Squatters were also inclined to indicate that they also were not vulnerable, perhaps reflecting their higher risk tolerance given their situation. Vulnerability was therefore a highly subjective term, with settlement participants having differing perspectives on vulnerability, depending on the context and exposure to different hazards.

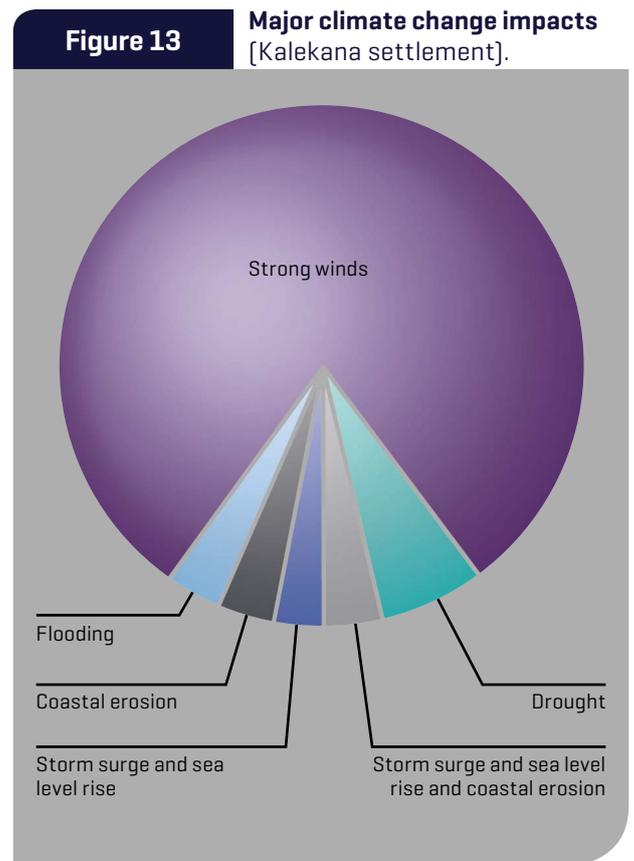


Image source: © Georgina Numbasa, RMIT University

As observed from Figure 14a and 14b, residents of the four squatter settlements have medium levels of adaptive capacity with respect to vulnerability to the effects of flooding, and that there are lower levels of adaptive capacity observed in Tamavua-i-wai. High levels of adaptive capacity in the four settlements are perhaps representative of the recognition of the need to respond to existing hazards.

Figure 14A

Vulnerability to effects of flooding and landslides and level of adaptive capacity [Tamavua-i-wai and Vunimoli Settlements]

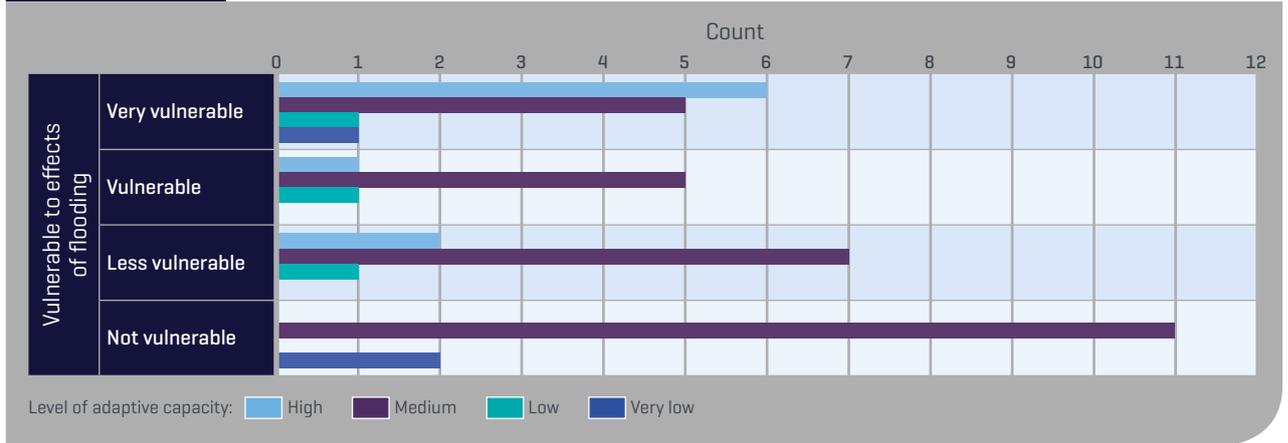
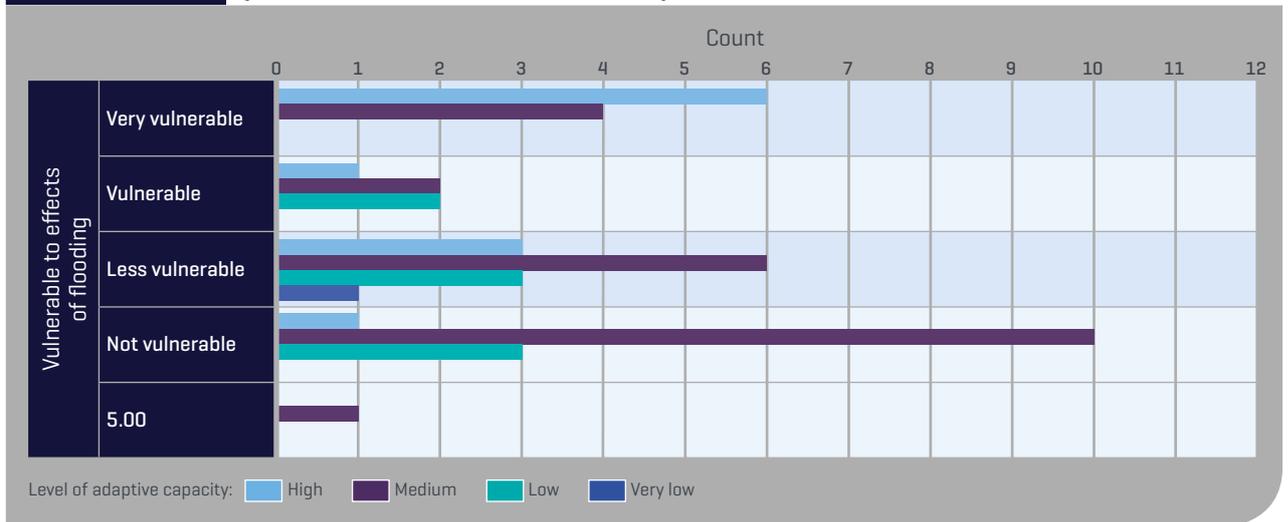


Figure 14B

Vulnerability to effects of flooding and landslides and level of adaptive capacity [Kalekana and Waieketu settlements]



Figures 15a and 15b indicate medium levels of adaptive capacity in the four squatter settlements for respondents indicating their settlements are 'less vulnerable' (Figure 15a), and 'not vulnerable' (Figure 15b). Respondents in Tamavua-i-wai had higher levels of adaptive capacity, but were less vulnerable to effects of sea level rise. Respondents in Kalekana and Waiekutu settlements however indicated they were 'less vulnerable' or 'not vulnerable' to the effects of sea level rise (medium level of adaptive capacity).

Figure 15A

Vulnerability to the effect of sea level rise and level of adaptive capacity [Tamavua-i-wai and Vunimoli Settlements]

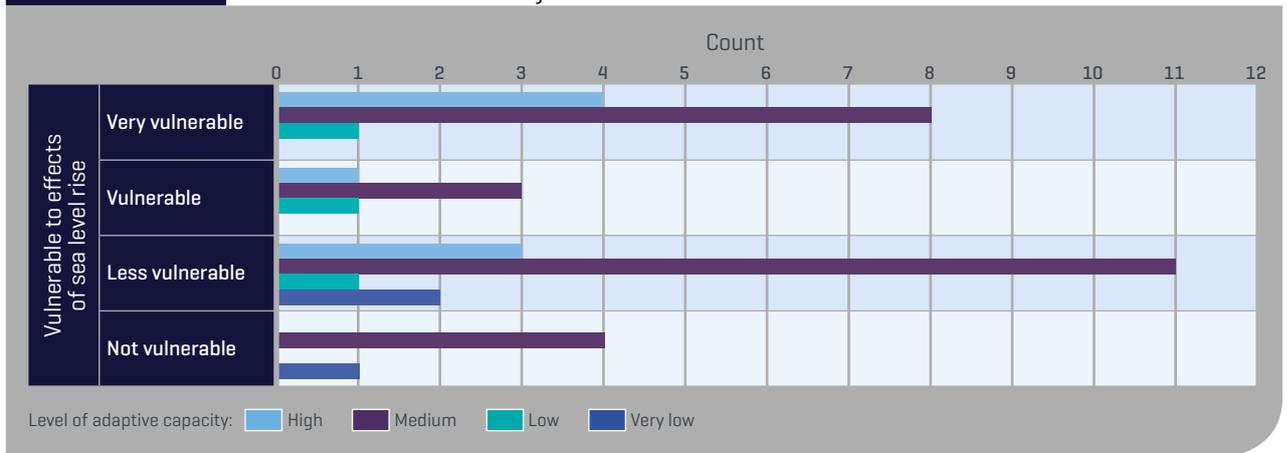
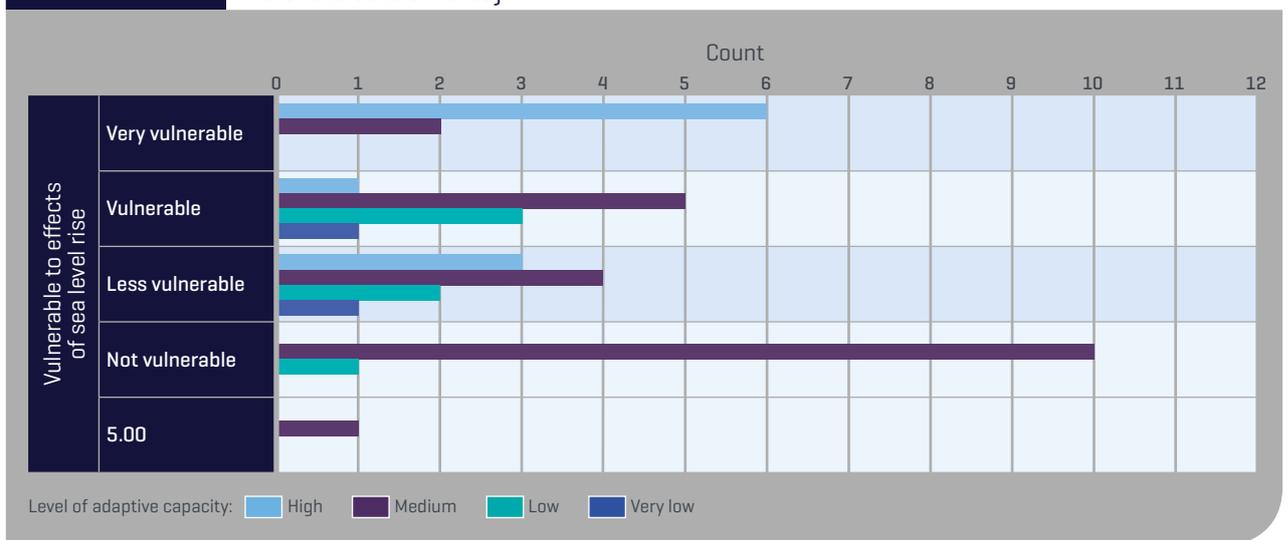


Figure 15B

Vulnerability to the effect of sea level rise and level of adaptive capacity [Kalekana and Waiekutu settlements]



5.3 Community-based adaptation in Fiji settlements

Household responses to the impacts of climate change in all settlement areas were compared to level of adaptive capacity, and results demonstrated that in the majority of cases respondents built protective barriers and sought help from relatives (medium level of adaptive capacity). Less respondents reported that they relied on seeking help from the Government, and temporary relocation (higher level of adaptive capacity). Respondents interviewed in all settlements, indicated that building protective barriers is

an important attribute in the community for climate change adaptation and some rely on seeking help from relatives and help from the government.

Perceived levels of local adaptive capacity were commonly linked to an individual's exposure to hazards and were manifested (in the majority of cases) by respondents in terms of building the necessary protective barriers (Figure 16). Other adaptation outcomes included temporary relocation and seeking help from relatives. These options, in turn, are influenced by a longer tenure, reliance on family members and family stability. Help from the Government was also listed as an adaptation response.

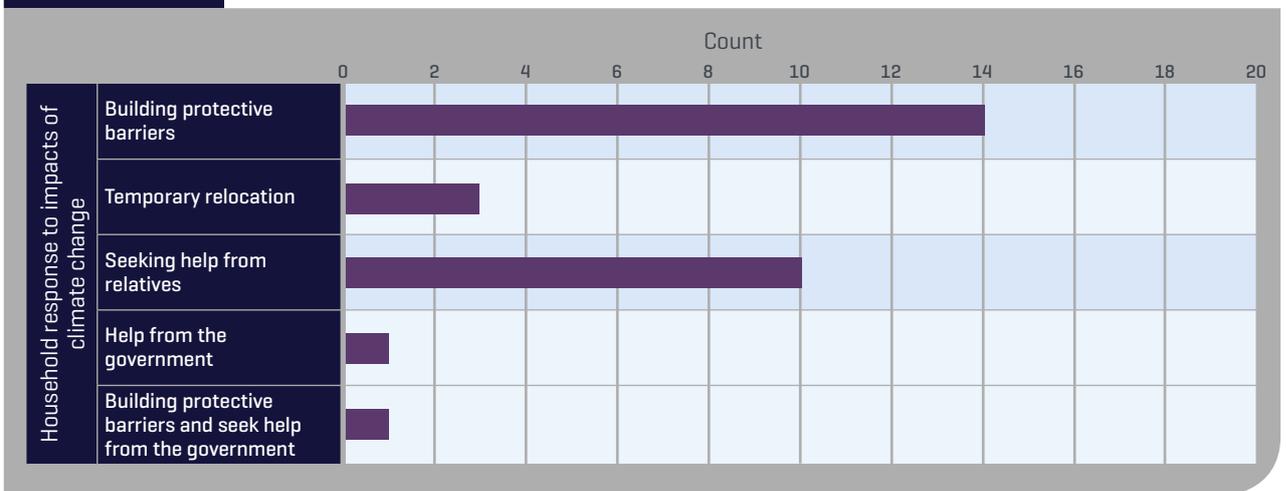
Figure 16

Household response to the impacts of climate change and level of adaptive capacity [Lami settlement]



Figure 17

Adaptation strategies adopted in the past [Lami settlement]



The majority of respondents relied on building protective barriers or structures and seeking help from relatives as their major adaptation strategies. This is in the context of long term occupation, reliance on family members and family stability. A smaller proportion relied on temporary relocation, help from the government and a combination of building protective barriers and help from the Government.

In Tamavua-i-wai and Vunimoli Settlements, building protective barriers was the most frequent adaptation strategy. In both settlements there was virtually no indication that temporary relocation was adopted as an adaptation strategy. In both settlements building protective structures and getting help from the Government were important.

In Kalekana and Waiekutu settlements, building protective barriers was the most common adaptation strategy. However, the second most frequent response in Kalekana settlement was temporary relocation as a means of an adaptation strategy to climate change. Kalekana and Waiekutu were slightly more reliant on government assistance, than Tamavua-i-wai and Vunimoli Settlements.

Figure 18 Adaptation strategies adopted in the past [Tamavua-i-wai and Vunimoli Settlements]

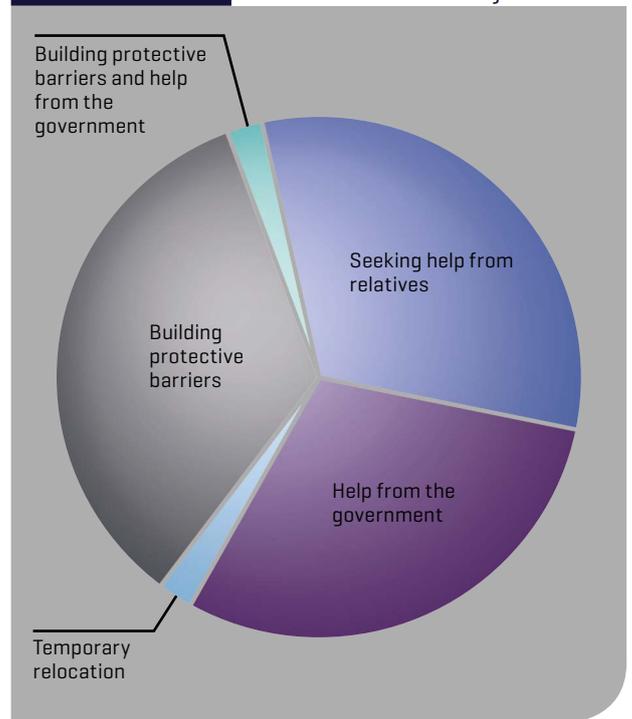


Figure 19A Adaptation strategies adopted in the past [Kalekana]

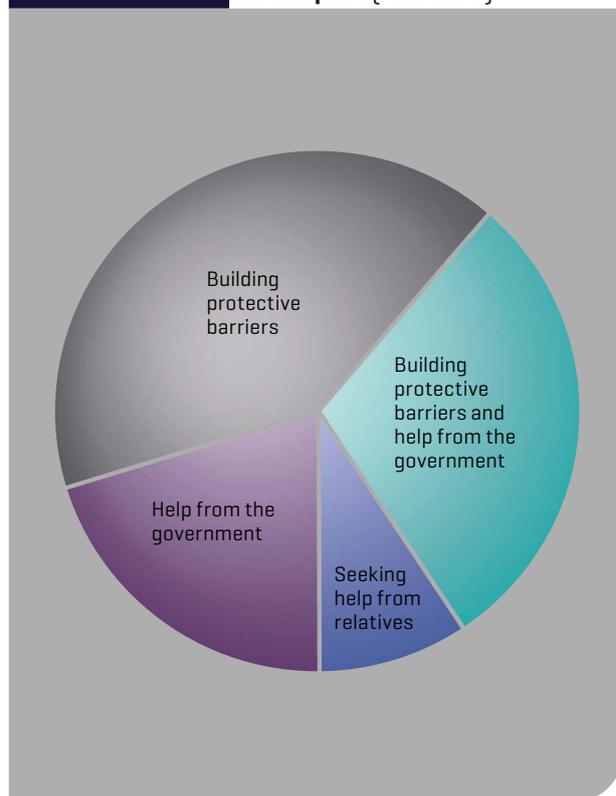
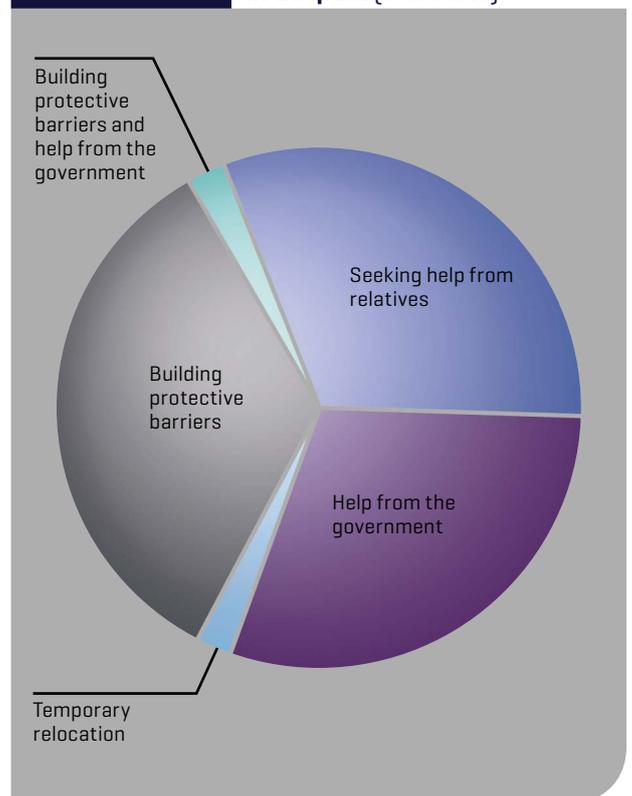


Figure 19B Adaptation strategies adopted in the past [Waiekutu]



6.0 Perceptions of Tenure Security in Fiji settlements



Image source: © Dan Orcheron, Fiji National University

The existing international literature includes a discussion on the factors that might indicate tenure security. Tenure security is generally considered to have three components – the formal ‘duration’, ‘assurance of the protection’ of property rights, and the ‘robustness’ of property rights (Bruce and Migot-Adholla 1994, UN-HABITAT (2008)):

1. Duration includes the time period the landholder has occupied the land in a manner that constitutes possession, and refers to whether the landholder has had property rights for long enough to have an incentive to invest (for example in adaptation).
2. Assurance of the protection of property rights is the degree to which the tenure is held without the rights being arbitrarily overridden by an individual or the state. It includes elements such as protection against eviction, enforcement, recognition (by the community and government), and dispute resolution.
3. Robustness of rights is the freedom of the landholder to use and dispose of their land free from interference. It includes elements such as the breadth, composition and nature of rights.

In this report we focus on the components of ‘duration’ and ‘assurance of the protection of property rights’ through indicators such as the threat of eviction, community acceptance (disputes and conflict are an element of this), legitimacy through government recognition (i.e. recording rights), and length of occupation on the site.

Roughly two thirds of households in all Fijian settlement case studies were semi-permanent and were identified as being ‘homeowners’. Decision-making with respect to land issues related to climate change adaptation is determined by ownership and related to how people actually build their houses and devote time and energy to those activities.

Table 5 Threat of eviction and perception of tenure security in Fiji settlements

	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami
Q 9 How secure is your tenure? [a] Very secure [b] Secure [c] Less secure [d] Not secure	[b] Secure [c] Less secure	[b] Secure [c] Less secure	[a] Very secure [b] Secure [c] Less secure	[a] Very secure [b] Secure [c] Less secure	[a] Very secure
Q 10 Are you vulnerable to eviction or land grabbing [a] Very vulnerable [b] Vulnerable [c] Less vulnerable [d] Not vulnerable	[c] Less vulnerable to [d] Not vulnerable	[b] Vulnerable [c] Less vulnerable to [d] Not vulnerable	[b] Vulnerable [c] Less vulnerable to [d] Not vulnerable	[b] Vulnerable [c] Less vulnerable to [d] Not vulnerable	[c] Less vulnerable to [d] Not vulnerable

Source: Fiji Islands Bureau of Statistics, 2007

6.1 Threat of eviction and perception of tenure security

Overall, the landowners in most of the settlements do not consider they are vulnerable to eviction or land grabbing. This indicates a certain level of community resilience, and that in most cases, adequate policies or mechanisms are in place to provide residents with a sense of security or reduced vulnerability (Table 5).

In all Fiji settlements 18 per cent of respondents indicated that their land was very secure. More than half of the settlers had indicated in a general sense that their land was secure, however, between 33 per cent and 47 per cent indicated that their land was less secure.

Squatters however were more inclined to indicate that they were ‘not vulnerable’, indicating that the term “vulnerability” was perceived in many perspectives. The perception of vulnerability also depended on where they were located. If the house is located on the top of the hill or higher up, they were deemed to be less vulnerable than the ones located on the lower side or near the coastal areas. Vulnerability also had a social economic and cultural component that was intertwined with their land tenure relationships. Squatters felt more vulnerable and landowners felt more secure.

Lami

The majority of respondents in Lami settlement considered their land tenure to be very secure (Figure 20a). A smaller proportion perceived tenure as less secure. In general respondents felt that this provided a certain sense of adaptive capacity and climate change resilience.

Almost 75 per cent of the respondents in Lami indicated that they were not vulnerable to eviction or land grabbing; which indicates security of tenure and long-term viability in the community (Figure 20b).

Figure 21a illustrated that although residents had lived there for more than 20 years, Tamavua-i-wai and Vunimoli settlements are in an uncertain situation with respect to their land tenure. Some of the reasons are that they are categorised as squatter settlements, and some uncertainty that their rights to land will be recognised by government and others. However, more than half the people in these settlements considered they were less vulnerable or not vulnerable to eviction or land grabbing (Figure 21b).

Figure 20A Security of tenure [Lami]

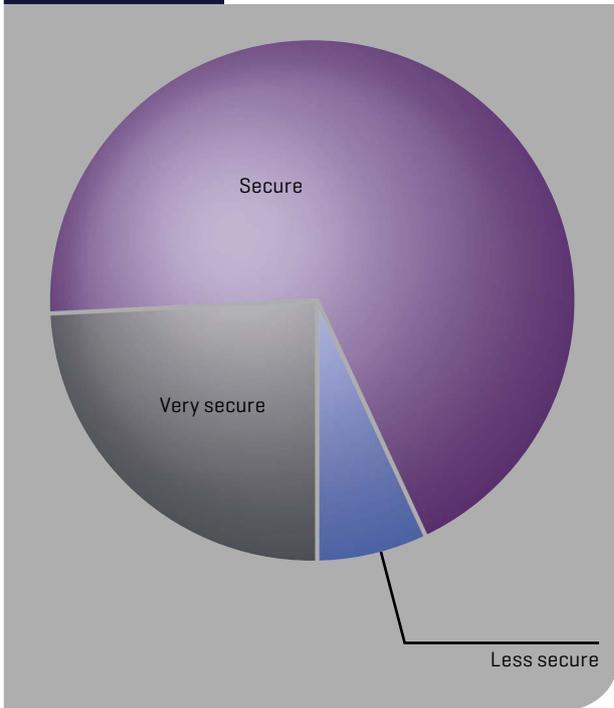


Figure 20B Vulnerability to eviction or land grabbing [Lami]

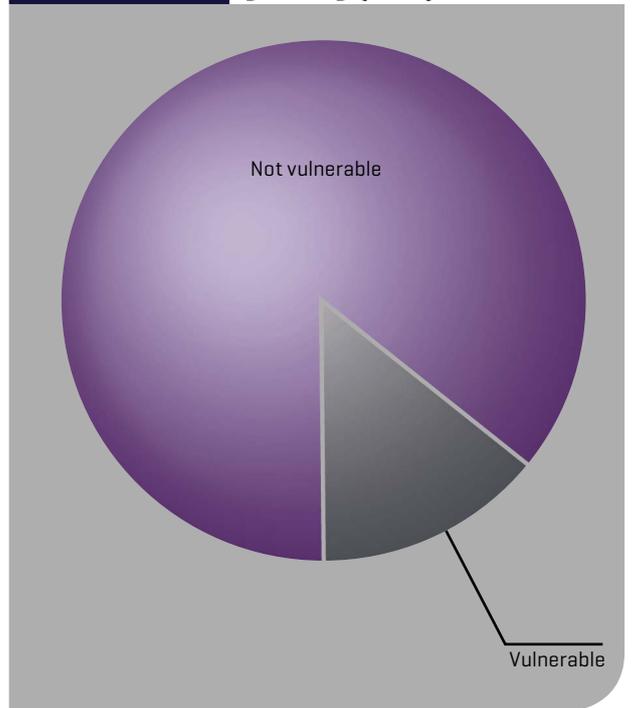
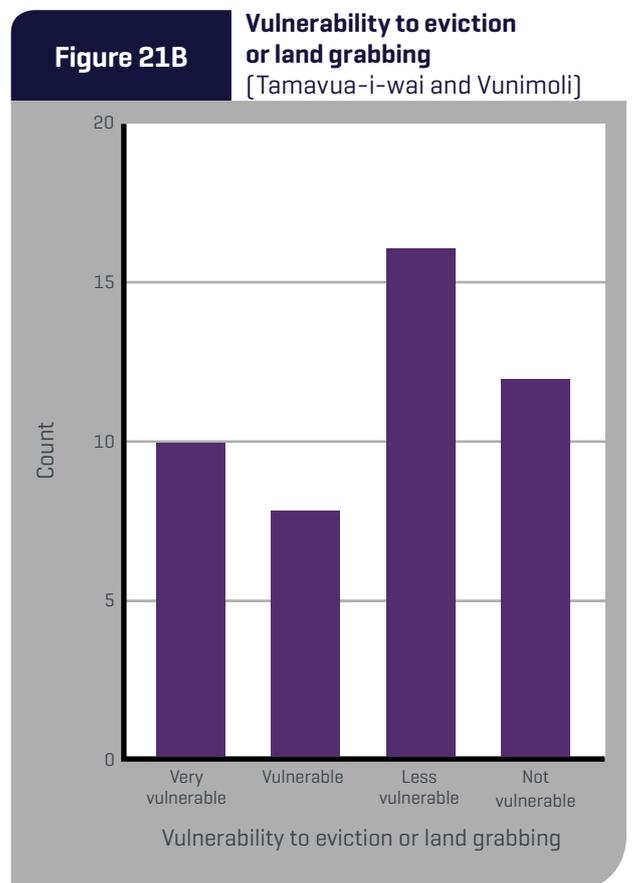
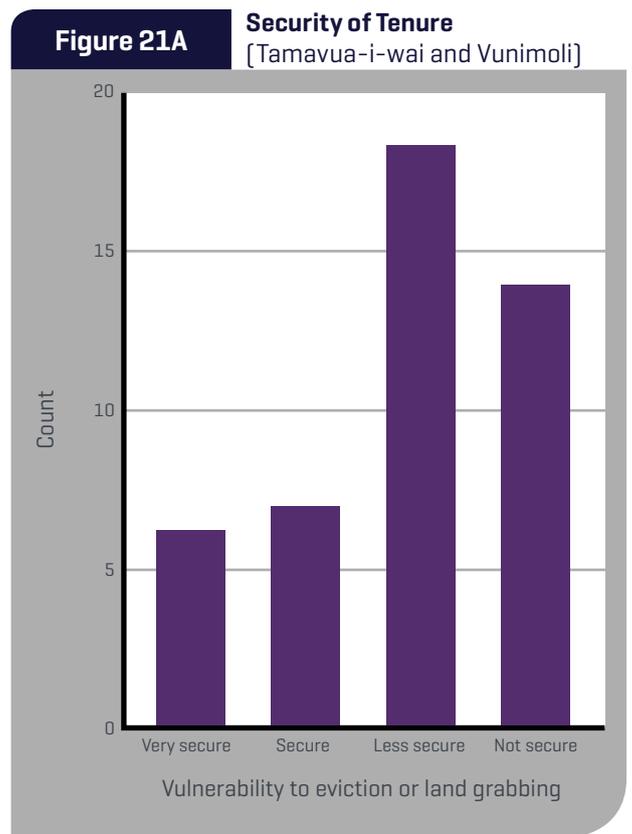


Image source: © Dan Orcheron, Fiji National University

Tamavua-i-wai and Vunimoli

Figure 21a illustrated that although residents had lived there for more than 20 years, Tamavua-i-wai and Vunimoli settlements are in an uncertain situation with respect to their land tenure. Some of the reasons are that they are categorised as squatter settlements, and some uncertainty that their rights to land will be recognised by government and others. However, more than half the people in these settlements considered they were less vulnerable or not vulnerable to eviction or land grabbing (Figure 21b).



Kalekana and Waiekutu

Approximately three-quarters of respondents in Kalekana and Waiekutu (Figure 22a) perceived themselves to have 'secure tenure'; even though the majority of residents are squatters. This is related to the amount of time they have been living on the land (more than 20 years), and a perception overall that their rights will be recognised by government and the community.

As illustrated in Figure 22b more respondents considered themselves vulnerable and very vulnerable to eviction or land grabbing. The likely reasons include political and institutional circumstances in those settlements as well as the location of part of the settlement on a nature reserve on which they gather timber and non-timber forest products.

Figure 22A

Security of Tenure
[Kalekana and Waiekutu]

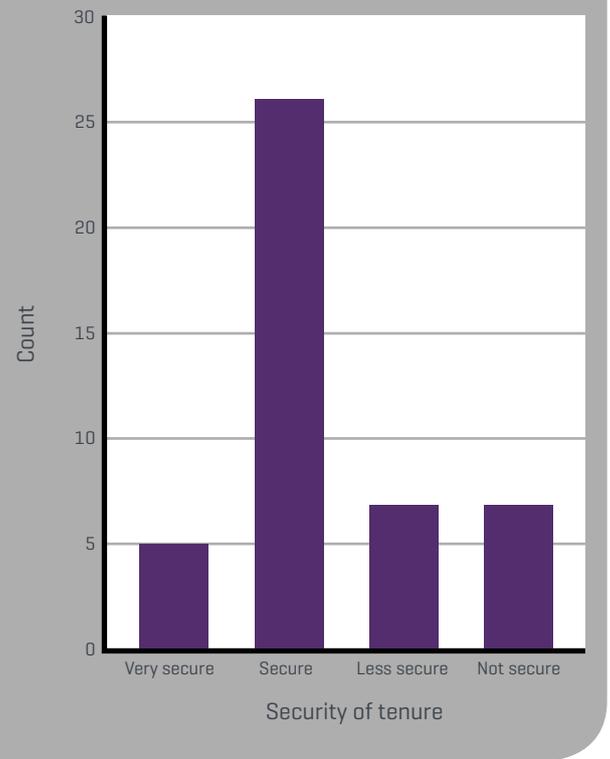


Figure 22B

Vulnerability to eviction or land grabbing
[Kalekana and Waiekutu]

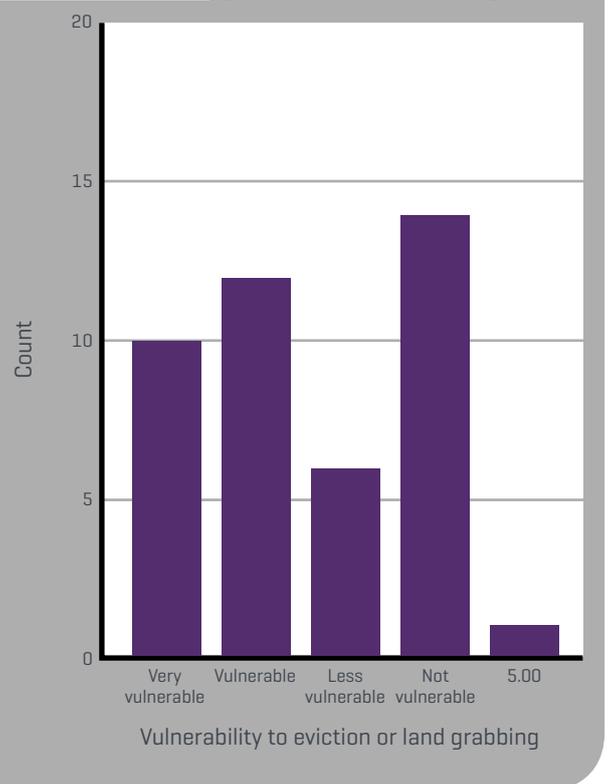


Table 6
Community recognition of tenure in Fiji settlements

	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami
Q 14 How long have you been living in this settlement/village? [a] Less than 10 year [b] 10-20 [c] 20-30 [d] More than 30 years	[c] 20-30 [d] More than 30 years	[c] 20-30	[c] 20-30	[c] 20-30 [d] More than 30 years	[d] More than 30 years
Q ? How did you gain access to this land? [a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements [e] State	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements [e] State	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements	[a] Customary arrangement [b] Private [c] Open access [e] State	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements [e] State
Q 11 Are your property rights recognised by others? [a] Yes [b] No [c] Not sure [d] To some extent	[a] Yes	[a] Yes, and some [c] not sure	[a] Yes, and some [c] not sure, and some [d] to some extent	[a] Yes, and [c] not sure	[a] Yes
Q 12 Does the government protect your access to land? [a] Yes [b] No [c] Not sure [d] To some extent	[c] Not sure [d] To some extent	[a] Yes	[a] Yes, and [d] To some extent (Forest Reserve nearby)	[a] Yes [c] Not sure [d] To some extent	[a] Yes [b] No [c] Not sure [d] To some extent

Source: Fiji Islands Bureau of Statistics, 2007

6.1.1 Community and government recognition of tenure

Many Fijian societies rely on close family ties and larger family units to “weather the storms”.

As discussed earlier, household occupancy and length of time in settlements, is one indicator of tenure security and resilience. The more family members that have been living for longer periods of time in the community the greater their perceived resilience.

The Fiji case-study research demonstrated that the majority of the people had been staying at their respective settlements for more than 2 decades (65 per cent), with their land have either been inherited, leased or given to them through customary arrangements. The majority of heads of the households were men, demonstrating the hierarchical patrilineal structure of the societies in each of these settlement areas.

The length of time living in the settlement is related to broad tenure relationships for each site (whether communities are on predominantly customary land or state land). Generally, broad tenure relationships were examined in the study and respondents had indicated that approximately 18 per cent of their land was very secure.

More than half of the settlements indicated that they have property rights that were recognised by others, with about 33 per cent not sure, and the remaining 20 per cent indicated that they did not have any property rights recognised. More than half of all settlements participants indicated that their access to land is protected by the government. About 25 per cent indicated that their access to land was protected by the government and a similar number of respondents indicated that they were not sure. Also, in Wailekutu settlement, there was a Forest Reserve, and most people in the settlement commented that the government own land they had no access to (reserve), to extract non-timber forest products, timber or other forms of utilization of this land area (Table 5).

The majority of respondents in Tamavua-i-wai and Vunimoli and Kalekana and Waiekutu settlements have been on their land for more than 30 years; which constitutes a sense of security of tenure, even though they are categorized as squatters or live in a squatter settlements (Figure 23).

In Tamavua-i-wai and Vunimoli Settlements, and Kalekana and Waiekutu settlements, residents indicated in the majority of cases that squatters have open access to land, and some customary arrangements are made for them to be deemed home owners. Also, the construction materials that the majority of homes are built on are semi-permanent, indicating that the families have had to invest some resources in making their homes liveable and on a semi-permanent basis, despite their squatter situation.

Residents in Lami-town/settlement area have been living there between 20 and 30 or more years. Slightly more than half the respondents indicated that they have customary arrangements regarding access to land and approximately 30 per cent in private ownership. The remaining approximately 25 per cent, is divided between open access and informal arrangements (Figure 24). It is likely that residents have customary ownership because of historical, inheritance or related reasons.

Participants commented on the fact that the government elected in the Fiji Democratic election in 2014 are supporting the squatter settlements to establish permanently, so they consider themselves 'less or not' vulnerable. Overall this is a significant factor in the perception of tenure security for each of the settlements.

Figure 23 Length of time in settlements [Tamavua-i-wai and Vunimoli and Kalekana and Waiekutu settlements]

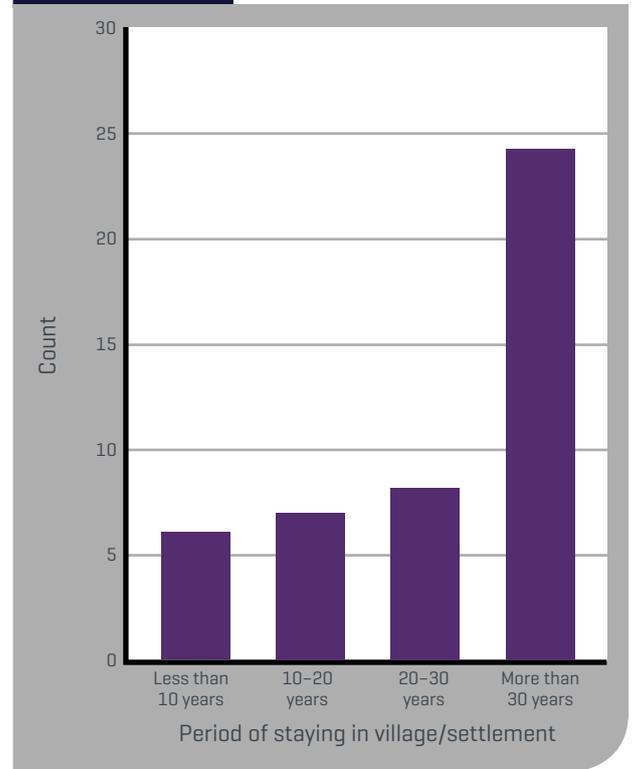
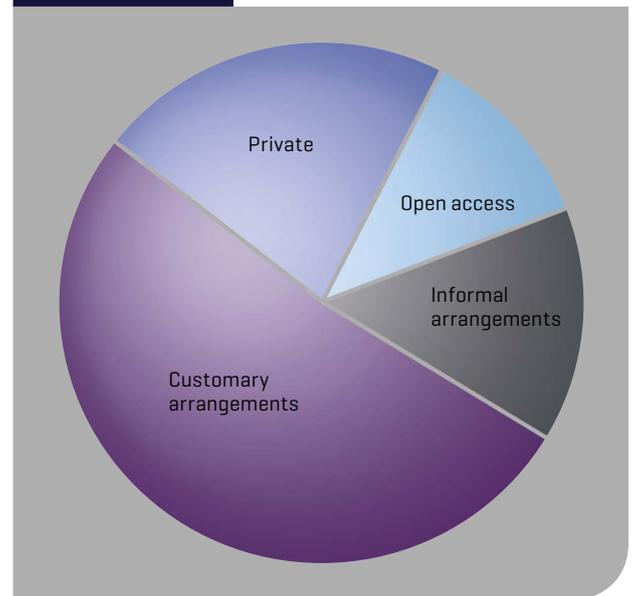


Figure 24 Method of gaining access to land in Lami settlement



6.2 Potential drivers for resettlement in Fiji settlements

6.2.1 Correlations between Land Tenure and Climate Change vulnerability

In order to determine if there was a correlation between security of tenure and climate change vulnerability to sea level rise, flooding or major climate related impacts in two similar settlement communities, we used a two-tailed Pearson Correlation Coefficient test.

Table 7 data indicates a significant difference ($p < 0.05$) (negative correlation) comparing the effects of flooding and sea level rise with security of tenure. As the effects of flooding or sea level rise increase, land tenure security decreases. Positive correlation exist ($p < 0.01$) regarding sea level rise and vulnerability to flooding; which indicates, flooding is correlated positively with sea-level rise. Moreover, vulnerable locations (near low-lying flood prone areas), are more likely to have less secure tenure relationships (negative correlation; -0.351 and -0.325 , respectfully). Contrarily, land areas that are less prone to flooding (higher up in the valley), have more secure land tenure.

In general for all settlement communities in the Fijian case study, (80 per cent) of respondents indicated they were aware of climate change issues, and roughly 15 per cent

indicated they knew of some aspects of climate change and a smaller percentage, had very little, to no knowledge of climate change. It was determined that frequency of visits from the Ministry of Agriculture, and other universities in the area including USP and UniFiji (University of Fiji) had provided awareness campaigns on climate change and most respondents were well aware of its implications.

Positive correlation exist ($p < 0.01$) regarding sea level rise and vulnerability to flooding and vulnerable locations (near low-lying flood prone areas), are more likely to have less secure tenure relationships (negative correlation). Contrarily, land areas that are less prone to flooding (higher up in the valley), have more secure land tenure.

6.2.2 Desire for resettlement

Households were asked whether their household should be resettled. Of note was the consistent response by the majority of people in all the settlements that they strongly disagree that they should be resettled. This is an indication that they are generally comfortable with their level of adaptive capacity and also their tenure security. The only exception was Vunimoli where a small number of households strongly agreed that they should be resettled. It is hard to determine why this group differs to the rest of the Fiji settlements, but it might relate to their location close to the river as well as a perception that they are vulnerable to eviction or land grabbing.

Table 7 Correlations between Land Tenure and Climate Change vulnerability

		awareness of climate change issues	vulnerability to effects of sea level rise	vulnerability to effects of flooding	security of tenure
Awareness of climate change issues	Pearson Correlation	1	-.276*	-.168	.168
	Sig. (1-tailed)	-	.044	.140	.138
	N	44	39	43	44
Vulnerability to effects of sea level rise	Pearson Correlation	-.276*	1	.964**	-.351*
	Sig. (1-tailed)	.044	-	.000	.013
	N	39	40	38	40
Vulnerability to effects of flooding	Pearson Correlation	-.168	.964**	1	-.325*
	Sig. (1-tailed)	.140	.000	-	.017
	N	43	38	43	43
Security of tenure	Pearson Correlation	.168	-.351*	-.325*	1
	Sig. (1-tailed)	.138	.013	.017	-
	N	44	40	43	45

* - Correlation is significant at the 0.05 level (1-tailed). ** - Correlation is significant at the 0.01 level (1-tailed).

Source: Fiji Islands Bureau of Statistics, 2007

Table 8

Response to question “should your household be resettled” for all Fiji settlements

	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami
Q 14 Should your household be resettled	[a] Strongly disagree	[a] Strongly disagree	[a] Strongly disagree	[a] Strongly disagree	[a] Strongly disagree
[a] Strongly disagree		[b] Disagree			[b] Disagree
[b] Disagree		[c] some agreed, smaller numbers			
[c] Agree		[d] Strongly agreed			
[d] Strongly agree					

Source: Fiji Islands Bureau of Statistics, 2007

6.3 Constraints and implications for resettlement

Slightly more than half the respondents agreed that resettlement to another community or area would not reduce the risk of climate change related disasters. Approximately 39 per cent agreed that resettlement will reduce the risks of climate change related disasters. While 12 per cent strongly agreed that resettlement to another area/community would reduce the risk and 17 per cent strongly disagreed. Given that most respondents across all settlements did not think that they should be resettled, or that resettlement would improve their climate risk, the responses to the other implications of resettlement are perhaps hypothetical.

However, most (slightly more than half) strongly agreed that any form of resettlement would affect their livelihood and land tenure relationships. Respondents in all settlements seem to agree that most do not have access to land that could be resettled to reduce the risk of disaster. The majority felt that “they were fine where they were; and “felt safe”; even though some settlements houses or communities themselves were at risk of flooding, or other damage (strong winds caused by cyclones and storm surges). A smaller proportion approximately 38 per cent indicated that yes they do have access to land in other areas that could be resettled to reduce their risk of disaster. The majority did not indicate where their land was located but they did say that they did have land, and if need be they could transfer to that land at any time. One elder did respond that the majority of the people have family members in other communities, which in itself “was enough”. A smaller proportion roughly 18 per cent indicated that they were not sure if they had land; which indirectly indicates that their land areas they have that could be resettled to reduce disaster risk, was less known or not known at all.

Most of the respondents agreed that they would welcome a resettlement group or groups if they were given the choice or opportunity. Given the general friendly and congenial nature of the Fijian culture accepting settlement groups or refugees is quite commonplace in terms of assisting, helping or building relationships. This is embedded in their daily lives and church functions that strengthen community resilience, and provide an opportunity for building relationships. A smaller portion of the respondents disagreed that they would be happy with welcoming resettlement group, mostly based on current tenure relationships, family ties with current settlement groups, and fear or mistrust of new groups. A smaller proportion strongly disagreed, based primarily on their current tenure relationship and their willingness to accept “unknown” settlement groups from outside. Respondents commented on the fact that some outsiders are not familiar with the communities are settlements themselves, and may find it difficult to adjust. Because of the church obligations and other things they would be willing but the respondents that strongly disagreed or generally more fearful of the introduction of thieves or robbers, marijuana dealers, or other social problems that come with accepting groups from other settlement areas. Some of this was also based on clan/family-ties, and Mataqalii relations; that are in most cases how families make decisions and how work is distributed and completed.

Table 9

Responses on resettlement implications in all Fiji settlements

	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami
Q 15 Would resettlement affect your tenure and livelihoods? [a] Strongly disagree [b] Disagree [c] Agree [d] Strongly agree	[c] 20-30 [d] More than 30 years	[c] 20-30	[c] 20-30	[c] 20-30 [d] More than 30 years	[d] More than 30 years
Q 16 Do you have land in other areas you could be resettled to reduce your risk of disaster? [a] Yes [b] No [c] Not sure	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements [e] State	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements	[a] Customary arrangement [b] Private [c] Open access [e] State	[a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements [e] State
Q 17 Do you think being resettled to another area/ community would reduce your risk? [a] Strongly disagree [b] Disagree [c] Agree [d] Strongly agree	[a] Yes	[a] Yes, and some [c] not sure	[a] Yes, and some [c] not sure, and some [d] to some extent	[a] Yes, and [c] not sure	[a] Yes

Source: Fiji Islands Bureau of Statistics, 2007

7.0 PNG Case study analysis

As described in the Fiji case study analysis the PNG case studies were selected to illustrate the impact of informal development on climate resilience at the village level, and the community perceptions of vulnerability and security of tenure. Selection of the case study settlements was based on the criteria outlined in Appendix 1.

7.1 PNG case study areas

Wewak is the fifth largest urban centre in PNG, and is situated on the north coast in East Sepik Province. Wewak is a coastal town that is highly vulnerable to the impacts of climate change. Wewak has been labelled as one of the climate change hotspots and a priority area of concern by many international climate change surveys and reports. As such, Wewak has been prioritised in national climate change adaptation programs.

Wewak has developed over the last few decades as the administrative and commercial centre for the province along with significant urban growth. Many settlers accessed customary land or land owned by the Catholic mission to build settlements. Informal settlements appeared on customary land in the 1950s, and by 1974 almost half the urban housing was informal. In 1987 a Catholic Church census recorded 29 ethnically based settlements in Wewak, and by 2000 the migrant population comprised 56 per cent of the total urban population of Wewak (Numbasa and Koczberski, 2012).

Many people in recent years have moved from disadvantaged rural areas and the outer islands to settle in Wewak. One of the drivers has been improved access to services and livelihood opportunities. Wewak has also been chosen the National Office of Urbanisation to be developed into a mega city. However, due to the risk posed by climate change this growth will need to be carefully managed with regard to tenure and location. Much of the migration into Wewak has been in existing informal settlements many of which are on swampy land, and have poor infrastructure including drainage, garbage collection, water supply or sewerage (Numbasa and Koczberski, 2012).

The land tenure arrangements of the town are a mixture of State land and free hold private land that belongs to the Catholic Mission and Customary land. Taking advantage of the dispute informal settlements in the meantime have flourished on the land. Since there is no clear ownership, the squatter settlers are not under pressure to pay rentals. This was also evident also in similar study by Numbasa and Koczberski (2012). In addition, they are not forced under customary obligation imposed on them by the land owners to participate and contribute in customary activities of the customary land owners. The method in which people gained accessed to the land varies with different tenure types. Hence, the three communities selected in the case study area all have different land tenure arrangements and are representative of Wewak District.

Figure 25

Location of PNG case study settlements in Wewak District

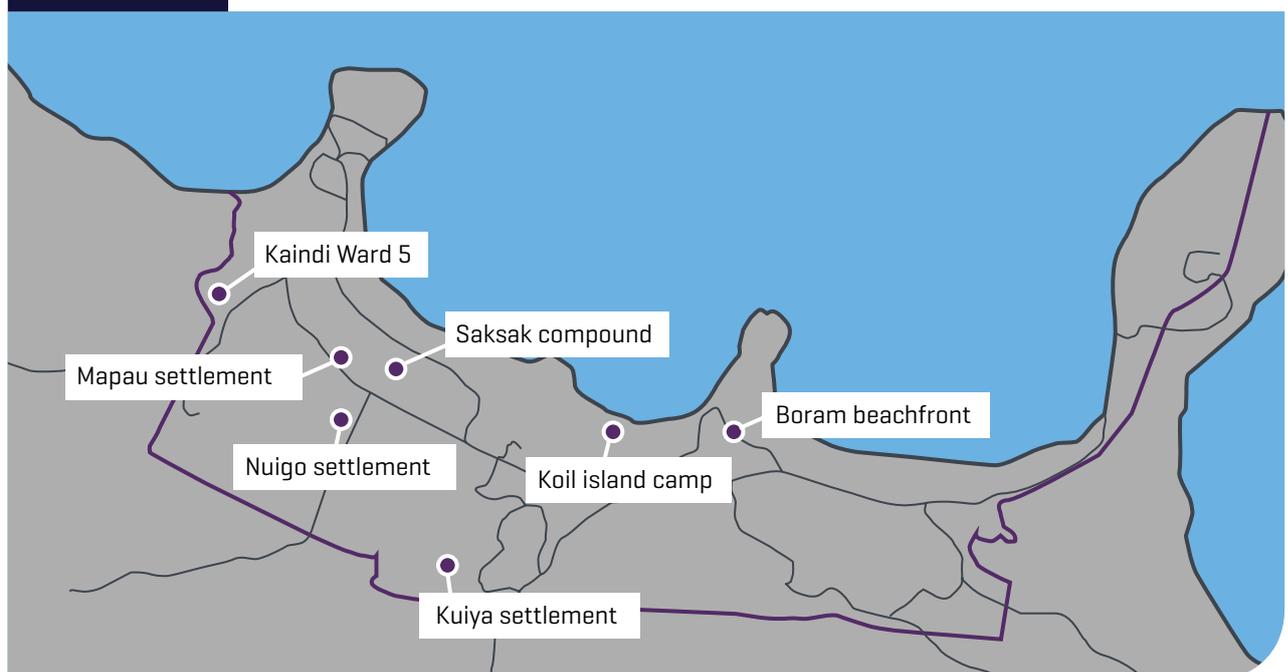


Image source: Adapted from Kiele, 2012

Table 10 PNG Case study settlements by tenure type

Communities	Land Settlement is located on:	Land Tenure Types
Basis Mengar Settlement	Customary Land	Informal Tenure
Nuigo Settlement	Alienated State Land	Formal Tenure (lease)
Saksak Compound	Alienated Freehold Land	Informal Tenure

Source: Fiji Islands Bureau of Statistics, 2007

Basis Mengar Settlement (Mengar Murik Settlement)

Basis Mengar Settlement is located on the periphery of Wewak Town and falls under Wewak Rural Local Level Government area. This settlement was selected to represent informal settlements located on peri-urban customary land on the edge of Wewak urban area.

The community is made up of migrants originally from the Murik Lakes which is along the east coast of Wewak. The settlers access land through customary arrangements with the customary land owners following a long history of friendship created through their traditional trade links. Most of the respondents from Basis Mengar settlement advised that they had gained access to land by customary arrangements (82 per cent), with 14 per cent gaining access through informal arrangements, and 4 per cent gained access through tribal inheritance.

The majority of the head of households at Mengar Murik Camp were males, and most were over the age of forty. Many had completed primary and secondary education. The percentage of those without any form of education, or with tertiary education was small. On the average there were more than 8 people in each household, and they all 'owned' the house they living in. Almost all of their houses are made of bush materials, while one customary landholder living within the settlement had his house built using permanent modern materials. The settlers houses are made of bush materials and this is due to restriction placed on them by the land owners.

The settlers do not have tenure security to the land they are living on. Most considered their tenure was either less secure, or not secure (79 per cent). This is consistent with most either considering themselves to be very vulnerable to vulnerable to eviction or land grabbing (76 per cent). The local perception is that they are temporary residents who are given limited rights as to what activities they can do on the land. They are restricted to conducting business activities and to accessing resources from the nearby bushes and mangroves.

Figure 26 Perceived security of tenure at Basis Mengar Settlement

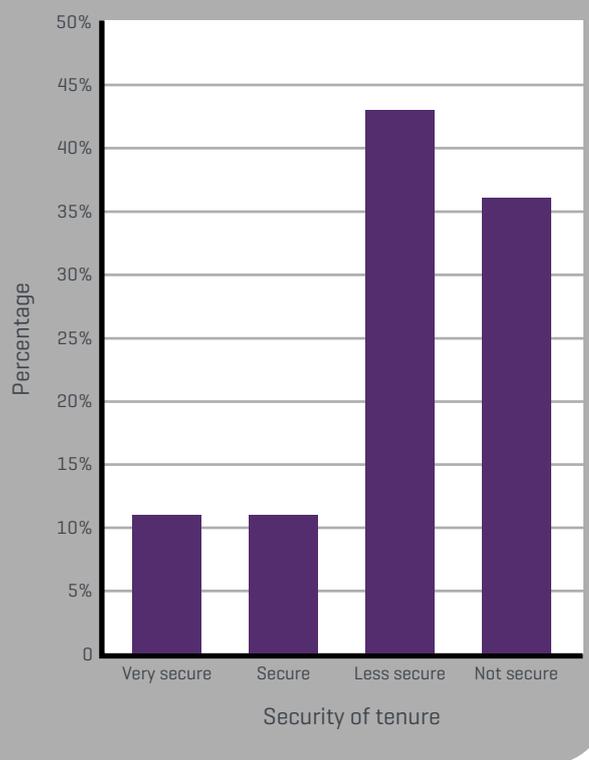
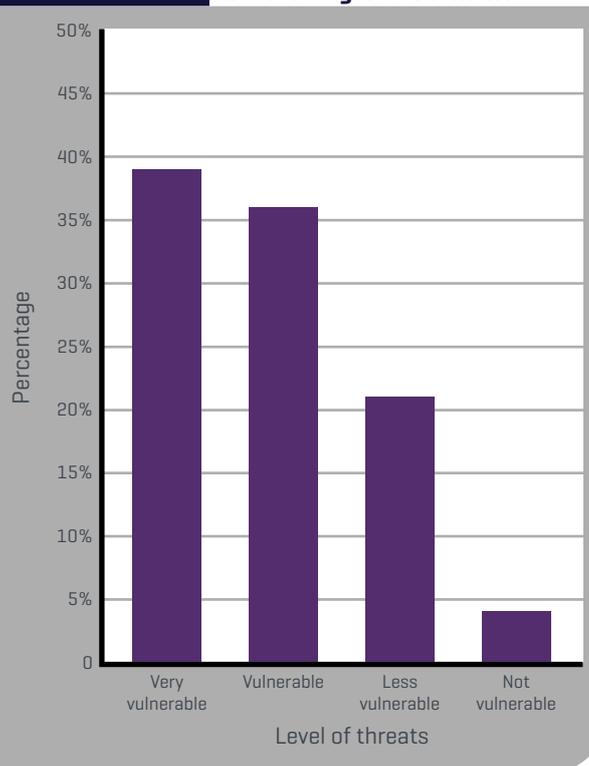


Figure 27 Perceived vulnerability to eviction and land grabbing in Basis Mengar Settlement



Nuigo Settlement

Nuigo is an urban settlement located on flat land within the urban boundary that connects with the Catholic Mission land and customary land that stretches into the foothills. Nuigo is governed by the Wewak Urban Local Level Government. Under the urbanisation plan of Wewak Town, Nuigo will be developed into a formal housing estate or suburb. The settlers were originally from the Sepik River and many settled on the land with agreement from the Catholic Mission when their villages along the Sepik River were flooded, while others were former employees of the Catholic Mission.

The land was formerly owned by the Catholic Mission but has been since transferred to the State (in 1986) to enable the provision of municipal services. It remains as state land. The location of Nuigo settlement on a State lease means there are no restrictions on livelihood activities, which has given confidence to the people to build permanent houses. However, the settlers were warned not to encroach onto neighbouring customary land for food gardening and collecting firewood (Numbasa and Koczberski, 2012). Over the years the original migrants have invited their relatives and friends to also settle on the land.

All the head of household respondents at Nuigo Settlement were male, with most between the ages of thirty to fifty. Almost all the respondents have reached primary and secondary levels of education while a small proportion has reached tertiary level of education and very few have no form of education. The average the number of people living in each household is four to eight, though a significant proportion of households have more than twelve people.

More than half of the respondents have house made of permanent materials, while a good proportion have their houses made of semi- permanent materials mostly off-cuts from the nearby timber mill, including tin sheets, used corrugated roofing from old buildings and card boxes. A small minority have made their houses out of bush materials.

Most respondents noted they had gained access to the land through various informal arrangements (83 per cent), while some of them gained access through the State formal process from the Wewak Lands Office (13 per cent), and 3 per cent gaining access through customary arrangements.

All the respondents own the houses they are living in. There was a strong response that they considers their tenure to be either secure or very secure (96 per cent), and that the majority (90 per cent) were less vulnerable or not vulnerable to eviction or land grabbing.

Figure 28

Perceived security of tenure at Basis Mengar Settlement

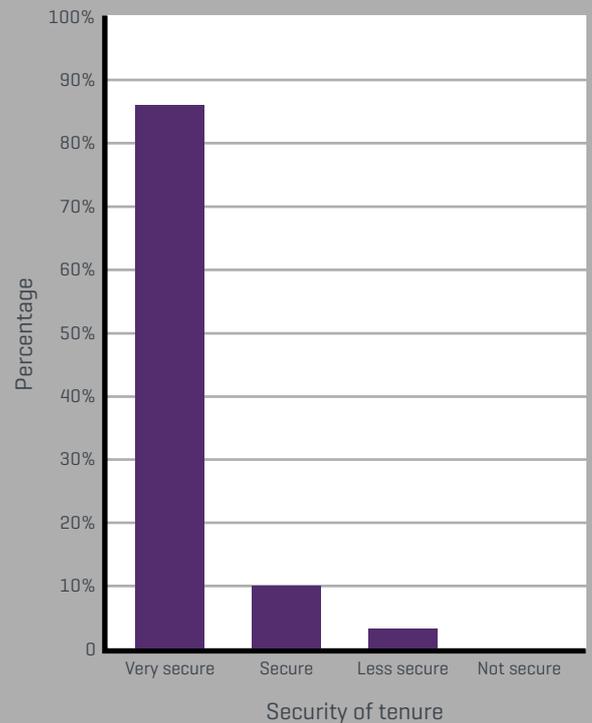
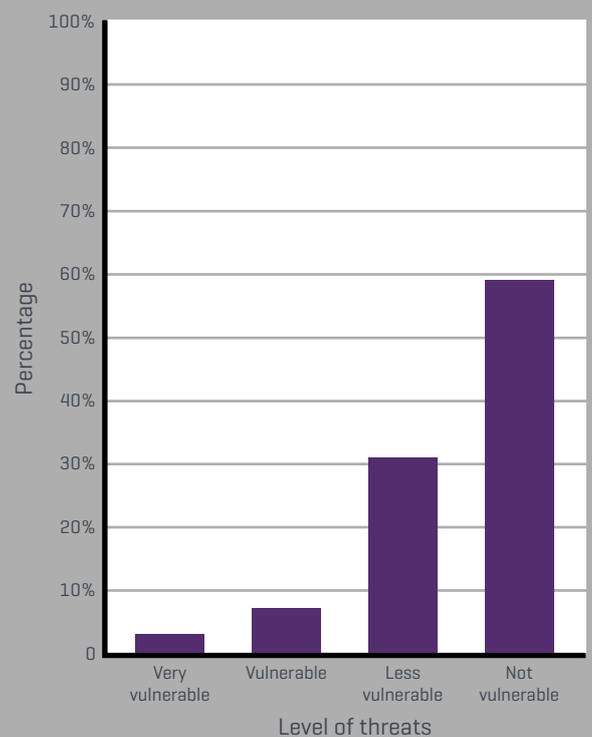


Figure 29

Perceived vulnerability to eviction and land grabbing at Nuigo settlement



Saksak Compound

Saksak Compound Settlement is located in the heart of Wewak Town urban boundary and is governed by the Wewak Urban Local Level Government. The settlement is located on a very narrow strip of land between the main road and Meni customary village. The land is located on swampy land consisting of sago groves. There is also very limited space available for urban expansion.

The settlement was originally settled by the workers of the Catholic Mission in the 1960s, and many of them came from the Sepik River region. They accessed the land from the local land owners and were allowed to settle on the land since there was no housing scheme.

The Church made the land available to its employees to build their houses there since there was no housing scheme available to accommodate the workers at that time. Over the years various groups from the Sepik River have settled on the land, and allowed their relatives and friends to settle on the land. The Catholic Mission has recently transferred the land back to the customary land owners. The land now under customary ownership means the settlers have to respond to the demands of the customary land owners in order to maintain access to the land.

In recent years the Church has given the land back to the customary land owners. However, the state wanted the land for its development plans. This has caused disagreement on the land use potential of the land once the settlers are evicted. The future of the settlers is not guaranteed. Those with permanent houses are concerned their houses can be demolished either by the Government or the customary land owners. The customary land owners want to lease the land for formal urban development, but they need the help of the government to evict the settlers. The Government may also wish to resettle the people in the settlement to their home of origin and free up the land for other formal urban development.

All the head of household respondents at Saksak Compound Settlement are males except for one. Most of them are between the ages of thirty to fifty, with a smaller number below the age of thirty, and very few over the age of fifty. Almost half of the respondents have reached the primary level of education while many reached secondary level of education and no one has reached tertiary education. The remaining few have no form of education. On the average there are more than 8 people in each household, and the majority own the house they living.

All respondents noted they had gained access to the land through informal arrangements, which means they don't have land records. This is clearly linked to the unanimous response that they did not consider their tenure to be secure, and that the majority (77 per cent) very vulnerable or vulnerable to eviction or land grabbing.

Figure 30

Perceived tenure security at Saksak Compound

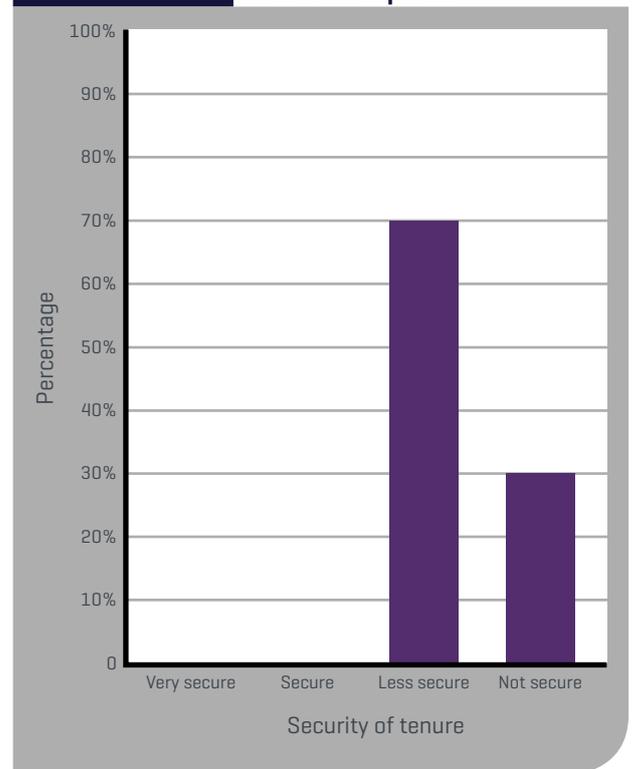
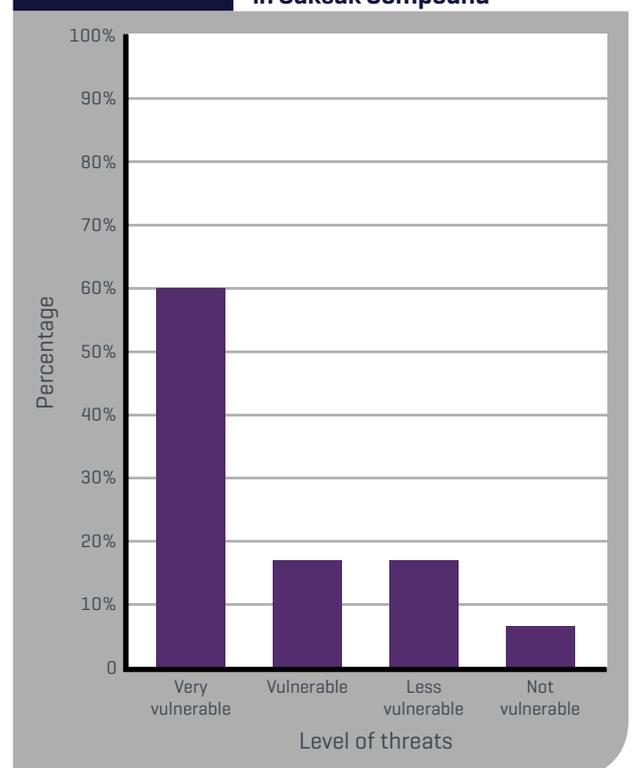


Figure 31

Perceived vulnerability to eviction and land grabbing in Saksak Compound



7.2 Perceptions of climate vulnerability in PNG settlements

The vulnerability is related to the location of each of the settlements and whether they are exposed to hazards. The Basis Mengar Settlement is more vulnerable to coastal hazards than Nuigo and Saksak Compound Settlement. The responses shown in Table 11 correspond with the settlement locations, with Basis Mengar Settlement located right along the coastline, while Nuigo and Saksak Compound Settlements are located further inland.

The respondents of Basis Mengar settlement were most concerned about the impacts of coastal erosion (75 per cent) and storm surge and sea level rise (25 per cent). In Nuigo settlement over half were most concerned about drought (55 per cent) with coastal erosion, storm surges and sea level rise also being a concern. In Saksak the primary concern was drought (97 per cent).

As illustrated in Tables 12 and 13, respondents considered Basis Mengar settlement the most vulnerable to sea level rise (100 per cent) and flooding (86 per cent), with most considering Nuigo and Saksak less vulnerable.

Table 11 The major climate risks for each settlement

Climate change risks	Basis Mengar Settlement	Nuigo Settlement	Saksak Compound Settlement
Storm surge and sea level rise	25%	24%	0%
Coastal erosion	75%	21%	0%
Flooding	0%	0%	3%
Strong winds	0%	0%	0%
Drought	0%	55%	97%

Table 12 Vulnerability to sea level rise

Level of vulnerability	Basis Mengar Settlement	Nuigo Settlement	Saksak Compound Settlement
Vulnerable	100%	34%	30%
Less vulnerable	0%	62%	70%
Not vulnerable	0%	0%	0%

Table 13 Vulnerability to flooding

Level of vulnerability	Basis Mengar Settlement	Nuigo Settlement	Saksak Compound Settlement
Vulnerable	86%	49%	23%
Less vulnerable	7%	52%	77%
Not vulnerable	7%	0%	0%

However, nearly half of the respondents from Nuigo considered they were vulnerable to flooding.

Basis Mengar Settlement is subject to flooding coming from the mangrove stream due to heavy rains as well as the usual rise and fall of the tides. Both Nuigo and Saksak Compound Settlements are located on land reclaimed from a swamp of sago groves. Their land gets water-logged and swampy during the heavy and prolonged rainy season. This could indicate that the people develop coping strategies to live with the seasons. Their main threat is security of tenure.

7.3 Community based adaptation in PNG settlements

The most frequent adaptation measure (57 per cent) used by residents in Basis Mengar was to build protective barriers, which is consistent with sea level rise and flooding being seen as the biggest risk. Some also seek help from relatives (21 per cent), and 18 per cent seek temporary relocation. Only 4 per cent seek help from the government. These responses indicate that there is a

high level of vulnerability to coastal hazards, but also that resilience is relatively strong which is perhaps related to their location on customary lands.

In Nuigo settlement the majority seek help from the government (62 per cent), while 34 per cent seek temporary relocation. These responses are consistent with their location on state land in informal settlements. There is a heavy reliance on government, rather than customary groups, which indicates a lower level of resilience.

For Saksak compound the risk is more related to drought. Therefore the adaptive responses differ. Respondents noted they seek help from relatives (33 per cent), seek temporary relocation (33 per cent) or seek help from the government (33 per cent). This indicates some adaptive capacity, but with a reliance on government for some people.

Common adaptation issues identified in the interviews included the concern over food and water security, inland flooding and landslides, coastal flooding and their impacts on the settlements. Other concerns were the potential for migration and health issues.

Table 14 Adaptation strategies adopted in the past

Household Adaptation Measures	Basis Mengar Settlement	Nuigo Settlement	Saksak Compound Settlement
Build protective barriers	57%	3%	0%
Seek help from relatives of 'wantoks'	21%	0%	33%
Temporary relocation	18%	34%	33%
Seek help from the Government	4%	62%	33%



Image source: © Georgina Numbasa, RMIT University

7.4 Perceptions of Tenure Security in PNG

7.4.1 Threat of eviction and perception of tenure security

The table below summarises the respondents perception of tenure security, their vulnerability to eviction and land grabbing, whether their property rights are recognised by others, and whether the government protects their access to land. These are all key elements of tenure security.

None of the people in Saksak compound consider their tenure was secure, and 77 per cent considered they were vulnerable to eviction and land grabbing. This is not surprising given their informal settlement on freehold land, now returned back to the customary land owners. This represents a very insecure tenure and represents the greatest tenure security concern in the settlements studied. Under the urbanisation program of Wewak Town, Saksak Compound is listed for demolition and the people are to be evicted and relocated or repatriated back to their place of origin. There is no specific time frame given for eviction and so the settlers are left in a limbo, hence they live on a day to day basis and cannot have long term plans to improve their livelihoods.

Slightly more people (21 per cent) in Basic Mengar Settlement considered their tenure secure. However more people considered they were vulnerable to eviction or land grabbing (75 per cent) than in Saksak. Interestingly, most people in Basic Mengar Settlement thought that their property rights were recognised by others (ie socially legitimate). This is at odds with very few (7 per cent) thinking that the government protects their access to land. Overall these responses suggest a high level of uncertainty about their tenure security. Given the social legitimacy of their occupation on customary land, the formal recording of their land rights would add greatly to their tenure security.

The responses on Nuigo settlement were very different to the other two settlements with regard to tenure security. This settlement is located on state land and so recognition by government is one of the key elements of tenure security. The minority who felt vulnerable to eviction or land grabbing are the ones who do not own land and have no security of tenure. The majority of people (96 per cent) thought their tenure was secure. Only 10 per cent thought that they were vulnerable to eviction or land grabbing. They were slightly unsure about their social legitimacy with only 45 per cent considering that their property rights were recognised by others. However, most (65 per cent) considered that the government protected their access to land. This indicates a relatively strong tenure security based on government acceptance of their rights, and formally recording their rights may help to improve their social legitimacy also.

Table 15 Threat of eviction and perception of tenure security in PNG settlements

	Basis Mengar Settlement [on customary land]	Saksak Compound [on freehold land]	Nuigo [on state land]
Q 9 How secure is your tenure? [a] Very secure [b] Secure [c] Less secure [d] Not secure	[a] Very secure or [b] secure tenure [21 per cent]	[a] Very secure or [b] secure tenure [0 per cent]	[a] Very secure or [b] secure tenure [96 per cent]
Q 2 Do you own the land on which you are living? [a] Yes [b] No	[b] No [96 per cent]	[b] No [100 per cent]	[a] Yes [93 per cent]
Q 10 Are you vulnerable to eviction or land grabbing? [a] Very vulnerable [b] Vulnerable [c] Less vulnerable [d] Not vulnerable	[a] Very vulnerable or [b] vulnerable [75 per cent]	[a] Very vulnerable or [b] vulnerable [77 per cent]	[a] Very vulnerable or [b] vulnerable [10 per cent]

7.4.2 Community recognition of tenure

More than half the residents at Saksak compound have been there for more than 20 years, while the rest are fairly new arrivals or are the second and third generations of migrants in the settlement. For those who have lived longer in the settlement, they could not build good permanent houses because of two main reasons; firstly, they could not afford and secondly and more important is the fact that the Catholic Mission did not give land titles to them. These findings are consistent with previous research done by Numbasa and Koczberski (2012). No one has a house made of permanent modern materials. Over half of them have their houses made of semi-permanent materials mostly off cuts from the nearby timber mill, tin sheets, used corrugated roofing from old buildings and card boxes. A good proportion has their houses made of bush materials.

However, they all accessed the land using informal arrangements. There has been ongoing conflict with customary land owners within the urban boundary. This represents poor levels of social legitimacy and acceptance of property rights and this is reflected in the response that 63 per cent considered their rights were not recognised by others. Most were at least 'not sure' if their property rights were protected by the government or recognised by others. Very few of the respondents believed that their property rights are recognised by others in the settlement while majority do not believe and are not sure if their property rights are recognised by others in the settlement.

Most of the people on Basis Mengar Settlement (68 per cent) have occupied the peri-urban customary land for over 30 years. They gained access to the land by customary arrangements and this is reflected in the response that

Table 16 Community recognition of tenure in PNG settlements

	Basis Mengar Settlement (on customary land)	Saksak Compound (on freehold land)	Nuigo (on state land)
Q 1 (IV) How long have you been living in this settlement/village? [a] Less than 10 year [b] 10-20 [c] 20-30 [d] More than 30 years	[c] More than 30 years [68 per cent]	[c and d] More than 20 years [53 per cent]	[c and d] More than 20 years [90 per cent].
Q 3 How did you gain access to this land? [a] Customary arrangement [b] Private [c] Open access [d] Informal arrangements [e] State	[a] Customary Arrangements [82 per cent]. Peri-urban Customary Land	[d] Informal Arrangements [100 per cent]. Mission Land, returned to Customary Land Owners within the urban boundary	[d] Informal Arrangements [83 per cent] State Land within the urban boundary
Q 11 Are your property rights recognised by others? [a] Yes [b] No [c] Not sure [d] To some extent	[a] Yes, or [d] to some extent [61 per cent]	[b] No, or [c] not sure [63 per cent]	[b] No, or [c] not sure [55 per cent]
Q 12 Does the government protect your access to land? [a] Yes [b] No [c] Not sure [d] To some extent	[b] No, or [c] not sure [93 per cent] – on Customary Land	[b] No, or [c] not sure [100 per cent] – former Mission land.	[a] Yes, or [d] to some extent [65 per cent] – State Land



Image source: © Georgina Numbasa, RMIT University

most (61 per cent) consider their property rights are recognised by others. Almost all (93 per cent) considered the government did not recognise their access to land. This represents a very high level of community acceptance. However it also suggests low levels of government acceptance and is consistent with the low number of people who thought their tenure was secure (21 per cent). It indicates that formal recording of their land tenure rights would improve their perception of tenure security considerably.

The community at Nuigo have been on state land within the urban boundary for more than 20 years (90 per cent), while a minority are fairly new arrivals or are the second and third generations of migrants in the settlement.

Most (65 per cent) respondents from Nuigo considered the government protected their access to land. Overall their government recognition and legal legitimacy is high through leasehold arrangements. However, they gained access through informal arrangements and 55 per cent are not sure of their property rights are recognised by others. This suggests some concern over the social acceptance of their land tenure rights.

Their overall perception of secure tenure (93 per cent) shows that the government recognition is considered more important in this case. The land was formerly Mission land in which the Mission did not give titles to the original settlers. The land ownership was successfully transferred to the State while some have confirmed their title to the land others have not.

7.5 Potential drivers for resettlement in PNG

The majority of respondents in Saksak settlement (66 per cent) agreed that their household should be resettled. This is a high number as resettlement is not something that would be considered lightly. There appear to be two strong factors working together here – very poor tenure security (100 per cent) and very strong concern about drought (97 per cent). These findings were supported by most people (84 per cent) considering that resettlement would reduce their risk to climate change. In the interviews resettlement was considered an option, but only on the condition that it is formally arranged by the government, and comes with a guaranteed security of tenure. In other words, they would require their land tenure rights be respected and recorded by government, and also recognized by the community.

This was in contrast to Mengar Murik Settlement and Nuigo where the majority of respondents did not consider their household should be resettled (61 per cent and 62 per cent respectively). This is far from a consensus with nearly one-third considering their house should be resettled. What this indicates is some level of concern about the impact of climate change, most (60 per cent in Basis Mengar and 52 per cent in Nuigo) thought that resettlement would not reduce the risk of climate change.

Table 17
Potential drivers for resettlement in PNG settlements

	Basis Mengar Settlement [on customary land]	Saksak Compound [on freehold land]	Nuigo [on state land]
Q 4 Are you aware of climate change issues? [a] Yes [b] No [c] To some extent [d] Not sure	[a] Yes or [c] to some extent [96 per cent]	[a] Yes or [c] to some extent [91 per cent]	[b] No or [d] not sure [86 per cent]
Q 5 What major climate change impact does the community face? [a] Storm surge and sea level rise [b] Coastal erosion [c] Flooding [d] Strong winds [e] Drought	[a] Storm surge and sea level rise, & [b] coastal erosion [100 per cent] – Located on coast	[e] Drought [97 per cent] – water security is a concern.	[e] Drought [55 per cent] – water security is a concern.
Q 14 Should your household be resettled? [a] Strongly disagree [b] Disagree [c] Agree [d] Strongly agree	[a] Strongly disagree or [b] disagree [61 per cent]	[c] Agree or [d] strongly agree [66 per cent]	[a] Strongly disagree or [b] disagree [62 per cent]
Q 12 Do you think being resettled to another area/community would reduce your risk? [a] Strongly disagree [b] Disagree [c] Agree [d] Strongly agree	[a] Strongly disagree or [b] disagree [60 per cent]	[c] Agree or [d] strongly agree [84 per cent]	[a] Strongly disagree or [b] disagree [52 per cent]

Part of this response is some residual concern over the impact of resettlement on tenure and livelihoods. In the interviews there was a fear about the lack of tenure security if they resettled and this was a factor in their responses.

Two key issues arose (i) for those who had moved from another area, the majority wished to return back to their own land on safe areas, and (ii) where permanent resettlement was considered there was a desire for government intervention to provide safe and secure land.

7.5.1 Correlation between tenure security and desire for resettlement

Some broad conclusions can be drawn from the information in Table 18. People with high levels of tenure security living in areas affected mostly by drought have a reduced desire for resettlement. However, people with no tenure security living in drought affected areas have an increased desire for resettlement. In areas affected by storm surge and coastal erosion, those with very low tenure security have less desire for resettlement. From these we can broadly conclude that the level of tenure security is a major factor in any desire for resettlement.

Table 18

Summary of tenure type, location, climate risks and desire for resettlement of all PNG settlements

Name of settlement	Type of land tenure	Tenure Security	Settlement location	Main Climate Change Risk	Agree to Resettlement	Tenure Security and Resettlement
Basis Mengar Settlement	Customary Land	4%	On shoreline	75% Coastal erosion	39%	Insecure tenure but less desire to resettle
Nuigo Settlement	Alienated State Land	93%	Inland, away from the sea	97% Drought	37%	Secure tenure less desire to resettle
Saksak Compound Settlements	Alienated Mission Land now dispute with Customary Owners	0%	Inland, away from the sea	55% Coastal erosion	66%	Insecure tenure leads to desire to resettle

7.6 Constraints and implications for resettlement

As Numbasa and Koczberski (2012) noted that the most common landowner restrictions exist on settlements on customary land. These restrictions are related to landowners determining who can reside in the settlement. Potential new residents are required to obtain prior approval from the landowners, with these approvals given only to those with family connections or who shared the

ethnicity of the dominant ethnic group/s. Failure to observe these restrictions could lead to conflicts with landowners and possible eviction (Numbasa and Koczberski, 2012).

Most people in all settlements agreed that resettlement would affect their tenure or livelihoods (57 per cent, 70 per cent and 52 per cent). Of note is that, while people in Saksak compound predominantly thought that their household should be resettled to reduce their climate risk, they also had the most people who thought that resettlement would affect their tenure and livelihoods (70 per cent).

Table 19

Perceived resettlement implications in PNG settlements

	Mengar Murik Settlement	Saksak Compound	Nuigo
Q 15 Would resettlement affect your tenure and livelihoods [a] Strongly disagree [b] Disagree [c] Agree [d] Strongly agree	[c] Agree or [d] strongly agree [57 per cent]	[c] Agree or [d] strongly agree [70 per cent]	[c] Agree or [d] strongly agree [52 per cent].
Q 16 Do you have land in other areas you could be resettled to reduce your risk of disaster? [a] Yes [b] No [c] Not sure	[a] Yes [64 per cent]	[a] Yes [77 per cent]	[a] Yes [66 per cent]
Q 18 Would you welcome a resettled group? [a] Strongly disagree [b] Disagree [c] Agree [d] Strongly agree	[a] Strongly disagree or [b] disagree [71 per cent]	[a] Strongly disagree or [b] disagree [70 per cent]	[a] Strongly disagree or [b] disagree [76 per cent]

Another factor in the decision about whether people thought that their household should be resettled was whether they had land in other areas that they could be resettled to reduce disaster risk. More people in Saksak compound (77 per cent) responded that they had land in other areas than the other settlements (64 per cent and 66 per cent respectively). This may also have been a factor in the higher desire for the household to resettle for Saksak compound. However, in many cases the climate risk in their home of origin is similar to their current settlement location and people are reluctant to move back. Being located in Wewak they felt they believed that they could get greater help from the government.

An important consideration in this study was whether settlements would welcome a resettled group. This is an issue of contention in much of the Pacific Islands and also relates to population density of the settlement area. In each of the three settlements there was a very strong response that they would not welcome resettled people. Given the predominance of customary land in PNG (97 per cent) this raises the question – where could people be resettled where they would be welcomed by the host community?

7.6.1 Alternatives for resettlement

In each of the settlements there was a very strong preference from respondents for the option of relocation to safer area on their own land. This is not surprising and reflects the challenges of moving to land owned by other groups.

Figure 32

Relocation preferences for Basis Mengar Settlement

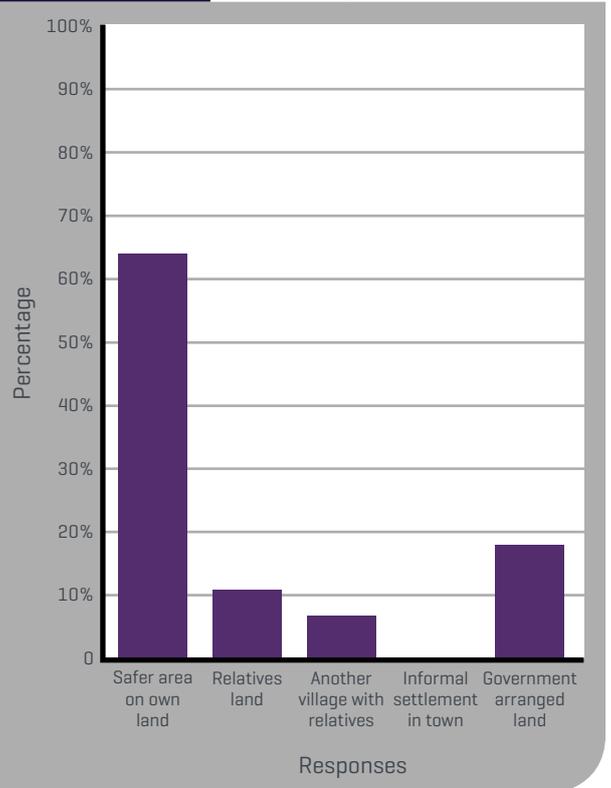


Figure 33

Resettlement preferences for Nuigo settlement

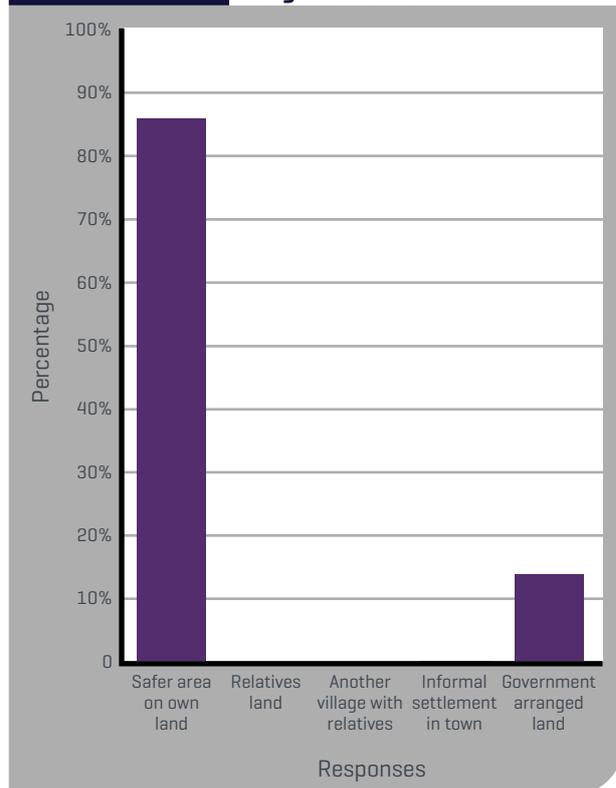
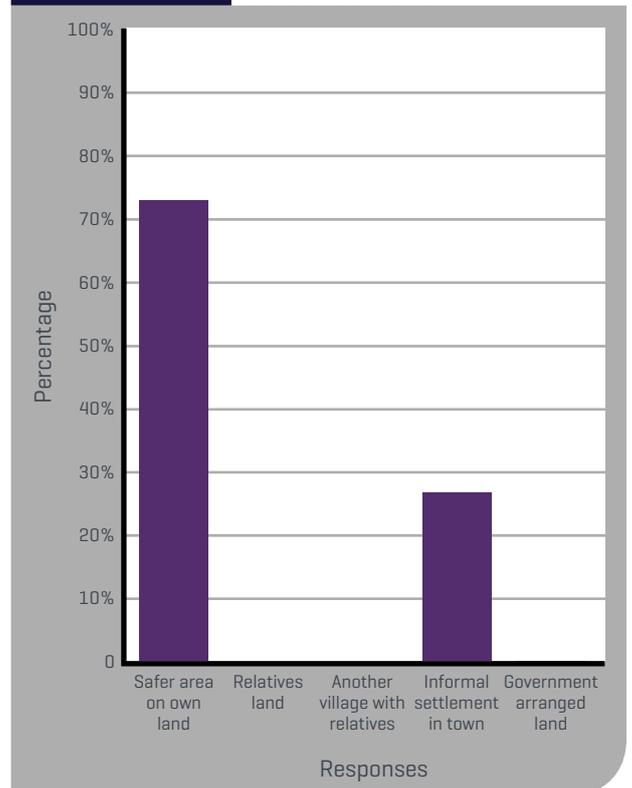


Figure 34

Resettlement preferences for Saksak settlement



8.0 Discussion



Image source: © Georgina Numbasa, RMIT University

8.1 Vulnerability and adaptation

Pacific Island Countries are acknowledged as being highly vulnerable to a changing climate. Many are also already subject to the devastating impacts of natural and climate-related extreme events (as evidenced by the destruction caused in Vanuatu and elsewhere by Cyclone Pam, in March 2015).

There has been much discussion in the international literature about land issues after natural disasters and how these may be addressed (e.g. Williams 2006; UN-Habitat/GLTN/FAO/IASC 2010, Mitchell 2010). There are general lessons to be learned from previous international disasters that include the need for land use planning to consider hazard risk, the importance in considering resettlement prior to disasters rather than in an emergency response, development of land policies that protect the rights of the vulnerable, improving land records to reduce the incidence of disputes, the need for capacity building in land agencies, and effective coordination between land and DRM agencies (UN-Habitat/GLTN/FAO/IASC 2010, Mitchell 2010).

As highlighted by the findings of the case study analysis, there are a variety of components that combine to constitute vulnerability (and also how local people actually perceive their own vulnerability). The first of these is the degree of historical exposure to the climate-related hazard (e.g. flooding, drought, storms) and vulnerability is therefore framed according to the current day (and linked to climate variability rather than longer term change).

Perhaps the exception to this is sea level rise, which is slow onset (though well documented and more certain), and which has considerable implications for resettlement as an adaptation option in the decades to come.

The sensitivity of informal settlements is high in many instances, mainly a result of poor quality housing and a lack of access to services and utilities. On the ground adaptation options were typically found to be 'hard' responses such as building flood defences, however there are also opportunities to implement softer responses that work more closely with nature (though these did not come out strongly from the interviews and surveys). Other important adaptation responses to a range of hazards were found to be the use of social and family networks for support, or alternatively by engaging in temporary relocation. In both these latter examples, customary settings and issues of land tenure are highly influential in determining whether such options are available to different groups and individuals. Whilst some of the respondents did not consider themselves vulnerable to climate risks, it is likely that this response was related to risk tolerance and reflective of a reliance on traditional coping mechanisms, which may not ensure continuing resilience in the longer term under future climatic conditions. What was clear from the analysis however was the direct linkage between tenure security, individual perception of vulnerability, and people's ability to adapt.

8.2 Levels of tenure security

While all settlements studied in Fiji and PNG involved informal settlements with a high level of exposure to climate impacts, their tenure security varies considerably.

Table 20 is a summary of the key elements of tenure security that existed in responses. The settlements in Fiji were generally perceived to be more secure in their tenure than the PNG settlements. The most insecure tenure is at Saksak compound where the respondents perceive their tenure to be very insecure despite many occupying the land for more than 20 years. A key factor in Saksak is the government policy to demolish the settlement and this illustrates the importance of government recognition as a factor in tenure security. Nuigo, by contrast had strongest perception of tenure security, as they were not concerned about eviction, and believed the government supported their rights to land.

In general the following issues existed to some degree in all the settlements studied in both Fiji and PNG:

- Urban growth and tenure insecurity.
- Informal land occupation and informal land markets.
- Potential for eviction, and land grabbing, especially in settlements not on state land.
- Inability to control the location & spread of informal settlements. Western land use planning approaches have generally been ineffective.
- Settlement in areas of high hazard-risk.

Land tenure is seen as a controversial issue in all settlement areas, because of its direct ties with people's livelihoods. In Fiji, the majority of ITaukei Fijians commented on the importance of their traditional system of land tenure. Although there were no noticeable tensions or conflicts, there were policy-related, social or other cultural conditions influencing local-level and land related conflicts; such as:

- Most of the local-level conflicts that were observed or mentioned in the interviews, involved actors – customary landowners, State agencies, investors, and squatter settlers – who may come together as part of land leasehold or other arrangements used to facilitate access to customary land.
- Local-level land-related conflicts generally take place within landowner groups over rights of inheritance.
- Conflict resolution mechanisms to settle local-level land-related conflict comprise customary and introduced mechanisms.
- Customary conflict resolution processes comprise conciliation processes where decisions are made on a consensual basis, mediation where a third party is involved or decision making by customary leaders.
- Introduced processes involve various modes of the Fiji Land Commissions and courts.

Table 20

Comparison of tenure security for all settlements in both Fiji and PNG

Aspects	Fiji					Papua New Guinea		
	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami	Basis Mengar	Nuigo	Saksak
Q 14 Living in this settlement/village more than 20 years	✓	✓	✓	✓	✓	✓	✓	✓
Q 9 Tenure perceived as secure?			✓	✓	✓		✓	
Q 10 Not vulnerable to eviction or land grabbing?	✓			✓	✓		✓	
Q 11 Consider that their property rights are recognised by others	✓	✓	✓	✓	✓	✓		
Q 12 Consider that the government does protect their access to land		✓	✓	✓	✓		✓	
Overall ranking of tenure security [1 = most secure]	3	3	4	5	5	2	4	1

The research in Fiji also focuses attention on informal settlements on native land – usually accessed by informal, or vakavanua arrangements where new settlers negotiate a stay on the land directly with landowners. It is clear, from this study however, that some of these arrangements – particularly for Indo-Fijian residents – can leave settlers in precarious tenure situations. Informal settlements on native land also pose significant challenges as options for state intervention in these areas are limited.

Tenure insecurity was a key issue for the PNG settlements. In the settlements considered, tenure arrangements are complex and in many cases not formally recorded and recognised by government. People have gained access to land using various informal and customary mechanisms. When combined with limited community and government recognition of their long term rights, the result is insecure land tenure. There are also various land transaction methods that include informal (informal arrangements, customary arrangements, and tribal inheritance), and formal (purchase, state lease). In each case the people living in the settlements were concerned about the security of their tenure. This lack of tenure security results in uncertainty about whether they will be evicted, or subject to land grabbing.

Numbasa and Koczberski (2012) argued that there had been insufficient focus by urban planners on how migrants maintain long-term access rights to customary land in urban PNG. They added, formulating effective urban development plans that address the growth of informal settlements “requires learning more about how informal settlements on customary land function and how migrants

negotiate agreements with customary landowners to allow them long-term and secure access to customary land” (Numbasa and Koczberski, 2012). The research in this report generally supports these assertions.

8.3 Perceptions on the benefits of resettlement

Resettlement may, in certain specific circumstances, be seen as an option for improving climate resilience. However, it is a complex decision with considerable potential for increased conflict over land if not treated with care. Of all the settlements studied, only respondents from Saksak Compound thought that they should be resettled (see Table 21). From the responses in Saksak it appears that (i) having land in other areas they can be resettled to, and (ii) a perception that resettlement would reduce their disaster risk, are key.

The overall desire not to be resettled was to some degree surprising given the informal nature of their settlements and their level of hazard-risk. However, their responses are consistent with all settlements apart from Saksak Compound (PNG) and Tamavua-i-wai (Fiji) considering that resettlement would not reduce their disaster risk. Another factor may be a concern that their tenure may be less secure at the resettlement site (Table 22).

In the case of Tamavua-i-wai some respondents indicated that they have land in other areas to which they can be resettled and this may have formed part of their belief that resettlement would reduce their risk.

Table 21

Community perception about whether resettlement was preferred, if they have land in other areas, and whether it would reduce disaster risk

Aspects	Fiji					Papua New Guinea		
	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami	Basis Mengar	Nuigo	Saksak
Believe the household should be resettled								✓
They have land in other areas they could be resettled to reduce your risk of disaster	✓					✓	✓	✓
Being resettled to another area/community would reduce their disaster risk	✓							✓

8.4 Constraints and implications for resettlement

A key constraint to decisions about resettlement is the possibility of land disputes or eviction at the new site. Most local level land disputes discussed in the interviews involved stakeholders who had come together under leasehold or other arrangements used to facilitate access to customary land. Local level conflict also occurs within land owner groups over rights of inheritance. Conflict can also occur over land accessed by informal (vakavanua) arrangements where new settlers negotiate occupation with landowners.

The responses confirmed that people in all settlements thought that resettlement would have a significant effect on their tenure and livelihoods. Any decisions about resettlement, therefore, would need to take great care in ensuring that existing livelihood options were maintained and accessible, or suitable alternative livelihood options developed close to the resettlement site. Resettlement must also provide for tenure security for the resettled persons at their resettlement site and their previous site, as well as for the host community or customary owners. In the case of secondary rights such as leasehold or tenancy it is important that all legitimate rights to land are protected.

However, in PNG the majority of land rights on informal settlements are not recorded or formally recognised by the government. This lack of tenure security leads to

the perceived threat of eviction, and forces them into haphazard living conditions, which further increases their vulnerability to climate change impacts. If a disaster occurs people in the informal settlements will be among those who find it most difficult to prove their pre-disaster rights and to return to their homes. The other significant factor in PNG, unlike the responses in Fiji, was the consensus that most would not welcome a resettled group (Table 22).

This research has also confirmed that the other critical factor in a resettlement decision is providing people who are to be resettled with confidence that they will be accepted into the community, and that the government will record, recognise and respect their tenure rights at the new site. There was a clear difference between the responses from Fiji and PNG in this regard. The respondents from the Fiji settlements were much more willing to accept resettled persons into their settlement. This reflects the differences in tenure security and community trust in the two regions.

Resettlement involves many complex cultural, economic and social aspects that must be addressed for the resettlement to be sustainable. Protecting livelihood options and tenure security, and ensuring the resettled land is safe are two key considerations. Another consideration in addition to these is the provision of adequate infrastructure and services at the resettlement site.

Table 22

Community perception about whether resettlement was preferred, if they have land in other areas, and whether it would reduce disaster risk

Aspects	Fiji					Papua New Guinea		
	Tamavua-i-wai	Vunimoli	Wailekutu	Kalekana	Lami	Basis Mengar	Nuigo	Saksak
Resettlement would affect their tenure and livelihoods.	✓	✓	✓	✓	✓	✓	✓	✓
Would welcome a resettled group.	✓	✓	✓	✓	✓			

9.0 Conclusions



Image source: © Dan Orcherteron, Fiji National University

This research confirms that there are correlations at whole settlement level between tenure security, perception of vulnerability, and people's ability to adapt. However these correlations are more complex at the household level. Generally, respondents with higher levels of perceived vulnerability also have greater perceptions of tenure insecurity and threat of eviction. This is consistent with the broad consensus in international literature that informal settlements are more likely to occur on land that is less desirable and in some cases hazard-prone. For example, Kalekana settlement was built on mud flats, and Tamavua-i-Wai village has had a history of frequent flooding.

While there are many similarities it cannot be assumed that the cultural norms associated with customary tenure in Fiji is the same as in PNG. Land tenure systems and the associated social and cultural rules vary from country to country and even within a country. There are also differences in the perception of tenure security across villages in the one region, based on the different underlying tenures, and the means of accessing the land. This review illustrates these differences most in the different perception of tenure security in the Lami Town corridor in Fiji, compared to those in Wewak district in PNG.

The perception in all four villages in Fiji was that tenure was either very secure or secure, and that they were not vulnerable to eviction and land grabbing. This reflects a certain level of community resilience, and that in most cases, adequate policies or mechanisms are in place to provide residents a sense of security or reduced vulnerability. However, in the three case study areas in Wewak the perception was that tenure security was low, and threat of eviction high. Only respondents in Nuigo considered that they had secure tenure and were not vulnerable to eviction. Perhaps surprisingly, despite a perception of poor tenure security in two of the PNG villages, only respondents from Saksak thought that they should be resettled. This reflects the concern over moving to a new location without a guarantee of tenure security at this location. Resettlement may actually make their tenure less secure.

Land tenure systems are not static, and the rules and processes around land tenure and property rights have adapted over the centuries to changing circumstances. The current pressures of climate change and urbanization also require the existing land tenure systems to adapt. The question is how should land tenure systems adapt? The answer to this is beyond the scope of this review, however it is a matter for the local communities to consider, as they will be central to this process.

However, care will be needed – especially in PNG with its very high percentage of customary land. As Jones (2012b) notes “Adjusting and fine-tuning land tenure systems, such as mobilising land in localities where urban growth pressures are strong and land values are rising, triggers tensions and internal disputes with landowners and landowning groups”.

Respondents in all settlements (except Saksak) stated that resettlement would not be a climate change adaptation option unless supported by the government with a guarantee of tenure security at the new site, and government support to maintain existing livelihoods or develop new ones near the resettlement site.

Long-term sustainability of resettlement decisions in Fiji or PNG will require effective coordination between the government agencies and the customary groups, and also look to reduce hazard risk and protect livelihoods. International experience shows that voluntary schemes often are the most effective. Due to the potential for conflict on private land, many countries attempt to resettle people on public land if suitable areas are available. Where land acquisition is used, care is needed over the process of acquisition and determination of fair value in compensation. Helping local communities adjust and become more climate resilient will require transparent and effective consultation and community-based partnerships with customary groups and government as key stakeholders, but also other ethnic groups and women active in discussions and decisions.

This research confirmed that two critical factors in any decision to resettle people are (i) providing tenure security for all people affected, and (ii) providing people who are to be resettled with confidence that they will be accepted into the community. The protection of tenure security requires that the government records, recognises and respects the tenure rights of all people affected – at both the resettlement site and the new site.

However, effective recording of land rights for people in informal settlements is a process that can test the capacity of land agencies in both countries. At present Fiji has a greater capacity to undertake the land administration required. However, the approach of using ‘fit-for-purpose’ land administration offers opportunities for this to be done in both countries on all areas covered by informal settlements.

If resettlement is to occur in PNG (in particular) great care is needed in selecting the resettlement site. This is due to the very high proportion of customary land in PNG (97 per cent), and the reluctance of communities to accept resettled people. State land provides a resettlement option that has less risk of conflict. However, there is only limited state land available. Therefore, customary land owners must be included in any discussions about resettlement. In most cases, other alternatives to resettlement will need to be explored as resettlement options on land with tenure security, and where resettled families are welcomed, may be limited

The results of this analysis will help decision-makers in the climate change adaptation and land agencies to better understand the implications of decisions about resettlement on informal settlements in Fiji and Papua New Guinea. The practical benefits from the application of this work by government agencies is improved understanding of the implications for resettlement decisions on vulnerability, tenure security and livelihoods of people in informal settlements. Climate change adaptation approaches need to consider ways to protect land tenure rights and livelihoods for people in informal settlements. The potential beneficiaries of these findings are government land and climate change agencies, UN and regional agencies, land professionals, and people living in informal settlements.

Land professionals have a central role in the management of decisions around land, and can inform decisions on climate resilience in relation to informal settlements. At the land agency level actions taken to improve the tenure security of people living in informal settlements improves their vulnerability. Improved land use planning processes can lead to better decisions about where to relocate people and avoid informal settlements emerging in hazard-prone area, if the community is engaged. Improved building codes and controls can prevent the construction of houses that are not suited to the hazard risk. Improved valuation of land also underpins the assessment of adequate compensation in relation to resettlement decisions, as well as land acquisition.

The results of this project may have applications in regions have areas with concentrations of informal settlements in areas of hazard risk and, like Pacific Island Countries, limitations in government capacity to respond.. Many of the PICs have significant issues with informal settlements and limited capacity for climate change adaptation. Aspects of this research are also applicable to Small Island Developing States, and countries outside the Pacific with large areas of customary or communal land including large parts of Africa, parts of Asia and also parts of South America.

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