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The importance of land use control and documenting property rights in Disaster Risk Reduction in Pacific Island countries

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There is evidence linking climate change with an increase in natural disasters. The Pacific Islands have limited resources and experienced staff to implement Disaster Risk Reduction (DRR) programmes. Land tenure in the Pacific Island Countries (PICs) is also unique with many countries having more than 80 percent as customary lands. This paper draws on lessons from two recent disasters and the existing literature on lessons from international disasters. Land issues to be addressed in DRR include people not being able to return to their land, and the complexity of resettlement of villages away from hazard-prone areas. The paper concludes that enforcing land use controls in hazard-prone areas can reduce the likelihood that people will settle in areas with high hazard risk. Also documenting property rights is one of the approaches that can increase tenure security and protect displaced people from eviction or land grabbing.

Keywords: tenure security; land use planning; Disaster Risk Reduction

1. Introduction

A 2012 *Intergovernmental Panel on Climate Change* report outlines the increasing climatic events that have exacerbated the frequency, unpredictability and severity of natural disasters in the previous decade (IPCC 2012). The records in EM-DAT (a major international disaster database) demonstrate the increase in reported occurrences of disasters through time. Pacific Island Countries (PICs) such as Fiji and Vanuatu regularly face storm surges while others are in seismically active areas and are exposed to earthquakes (e.g. Fiji, the Solomon Islands, Tuvalu). Samoa, American Samoa and Tonga were among the world's top 10 countries for the number of deaths per 100,000 inhabitants in 2008 (ESCAP/UNISDR 2010).

Many of the PICs are also Small Island Developing States (SIDS), which are particularly vulnerable to natural disasters and the impacts of climate change. The OHCHR (2011) note that there are five Least Developed Countries in the Pacific, including Samoa (due to its disaster vulnerability and economic setbacks caused by the 2009 tsunami). SIDS invariably have less capacity to respond to natural disasters, and to undertake DRR such as adaptation and mitigation measures. The remoteness and large geographical spread of some PICs result in higher energy and transportation costs, and the response to natural disasters relies heavily on international support (FIG 2010). Rapid urbanisation is also

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placing unprecedented pressure on land in SIDS, with the poor and more vulnerable people moving to informal settlements which are often in disaster-prone areas. These people are therefore at great risk of displacement and loss of livelihood assets in the event of a disaster.

Campbell *et al.* (2005) noted that nearly all urban areas in PICs are in coastal locations, which tend to be more densely populated and low-lying, making them especially vulnerable. If the incidence of sea-level rise or natural hazards increases governments will need to consider relocating parts of urban areas away from coastlines. However, decisions about resettlement are complex and have many implications, including land availability, the provision of infrastructure and the locations of informal urban settlements in areas of hazard risk.

The PICs typically have a high percentage of customary tenure, and consequently a small percentage of freehold and public land that in many PICs covers the major urban areas and significant infrastructure. However, customary land tenure systems can vary greatly between countries across the Pacific region due to differences in the historical application and the impact of colonialism. While it is not wise to generalise about the systems and issues faced, there are some common themes that emerge. AusAID (2008) argued that customary land tenure systems share some common features and characteristics, including:

- Access to land primarily stems from birth into a kinship group.
- Groups based on kinship or other forms of relationship are the main landholding (or 'owning') units.
- The main land-using units are individuals or small household.
- Men, particularly chiefs, elders or senior men within the customary group, have the main say in decisions over the group's land matters.
- As well as being a source of power, land

is a focus for many social, cultural and spiritual activities.

- There are usually ways to accommodate the land needs of anyone accepted into the group. Outsiders – for example, refugees from tribal fights – are sometimes adopted by a group and gain the privileges of group membership.
- Land can be transferred only within existing social and political relationships.
- Rights to access land are constantly adjusted to take account of changes in group membership – some groups increasing and some dying out – and the need to redistribute land.

However, the large percentage of customary land presents unique challenges for DRR as any decisions about the location of settlements and the use of customary land must be made in consultation with the customary owners. There are also issues around the leasing of customary land and the large number of informal settlements which are also often on customary land. In both cases these have been among the major sources of violent conflict between groups in the Pacific Islands. For example, they played a part in the tensions in Fiji between the customary owners of land and the people who have leased land for plantations. Attitudes over land tenure are strongly held in the Pacific Islands and poor decisions about land or inadequate consultation face a high risk of conflict.

AusAID (2008) argue that customary systems in Pacific countries do not provide adequate tenure security for some group members (especially women), outsiders and urban settlers. They add that some of underlying reasons include:

- increased interaction with outsiders and the introduction of new ideas, which have sometimes undermined customary authority
- rapid population growth and migration
- ineffective state institutions and poor

perceptions of the legitimacy of some institutions

- social and political instability.

The discussion in this paper is based on a literature review and country case studies developed during a training program in Fiji in 2012 in consultation with participants from land and DRM agencies from six PICs. It is set in the context of a Disaster Risk Management Framework approach advocated by the Hyogo Framework for Action 2005–2015 (UNISDR 2005) that includes pre-disaster action (DRR) as well as emergency response and the post-disaster activities of recovery and reconstruction. However, the focus here is on the pre-disaster activities of disaster prevention, adaptation and mitigation (i.e. DRR). In particular the aim is to identify how DRR can be informed by the land issues faced in the response, recovery and reconstruction following recent natural disasters.

There has been much discussion in the international literature about land issues after natural disasters and how they may be addressed (e.g. Oliver-Smith 1996; Williams 2006; UN-HABITAT 2010; Mitchell 2010; Mitchell 2011). These land issues include the loss of access to land, shelter and livelihoods due to damage from the disaster, providing secure tenure for people who have been resettled, and the difficulty in proving the legal or social legitimacy of displaced people's rights to their pre-disaster land (UN-HABITAT 2010; Mitchell 2010). The result is that the poor and most vulnerable (e.g. the elderly, children, ethnic minorities) are often most at risk. Another lesson that is relevant to the PICs is that inheritance rights are often vulnerable after a disaster where the male head of the household dies.

The following discussion outlines methods used and considers the lessons from previous disasters for addressing land issues as part of a DRR approach. Two case studies of natural disasters in Fiji and Samoa are provided to illustrate the points made.

2. Lessons for PICs from previous disasters

While each disaster in each country presents a unique set of challenges, there are general lessons from previous disasters that can be used to inform DRR. These 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 2010; Mitchell 2010).

PICs vary considerably in their capacity to implement DRR programs. Given their size and the predominance of urban areas along the coast, they are also particularly vulnerable to natural hazards. However, a strong case can be made for investment in capacity building for land agencies in key coastal urban areas as a mitigation measure. Some of the more obvious concerns for land and DRM agencies after a disaster focus on decisions about resettlement and these are complex decisions. Physical (or land use) planning provides a framework to initiate the discussions between government and the community, and Chand and Yala (2008) argue that, in general, there needs to be a transition from the existing informal arrangements into more formal (western) planning, land administration and dispute resolution systems. At another level there is potential for the vulnerable members of society to have difficulty returning to their land and resuming livelihoods.

The following is intended to foster discussion on ways that land issues may be addressed in the PICs through pre-disaster mitigation and preparedness measures. It is based upon a literature review and a series of case studies developed for training on land tenure and disaster risk management at the University of the South Pacific from 9 to 13

July 2012 funded under the AusAID Pacific Public Sector Linkage Program. Twenty-four participants from Land and DRM agencies in Fiji, Kiribati, Samoa, the Solomon Islands, Tuvalu and Vanuatu attended the training. The case studies were developed based on a literature review and sent to the training participants from each country, who provided comments and also provided additional feedback during the training.

While there are many dimensions to land and natural disasters the author considers that, based on the literature review and comments from training participants, two elements are particularly important to DRR in the Pacific Islands – enforcing land use planning controls, and improving tenure security through improved documentation of pre-disaster property rights.

Enforcing land use planning controls

The pattern of land use and land occupation is a reflection of the development decisions made by a country. Therefore hazard risk is a cumulative result of the deficiencies in past decisions related to land use and building control (Correa 2011). An absence of land use control or poor enforcement of existing controls as well as an absence of low-income housing programs can result in informal settlements appearing in the areas of greatest hazard risk (Correa *et al.* 2011). These areas are the least in demand and may be the only remaining viable option for the very poor. Larden and Sullivan (2008) argued that a failure to acknowledge or accept informal settlements is both a cause and a consequence of poor urban planning.

There are many informal settlements in PICs that are disaster-prone, and lack tenure security and services. While physical planning legislation exists in some PICs laws are often not enforced and the existing informal settlements are characterised by poor standard housing construction, limited access to reticulated water, sewerage and electricity, and

building in locations that face significant hazard risk. Across the Pacific Islands there is a trend towards recognising the rights of informal settlements and working with them to provide services and recognise their tenure.

Measures that reduce the risk of disasters are among the more important priorities of government. In areas of higher exposure to and risk of natural hazards effective land use planning can help to reduce the hazard risk and therefore reduce vulnerability (Mitchell 2011). However, in many of the PICs planning legislation (if it exists) is not enforced. Lunnay (2012) agreed, stating that a major issue to be addressed in DRM is the lack of planning controls. As a result development occurs on low-lying flood-prone land and areas that may be subject to inundation from the sea. For example, the development of resorts has occurred on coastal land adjacent to beaches without land use planning approval or consideration of hazard risk. There are often no planning controls that set aside land along foreshores as reserves that cannot be developed. Where they do exist they may be at odds with customary rights to access the coast and water.

In the major coastal urban areas there is strong justification for improving capacity and removing the barriers to the effective implementation of planning controls. Responses can include developing and enforcing planning zones over hazard-prone land, developing minimum relocation standards according to the local context, and developing land use master plans in collaboration with stakeholders. Where resettlement is considered, the community consultation processes of traditional (western) land use planning provide a framework on which discussion about changes to land use between government, customary groups and other interested parties can proceed.

Combining hazard mapping with land use master planning developed through effective community consultation allows for informed resettlement decisions. This is especially true

in those PICs with a large percentage of customary land (for example Fiji, Samoa, Solomon Islands and Vanuatu, among others). Active cooperation between government and customary groups is essential in achieving DRR. Much better to make these decisions using a land use planning process before a disaster rather than in the pressurised situation after a disaster strikes. Hazard risk mapping to support town planning and village development can include identification of vulnerable areas to guide land use zoning for urban and rural environments, and decisions about resettlement.

A review of existing policies and Land Use Master Plans with regard to existing DRR actions would enhance this work. This process could explicitly also address their vulnerability to disasters and measures to protect the rights to occupy the land post-disaster, or a plan for their post-disaster resettlement. Risk assessment would involve identifying areas to be demarcated as disaster-vulnerable areas on maps. These areas can be assessed for their suitability to be created as buffer zones within which development is prevented.

Hazard risk mapping should also inform land administration in areas at risk. As disasters may involve long-term or permanent resettlement of people the land agencies should develop policies on how to recognise and record tenure and property rights of people resettled after a disaster.

Documenting property rights

A common lesson from international experiences with natural disasters is importance of tenure security in protecting property rights of the more vulnerable and minimising the loss of land and livelihoods (e.g. Mitchell 2011; Usamah *et al.* 2012). Small Island Developing States (such as the PICs) face significant disaster risk, and most countries have informal tenures (such as customary land or informal settlements) not recorded by land agencies. After a disaster decisions concerning restitu-

tion need to be made quickly to allow the rebuilding and resumption of livelihoods. In some countries funds for reconstruction of houses are released only after formal land administration records are developed. However, on informal and extralegal tenures this may be very challenging where formal land administration had limited impact prior to a disaster (Zevenbergen *et al.* 2013).

In many cases the lack of land records or understanding of the complexity of property rights can be a barrier to the effective adjudication of rights. The land policy and legal frameworks may not adequately protect the more vulnerable such as women, children, the elderly and ethnic minorities. When a disaster occurs, groups whose rights to land are informal yet socially legitimate (for example, customary groups, tenants, sharecroppers, or farm labourers), or people occupying land illegally (e.g. informal settlements or squatters), are vulnerable to land grabbing or resettlement without compensation (Mitchell 2010). Changes to land administration that involve recognising and respecting all legitimate tenures are consistent with the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (CFS/FAO 2012), which includes a general principle that States should:

Recognise and respect all legitimate tenure right holders and their rights. They should take reasonable measures to identify, record and respect legitimate tenure right-holders and their rights, whether formally recorded or not; to refrain from infringement of tenure rights of others; and to meet the duties associated with tenure rights.

Safeguard legitimate tenure rights against threats and infringements. They should protect tenure right-holders against the arbitrary loss of their tenure rights, including forced evictions that are inconsistent with their existing obligations under national and international law.

Curry *et al.* (2012) argue that 'it is now recognized that adaptation, not replacement, of

customary tenures is the most appropriate way to resolve land issues for future development ... a significant task in many places is for land tenure arrangements to become flexible enough to enable and accommodate the settlement of those displaced through no fault of their own'. Lessons from previous disasters are that governments need to recognise the property rights at the new location, whatever the tenure type, otherwise the resettled people are at risk of land grabbing or conflict over land. This does not necessarily need to be land titles and could be in the form of land use certificates, records of occupation, or leases. The important aspect is a perception of tenure security through government endorsement and community acceptance.

As discussed earlier, many PICs (including Fiji and Samoa) have informal settlements and in the case of Fiji almost 10 percent of the national population now lives in squatter settlements. Sometimes the occupancy is illegal and in other cases the settlers may have 'extra-legal' rights. In either case the occupants have insecure tenure. Roads are not built, electricity is not connected legally and, in most settlements, there is no reticulated water or sewerage and no neighbourhood schools (AusAID 2008). In many of the PICs these settlements also have other problems such as conflict over land, poor health and inadequate sanitation (AusAID (2008)). In other parts of the world, Slum Upgrading Facility projects have led to improved tenure security through regularisation. This has helped to secure affordable housing finance, and an increase in property tax revenue for local authorities (UN-HABITAT 2009). Improved tenure security also improves their resilience to natural disasters.

One way to improve disaster resilience is to develop pre-disaster baseline records of land tenure and property rights where land records do not currently exist or are inaccurate. Depending on the country context this may range from creating accurate formal records of all land tenure types (including informal), to

developing simple records of legitimate interests in land. Tools such as the Social Tenure Domain Model (STDm) may be very effective in achieving this in some cases. Records derived from the STDm can allow land rights to be built into the cadastral systems of land agencies; however, further development is needed on how to operationalise this (Bennett *et al.* 2013).

Similarly, the more vulnerable can be protected through the revision of the legal framework for land tenure to ensure adequate protection for widows and orphans in the event of a disaster. This could be achieved through setting up a centralised national disaster database taking into consideration issues such as the land profile, hazard risks, existing development, land use plans, land valuation and land tenure.

As discussed earlier, a consequence of many natural disasters is that the loss of land agency staff, land records, and infrastructure can have a significant impact on response and recovery. Land records can be vulnerable to damage and destruction (Nelson 2010; UN-HABITAT 2010; Mitchell 2011). Actions taken pre-disaster to make staff, land records (and other important government records), surveying control networks and survey marks less vulnerable are important elements of a DRR program. As Nelson (2010) noted:

There are a number of guidelines and procedures that can be used to guide the development of methodologies to prevent and or mitigate the damages to records whether paper, digitized records, electronic or in other forms. These guidelines can be in a form of a recovery plan, or service continuity and response plan or a standard operating procedure. The hazards and risks need to be understood prior to the development of a plan. From this understanding, preventative and preparedness measures can then be designed to address these risks. A backup server at an off-site location is vital. Procedures should also be in place to ensure smooth switch from primary servers to backup servers to guarantee a smooth transition ... The emphasis on the availability of fire suppression equipment in

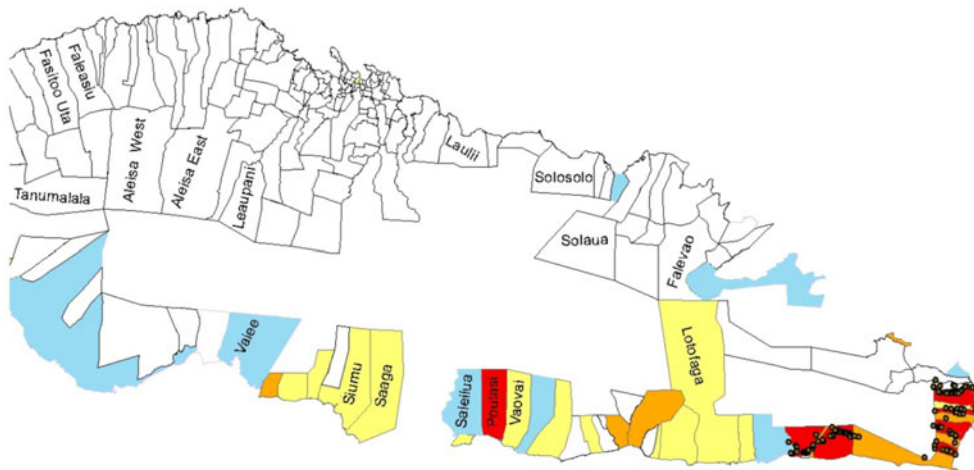


Figure 1. Impact to village areas on Upolu Island. Red indicates 351–813 persons, Orange 126 to 350, and Yellow 6 to 125 (Source: Ministry of Health 2009)

records storage or archives is a minimal investment but an effective preventative measure in the long term.

In the Pacific Islands much of the knowledge of property rights and boundaries is based on oral traditions. The weakness in a post-disaster context is that the death of senior members of the customary group may mean there are not enough people with the land knowledge to equitably protect the rights of all members. There may be a need to have local plans to address this potential weakness. Increased awareness is needed by customary groups on the interrelationships between land ownership, disaster mitigation measures, land use master planning, and environmental issues.

The following sections present two case studies that illustrate some of the points made – the earthquake and tsunami in Samoa in 2009, and the 2012 Fiji floods – each of which provides a graphic reminder of the vulnerability of communities to the increasing frequency and severity of natural disasters.

The 2009 Samoan tsunami

In September 2009 two earthquakes caused tsunami waves in Samoa that killed 147 people

and internally displaced around 5300 (approximately 2.5 percent of the population). Communities in 23 villages mainly along the southern coast of Upolu Island (see Figure 1) fled their homes and were displaced to higher ground further inland. As approximately 70 percent of the urban areas are located in low-lying coastal areas, there was significant damage to buildings, roads, water and electricity systems. Agricultural land suffered damage, and people lost livestock and equipment, and tourist commercial businesses were destroyed. As the land rises quite rapidly from sea level, villagers only had to move between 1 and 5km inland to be safe (OHCHR 2011).

Following the 2009 tsunami decisions were made to resettle vulnerable coastal communities. A challenge was to find suitable land that did not cause a tension with the customary owners of the land. As most land in Samoa is under customary ownership (81 percent), this means that effective communication between the government and customary groups is important. The Village *Fono* (Council) had an important role in this communication, which was essentially a land use planning exercise.

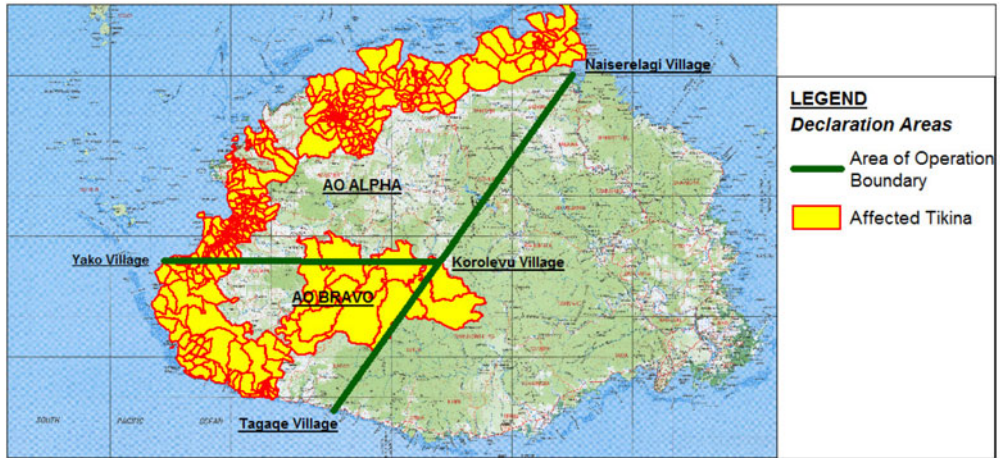


Figure 2. Areas affected by the 2012 floods in Fiji (Source: Tuamoto *et al.* 2012)

Many survivors chose to move to higher ground inland (Connell 2012). In most of the cases the topography of the land rose quite quickly from the coast to much higher ground, allowing the resettlement of villages on higher community-owned garden land, although still close to their original location. Most families who live on the coast also own farm land inland. The post-tsunami relocation pattern of communities was considerably more dispersed than in traditional villages in Samoa. However, the more dispersed the population the more expensive the capital investments for the provision of services were (World Bank *et al.* 2009). The initial observation was that the majority of the affected families who remained inland were occupying their own lands. Some people returned later to their land of origin for a variety of socio-cultural reasons. These included ocean-based livelihoods, social organisation, extended family ties, strong community structures, customary land ownership where occupation is the basis for right to tenure, powerful links to the village church, and emotional ties with ancestral grave sites on traditional land. All these reasons made it difficult for a community to voluntarily relocate away from their original location

(World Bank *et al.* 2009). Lauer *et al.* (2013) also noted that on the island of Simbo the aftershocks were a catalyst for people to move to several recently cleared gardens which became temporary camps.

There were, however, a small percentage of persons who remained with host families on properties on which they are not able to place a long-term claim as customary land cannot be sold. The authorities considered that these problems could be resolved through self-governance at the local level facilitated by the customary land tribunal where the affected parties could be helped to negotiate an exchange of land rights. However, the resolution of land tenure issues for these people required urgent attention (World Bank *et al.* 2009), illustrating the challenges of post-disaster resettlement. Post-disaster surveys indicated that 95 percent of the affected people preferred to stay in the safety of their farm-lands (Iese 2012).

The World Bank *et al.* (2009) argued that planning for relocation should aim to maintain the social cohesion and social networks of the relocated communities; such inter-community relationships are fundamental in helping communities gain back their strength and

their resilience. The resettlement of coastal villages provided an opportunity for a land use planning process that considered the economic and touristic development of the areas on a new basis, potentially increasing the land value. These opportunities need to be examined in consultation with the communities to develop an appropriate recovery and reconstruction strategy on tourism for the area (World Bank *et al.* 2009).

The loss of land agency staff, land records, and infrastructure after a disaster can have a significant impact on response and recovery. Nelson (2010) stated that after the 2009 Samoan tsunami 'Personal properties such as vehicles, furniture, family memoirs and important documents were washed away or soaked by sea water. Records such as birth, death and marriage certificates, land related records, family titles, and business licenses, were replaceable as the Government archives where these records are kept were not affected'. Heritage Preservation (2009) reported that following the 2009 tsunami 'The Registrar's Office, which holds the land records for American Samoa, was heavily flooded; 120 boxes of records were recovered and sent to a nearby tuna packing plant for freezing. A lesser amount of records at the *Fono* (Legislature), Power Authority, Development Bank, and High Court were also damaged, and local teams have been in touch with the National Archives and Records Administration on the best way to proceed with recovery efforts'. One of the major lessons was that actions taken pre-disaster to document land tenure for people in areas of high hazard risk and to protect those land records from damage by disasters are important elements of a DRR program.

The 2012 floods in Fiji

Nadi is located on the mouth of the Nadi River and was initially an agricultural community centred on the sugar cane sector. The establishment of the Nadi International Airport boosted

the economy of the agricultural community, which shifted to tourism, and now Nadi is the hub of tourism and other tourism-related activities which are significant drivers of the national economy (Tuamoto *et al.* 2012).

As a result of the 2012 flood there was a 'Declaration of a State of Natural Disaster' on 25 January 2012 for a 15 day period, and on the 8 February for a 10 day period. A total of 728 people were evacuated into seven schools, including 304 children. The evacuation centres were activated on 23 January as floodwaters broke the river banks and homes began to be flooded (Iese 2012).

The emergency response was managed through the National Emergency Operation Centre office in the NDMO office in Suva, and the Divisional Emergency Operations Centre (divisional commissioner western district emergency operations centre) at the Nadi office. An Emergency Response Review found that the strengths of the response were the interagency coordination, the utilisation of military logistic systems that enabled the effective distribution of relief supplies to affected families, and the GIS capacity within NDMO, which provided support in terms of hazard mapping and coverage areas. The emergency response weaknesses and challenges were found to be:

- The Early Warning System warning was not timely – Some people hesitated to leave to secure their properties.
- A limited budget.
- Difficulties in the co-ordination of relief efforts including civil society and NDMO consultation.
- Insufficient awareness of the risk involved.
- Difficulties in providing adequate transitional shelters
- Difficulties in sustaining livelihoods after the disaster, especially for farmers who lost their crops (Tuamoto *et al.* 2012; Iese 2012).

The floods affected mostly the west side of the island and in particular the Nadi area (see Figure 2). The Pacific Humanitarian Team (2012) reported that ‘At the height of the flood around 15,000 men, women and children sheltered in evacuation centres, most of whom returned after several days ... it is clear that around 1000 people will need alternative shelter/housing for a longer period as their homes have been damaged or destroyed in the floods. These families are particularly vulnerable’.

Challenges for land administration during the emergency response included a lack of baseline information that would enable the quantification of the degree of affected livelihoods, surveyed boundary shifts due to silting or landslides, and the need for care with the process of resettlement, land acquisition and compensation (Tuamoto *et al.* 2012; Iese 2012).

Land tenure in Nadi includes native (customary) land, Crown land and freehold land (see Figure 3). In Nadi the land parcel boundaries and records are clearly defined and records available and administered within relevant legal frameworks. This level of documentation of land rights was an important aspect of the ability of the land and disaster agencies to respond.

The Government has developed a long-term plan for the relocation of the airport, tourism services, ten *i-taukei* villages, and commercial developments. This is clearly a large undertaking and has many commercial and land value consequences. The choice of site will need to take into consideration the land tenure of the site and provide for tenure security for the relocated people and enterprises. Also important are accurate estimates of the land value of the land from which resettlement occurs and also of the land to which people are resettled. Resettlement on customary land can be very problematic as the customary owners are more likely to consider the ‘value’ in more than purely economic terms. Valuation of customary land is a notoriously difficult

process, and has been a significant cause of dispute over land in the Pacific Islands (Mitchell and Myers 2013). However, current records on land tenure and land valuation are necessary if adequate compensation is to be paid (Tuamoto *et al.* 2012).

Other lessons for DRR are that a hazard risk assessment and land use master planning process could be used to assess whether people affected by this flood face recurrent risk and should be resettled in order to reduce their risk to future floods.

3. Conclusion

This paper presented some lessons learned from previous international disasters, as well as from recent disasters in Samoa and Fiji. Some of these post-disaster land issues were due to a combination of limited capacity and the damage caused by the disaster, and these lessons can help to inform pre-disaster actions (i.e. DRR). Some issues also arose from the decisions made to relocate the villages most affected by the respective disasters. This paper argued that decisions on resettlement should be made prior to disasters as a mitigation or prevention measure and can benefit from using a land use planning process where there is an opportunity to undertake effective and transparent community consultation on whether this is needed and how it occurs.

Closely related is the need to protect the property rights of all those affected by a disaster, including displaced persons and host communities. Emerging tools such as the STDMS provide an opportunity to do this at scale. As land tenure and disaster risk are key elements in the decisions on resettlement it is important to establish effective mechanisms for coordination between land agencies and disaster management agencies.

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