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Urbanisation and Natural Disasters in Pacific Island Countries

John R. Campbell

Abstract

The growth of urban populations in Pacific Island Countries is reflected in growing numbers of informal settlements with high levels of exposure and vulnerability to natural disasters. As urban populations grow and become increasingly dense, with large numbers living in informal settlements, the potential for major catastrophes is increasing. Despite this, most disaster risk management throughout the region still focuses on rural areas, reflecting historical practices and experience and some political preference for rural areas. There is a greater need in the region to develop measures that reduce people's exposure to hazardous events in towns and cities, mostly by incorporating urban planning measures that discourage settlement in marginal and hazard-prone areas. This will be challenging given the complexity of land tenure arrangements throughout the region. It is also important that the root causes of people's vulnerabilities are addressed, so that the processes by which they come to live in unsafe conditions can be understood and measures introduced to reduce people's risks and losses.

Introduction

Pacific Island countries (PICs) are exposed to many types of natural hazards, the majority of which are climate related and projected to either increase in frequency of occurrence and/or intensity as a result of climate change. Accordingly, disaster risk reduction (DRR) (see terminology section below) will be a key element of climate change adaptation in the Pacific Islands region. Failure to achieve significant reductions in disaster risk is likely to result in severe hardship for affected communities.

Traditionally, communities in PICs had a range of practices that enabled them to cope with extreme environmental events (Campbell, 2006). Prior to colonisation, these communities lived in non-urban, mainly village, settings and engaged in rural subsistence livelihoods. With the advent of colonial control and the introduction of Christianity, responses to disasters began to change – cash earnings supplemented subsistence livelihoods and the

provision of relief (from governments and/or churches) increasingly began to follow disasters. For most of their colonial history and into the era of independence, the focus of activities that today would be called disaster risk management has been rural areas, with towns and cities being largely neglected despite the fact that they now account for almost a quarter of all Pacific Island people. The term disaster risk management (DRM) refers to an overarching approach to hazards incorporating two main sets of activities: disaster risk reduction (which in the past was often referred to as prevention and/or mitigation) and disaster management (often referred to as preparedness) (see below). While PICs and relevant regional organisations have achieved considerable progress in improving disaster risk management in recent decades, much of this has been in the context of rural communities and most of the effort has been in the area of disaster preparedness and management of the disaster event rather than reducing losses and prevention. There are several reasons for this. Until the last few decades, the populations of all but a handful of PICs have been predominantly rural. In addition, given that, in terms of spatial distribution, urban areas make up only a small percentage of the land area of most countries, the probability of urban areas being struck by events, such as tropical cyclones, is relatively low. The same may be said, of course, for any single rural community, but taken as a whole it is more likely that a disaster will affect a rural community, or several of them in a country, than an urban area. The relative isolation of many rural communities requires special planning and preparedness for disasters and in some countries the provision of disaster relief may be seen as a de facto form of rural development assistance.

Despite this rural focus, it is becoming increasingly important to address the issue of urban disaster risk management in PICs. As urban populations grow and towns and cities continue to house increasing concentrations of people, there is a growing possibility of further very severe impacts should a disaster strike. The effects of disasters in urban areas may not be confined only to the towns which, particularly national capitals, tend to have a large share of national GDPs, nationally significant resources and are the loci of national development planning and infrastructure. Major urban disasters are likely to have widespread and long-term implications for the sustainable development of PICs. This is of concern especially where towns and cities are located in hazard prone locations such as coastal plains and seismically active areas or have significant proportions of their populations living on unstable slopes or low-lying land.

Terminology

An array of terms has arisen in the field of disaster management as it has gained increasing visibility in recent decades following the International Decade for Natural Disaster Reduction in the 1990s. From this emerged the International Strategy for Disaster Reduction (ISDR) which is today administered by the UN Office for Disaster Risk Reduction (UNDRR). This period has seen a slow change of emphasis in disaster risk reduction from focusing on the physical extreme event (often referred to as the hazard) to recognising the social, political and economic causes of vulnerability. From this perspective, disasters are not natural and occur only when a vulnerable community or society is exposed to a hazard (Wisner et al., 2004). Reducing vulnerability, then, becomes the key to reducing disaster risk. The following terms are used in this report and their definitions, as used in relation to the ISDR and the UNDRR, are as follows (UN General Assembly, 2016):

Disaster: A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts.

Disaster management: The organisation, planning and application of measures preparing for, responding to and recovering from disasters.

Disaster risk management: The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses.

Disaster risk reduction: The prevention of new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.

Exposure: The location of people, their activities (including livelihoods), infrastructure and cultural, economic and social assets in hazard prone areas (This combines IPCC (2014) and UNGA (2016) definitions).

Vulnerability: The propensity or predisposition, determined particularly by economic, political and social processes, to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt (adapted from IPCC (2014) and UNGA (2016)).

Hazards in Pacific Island Countries and Territories

Most PICs have high levels of exposure to natural hazards and most of these may impact upon urban areas. All but a few countries, those close to the equator, are exposed to the tropical cyclone hazard (with its three elements of devastation: wind, rain and sea (storm surge and high waves)) and most urban areas are in coastal locations. Table 1 lists the hazard events commonly experienced in the region.

Table 1. Natural Hazards in the PIC Region

Geophysical		**Biological**	
Meteorological	Geological	Floral	Faunal
Tropical Cyclone	Volcanic Eruption	Weeds	Pests
Drought	Earthquake	Fungal diseases	Disease vectors
Flooding	Tsunami	Human	Human
River	Slope Failure	Animals	Animal
Coastal	Erosion	Plants	
Frost	Slope		
	Riverbank		
	Coastal		

After Burton et al. (1993)

The focus of this briefing paper series is on climate change. The hazards listed in the left-hand column of Table 1 are clearly linked to this, but it should be noted that other hazards are also likely to be connected to climatic events. For example, slope failure and erosion often occur under conditions of heavy rainfall as does riverbank erosion while coastal erosion may be linked to sea level rise and storm surges associated with tropical cyclones. The impacts of tsunami may be greater in a context of higher sea levels and coral reef degradation (caused by ocean acidification and increasing sea temperatures). Similarly weed infestations, pests and disease vectors are also linked to some climatic variables. Climate change scenarios suggest that many of these hazard events will occur more frequently and/or with greater intensity (Porter and Xie et al., 2014; Smith and Woodward et al., 2014). For example, tropical cyclones are projected to become more severe (greater wind speeds and precipitation) but to occur less often or at no greater frequency than at present (IPCC, 2014). A scenario such as this suggests that if levels of vulnerability are not reduced, the losses and harm will be greater, and the time taken to recover will be longer. In effect the periods of 'normality' between events will become shorter even if the frequency of hazard events declines.

There is considerable variety in the physical geography of islands in the Pacific region (Table 2). To the west of the region the large Melanesian Islands are formed by subduction as the continental Australian and Filipino tectonic plates override the oceanic Pacific plate. To the east of Melanesia lie the Intraplate or Oceanic Islands which range from large volcanic high islands through to low-lying atolls. There are urban areas of varying size and complexity on all of these island types. The biggest cities, located on the large interplate-type islands along the ring of fire, are exposed to the earthquake hazard in addition to the range of other hazards common to PICs. The town of Rabaul, former capital of East New Britain province, Papua New Guinea, was destroyed by volcanic eruption in 1994, and the provincial capital was moved to Kokopo, some 20 km away. The small town of Gizo in the Western Province, Solomon Islands, was devastated by an earthquake and tsunami in 2007 and in 2014, a tropical depression (later to become Cyclone Ita) caused major flooding of

the Mataniko River in Honiara, the capital, resulting in 22 fatalities and the displacement of about 10,000 people. Port Vila, the capital of Vanuatu, experienced damage from an earthquake and tsunami in 2002 and in 2015 was severely impacted by Cyclone Pam, one of the highest magnitude Tropical Cyclones recorded in the South Pacific.

Table 2: Types of Island in the Pacific Region

Island Type	Implications for Hazards
Interplate Islands or Continental Type Islands Large High elevations High biodiversity Well-developed soils River flood plains Orographic rainfall	Located along subduction zone and prone to earthquakes and volcanic activity. River flooding more likely to be a problem than in other island types. In PNG high elevations expose areas to frost (extreme during El Nino).
Intraplate or Oceanic Islands **Volcanic High Islands** Steep slopes Different stages of erosion Barrier reefs Relatively small land area Less well developed river systems Orographic rainfall	Because of size few areas not exposed to tropical cyclones. Streams and rivers subject to flash flooding. Barrier reefs may ameliorate storm surge and tsunami. More recent islands may be prone to volcanic eruption.
Atolls Very small land areas Very low elevations No or minimal soil Small islets surround a lagoon Shore platform on windward side Larger islets on windward side No surface (fresh) water Ghyben Herzberg (freshwater) lens Convectional rainfall	Exposed to storm surge, 'king' tides and high waves. Narrow resource base. Exposed to freshwater shortages and drought. Water problems may lead to health hazards.
Raised Limestone Islands Steep outer slopes Concave inner basin Sharp karst topography Narrow coastal plains No surface water No or minimal soil	Depending on height may be exposed to storm surge. Exposed to freshwater shortages and drought. Water problems may lead to health hazards.

Source: Campbell (2006)

Some of the younger oceanic high islands, formed originally as volcanoes over 'hot' spots in the earth's mantle, have active volcanoes but these are not close to urban areas. Generally, oceanic high islands are characterised by steep slopes and have relatively small river catchments and streams that are subject to flash flooding during heavy rainfall events and especially during tropical cyclones where the flooding is often worsened by the effects of storm surge. Apia, the capital of Samoa, is an example of an urban area that is exposed in this way – indeed a large portion of Apia is very low-lying. Considerable damage resulted from flooding caused by Cyclone Evan in 2012.

Atolls are made up of small islets surrounding a lagoon. Typically, the islets are very low-lying, often no more than a few metres above sea-level and can be washed over by storm surges during tropical cyclones and even inundated temporarily by seawater during king tides. With no surface water they are dependent upon a freshwater lens to support human populations. Despite these constraints, atolls support significant numbers of inhabitants and the urban areas are very densely populated. Atoll populations are particularly exposed to a variety of natural hazards.

The suite of hazards in the Pacific Islands region also includes biological hazards. Urban areas, particularly those with high densities of population, poor urban water quality and inadequate sanitation may be particularly prone to human diseases. Scenarios including increased incidence of droughts have particular relevance in this regard. Tarawa, in Kiribati, experienced a serious cholera outbreak in 1977 and incidence of diarrhoeal diseases is quite high in many urban atoll settings. The issue of disease outbreaks and epidemics is also of concern for smaller PICs which tend to have limited hospital and general medical facilities. Where diseases are communicable, urban areas may enable rapid transmission of illness.

Urban Disaster Risk Reduction Measures: An Overview

The range of measures to reduce disaster risks or to reduce losses from disasters can be grouped into three categories. The first of these are measures that seek to keep the hazard away from people. These are usually in the form of 'hard' engineering works such as river stop banks or levees, channel straightening and coastal protection works such as sea walls. Usually such measures are expensive and require maintenance. Moreover, they fail in the event of supradesign extremes (which may be expected to occur more frequently with climate change) and often lead to greater losses than would be the case if they were not constructed as they inevitably lead to a belief that the 'protected' areas are completely safe. This group of measures may also include activities such as catchment management through reforestation or, in the case of coastal hazards, through coral reef protection and mangrove replanting.

The second group of measures are those in which, rather than keeping the hazard agent away from people, people are kept away from the hazard, or more correctly from hazardous areas where the hazards are most likely to occur. These measures are usually land use planning mechanisms, often based on hazard maps, that restrict development, or particular types of development, in locations that are exposed to flooding (river and or coastal), shaking from earthquakes, and the like. Key elements of this group include zoning ordinances and subdivision regulations which require applicants to obtain consent to build

in areas that have been designated as unsuitable for residential or other types of development. Typically, such areas are low-lying, adjacent to waterways or the sea, on unstable slopes or on or near fault lines. Other measures seek to keep people protected from the hazard by reducing the vulnerability of buildings. Usually this is achieved through building codes which require buildings to be able to withstand certain wind speeds or levels of shaking during an earthquake. They may also require minimum floor levels for protection from flood waters. Finally, keeping people away from the hazard includes evacuation measures which are commonly linked to civil defence and disaster management, the development of effective warning systems and the identification of places to which people may be safely evacuated.

The third group of measures are those that seek to reduce the losses after they have been sustained. These include insurance, which is often attached to home and contents insurance policies and out of the reach of most PIC households, and the provision of disaster relief. The latter is often carried out through government agencies and independent organisations such as the Red Cross and also funded by international agencies and through bilateral assistance.

It is fair to say that PICs have tended to neglect the option of keeping people away from the hazard. Indeed, DRM in the region, which has only been formalised in many countries since the 1990s, has tended to focus on improving the third option, disaster management, relief and recovery. The building of protective works has tended to be carried out through national level public works departments, or occasionally by urban authorities, usually with little consultation with disaster management officials. Land use planning approaches to keep people away from exposed locations is also very much neglected. As shown in Campbell (2019b), urban planning has made little headway throughout much of the region (Samoa being a significant exception). Figure 1 summarises the range of disaster reduction measures taken in PICs and their respective levels of uptake. Given the relatively limited capacity for urban planning and management, it is not surprising that the planning tools designed to keep people away from hazard locations have had little application.

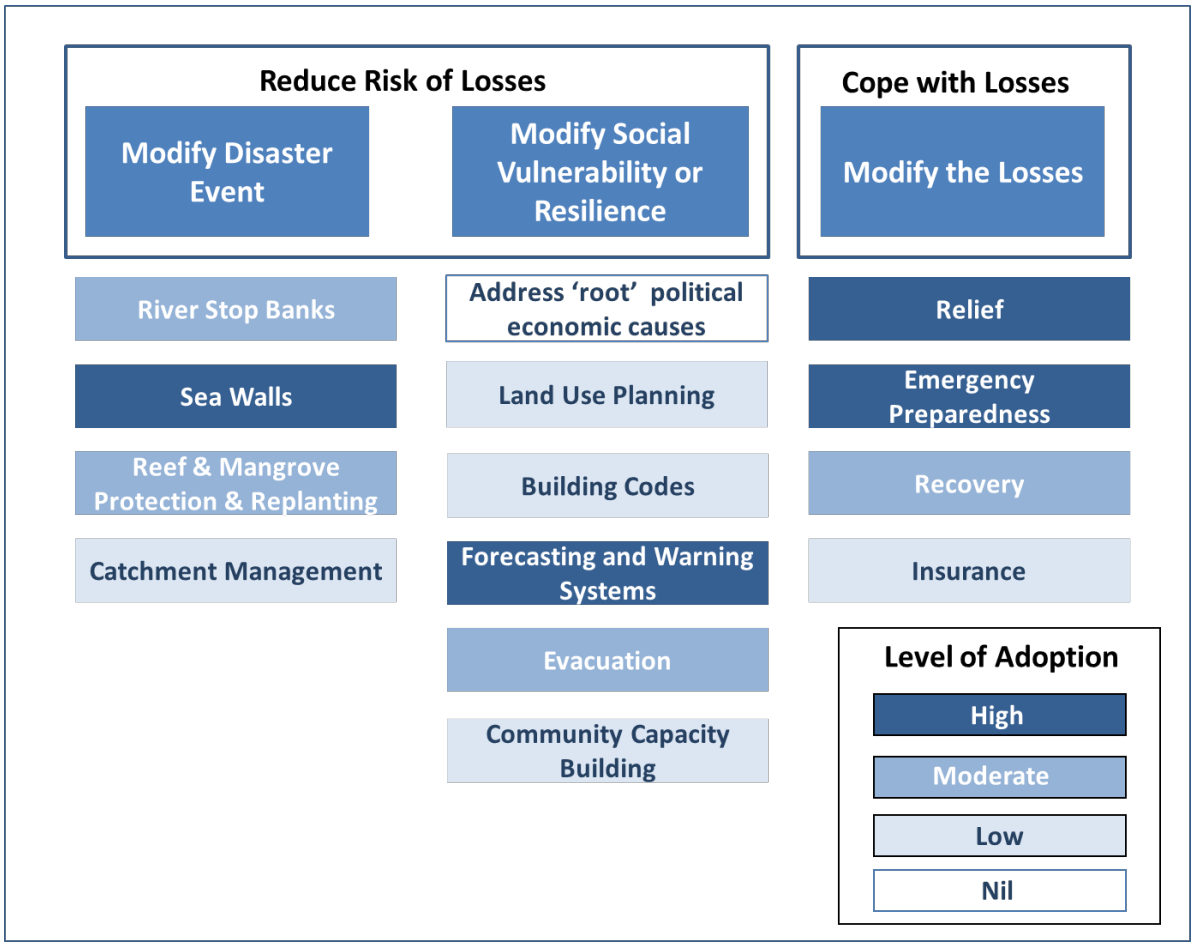

Figure 1. The range of disaster risk reduction measures available to disaster risk managers and urban authorities in PICs, and their levels of adoption. Long term measures to keep people away from hazards such as land use planning and building codes tend to have the least uptake. Concept for Figure based on Ericksen's (1986) characterisation of DRM in 20th century New Zealand.

Kenneth Hewitt (1983) raised concerns about the dominant approach to DRM that had existed around the world through much of the 20th century up to the time of his writing (and indeed well beyond). This tended to favour a focus on building scientific knowledge about, and monitoring of, the geophysical processes giving rise to extreme events and implementing engineering solutions to control their effects (and keep them away from people) and, when they failed, the institution of emergency measures (such as evacuation and post-disaster assistance), often in the hands of military organisations. Hewitt pointed out that disasters reflect ongoing societal conditions but approaches to understanding why and how they happened tended to separate disasters (as 'unscheduled events') from every-day social, economic and political processes. As a result, little headway has been made in finding measures that successfully reduce disasters.

Wisner et al. (2004), like Hewitt, show that the causes of disasters lie in the social realm, rather than the physical world. Rather than focusing on modifying extreme events, they stress the need to examine the processes through which vulnerability is (re)produced. From their perspective disasters occur only when a vulnerable population is exposed to a

natural extreme event or hazard (such as a tropical cyclone for example). They go on to show that vulnerability is a product of political economic structures, with the root causes lying in macro-processes such as a history of colonisation, the expansion of neo-liberal economic ideologies and globalisation. Figure 2A illustrates the model as a process in which these root causes are transformed through dynamic processes into unsafe conditions (or vulnerability).

It is not difficult to apply this model to Pacific Island urban areas (and indeed rural communities as well). All PICs (perhaps with the exception of the Kingdom of Tonga which was a British Protectorate) have a history of colonisation which included a range of processes that undermined traditional resilience in the region including changing religions, introducing the cash economy and capitalist modes of production (which existed alongside the subsistence economy in rural areas), and developing urban centres which initially were sites of exclusion for indigenous people (see Campbell 2019b). The early towns were also nearly exclusively coastal (and indeed colonial and missionary interests brought rural communities from inland areas to coastal sites where they could be administered or controlled). New vulnerabilities were established, and older forms of resilience undermined. Applying the progression of vulnerability model enables the identification of the processes by which urban vulnerabilities have emerged and the unsafe conditions that have resulted (see Figure 2B). Figure 1 also includes a box which shows that addressing the root causes of urban vulnerability has been largely neglected throughout the region, and by most international and voluntary agencies involved in disaster risk reduction.

Both models give insight into why urban areas have become highly vulnerable in PICs. On the one hand, while it is not likely that the root causes will (or indeed can) be addressed by PIC governments, identifying dynamic pressures can help point to actions that may increase community capacities to build resilience and recognising unsafe conditions can provide indications of where reductions in vulnerability may be achieved. It is also very important to recognise that, while Figure 2B lists examples of unsafe urban conditions, Pacific island people do have high levels of agency and, while some elements of resilience have declined, there is still considerable capacity within urban communities (including informal settlements). On the other hand, identifying the three approaches to disaster risk reduction (in Figure 1) shows where there are imbalances in the various foci of DRM, and that some of the measures which have received the greatest support and investment are unlikely to bring about sustainable and long-term improvements in disaster risk management.

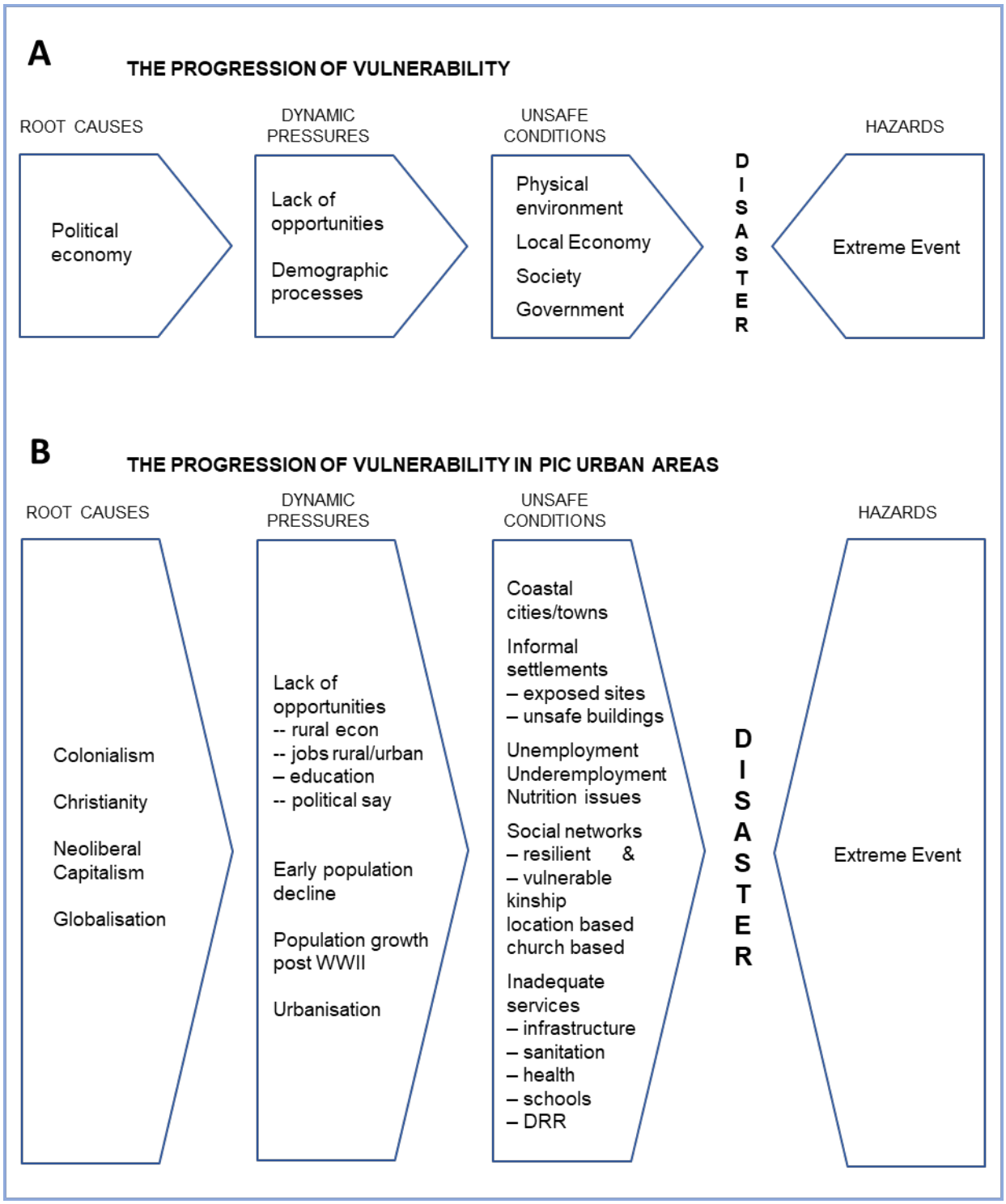

Figure 2. The progression of vulnerability. 2A shows in abbreviated form the key elements of the process in which root causes are converted into vulnerable local communities. In 2B some salient characteristics of colonial and post-colonial PICs are placed in the model to illustrate the ways in which urban vulnerabilities are created. After Wisner et al. (2004).

Rural – Urban Comparisons in Exposure to Disaster Risk

There are a variety of reasons why urban areas require some different approaches to disaster risk management, compared to those applied to rural communities, (see Table 3). Livelihoods in urban areas have distinct differences from most rural communities where both subsistence and commercial agriculture play an important role. While urban gardening is important in PICs (Thaman, 1995, 2004) it is usually a supplement to purchased foods. In this sense, urban residents may not be as directly affected as those in the rural areas, where crop damage can critically impact both subsistence and commercial livelihoods, although 75 to 100 per cent of urban gardens were lost during the 2014 flood event in Honiara (OCHA, 2014) causing considerable hardship. Rural residents usually have access to famine foods and not all crops are equally vulnerable though it may take a year for seasonal crops to be re-established, and damaged coconut trees, a key source of rural cash income in many rural areas, may take several years to begin producing again following tropical cyclones. However, where urban dwellers lose employment as a result of disaster damages, or similarly are unable to ply their wares and services in the informal sector, livelihoods can be severely diminished. Also, the impacts of disasters on agricultural areas beyond the towns and cities can result in heavy increases in food prices, placing further pressure on urban food insecurity.

Traditional Pacific Island communities were often described in terms of their relative well-being, producing surpluses with ample leisure time. Fisk (1962, 1964) referred to this as subsistence affluence. It was made possible through sustainable agricultural practices that Clarke (1977) described as 'structures of permanence'. This is no longer the case in many rural communities. The grafting of a commercial agricultural component onto traditional farming practices has placed pressure on land and labour and has reduced the efficacy of the subsistence sector. In addition, people's wants and needs, the determinants of affluence, have drastically increased. Indeed, these processes are among the motivations for rural to urban migration. Nevertheless, it still appears that most hardship is experienced in urban communities where the subsistence sector is much smaller. The adaptive capacities of communities with more secure livelihoods and abilities to cope with extreme events are likely to be considerably greater.

Table 3. Summary of differences between rural and urban communities.

	Rural	**Urban**
Economy	Self-employed mixed cash-subsistence agricultural production. Subsistence fishing.	Employment, under-employment, unemployment, informal sector, small scale subsistence food production.
Wellbeing	'Subsistence affluence' declining	Poverty, hardship some affluence
Water Supply	Drought risk	Drought risk and general supply problems
Housing	Traditional and transitional. Permanent.	Informal, transitional, temporary.
Land tenure	Secure. Resilient structures.	Insecure. Vulnerable structures.
Utilities	Small scale, not highly dependent	Larger scale, higher levels of dependency on government (local or national) provision
Social cohesion	High levels of community organisation through traditional and other socio-political structures	Mixed levels of community cohesion especially among people without common origin
Local Knowledge	High levels of understanding of local environmental conditions often supported by passing down of traditional knowledge.	Less comprehensive understanding of local environmental conditions
Access to emergency services	Often isolated – initial post-disaster assessment may take several days or even weeks	Close to emergency services before, during and after event. Informal settlements sometimes neglected

Water supplies in Pacific Island communities range from manually collecting water from streams and wells and roof catchments, to local schemes where water is piped to villages from nearby and distant water heads. Sometimes it is pumped as a result of rural development schemes. Urban areas have a similar range. Although most towns and cities have reticulation systems, they range in size, capacity and coverage. It is common for informal settlements to be omitted from such schemes and potable water supply is an issue of major

concern in informal settlements, even when they are not affected by disasters. When disasters occur, provision of fresh water can become critically constrained and is a major concern following tropical cyclones and tsunami where water supply sources in coastal areas may be affected by saltwater contamination. During droughts urban areas can be particularly exposed as the demand for water is much greater than the available supply, given the densities of the towns and cities.

There has been a significant transition in Pacific Island housing styles with traditional structures becoming less common, and with those that are being constructed often built in non-traditional ways (e.g. using nails instead of sennit (rope made from coir) which has considerable strength) (Campbell, 2006). Nevertheless, in most parts of the region, rural dwellings are permanent structures, designed and built to last. By the same token, 'formal' structures in urban places are also often constructed in accordance with wind resistant building standards. The informal settlements, however, are often characterised by housing that is sometimes specifically temporary, reflecting the reluctance of landowners to allow squatters to establish a permanent foothold on their land or of banks to provide loans. These buildings, and their contents, are likely to be among the most at risk of failure and loss, in the event of high winds such as in the event of tropical cyclones.

Throughout the Pacific Islands region, land is of critical importance to most social groups and is considered by many to be the heart of their identity – it is not easily transferred to others (see Campbell 2019a for a discussion of land in PICs). Most freehold land in PICs was alienated either before, or during, their colonial eras. One reason this was done was to establish many of the colonial administrative centres. However, as the towns have expanded the availability of 'spare' freehold land has diminished. One outcome is that informal settlements have emerged on the land belonging to communities that have been absorbed by the urban growth and those that live nearby the towns and cities. A major goal of urban governance throughout the region is to find ways in which improved security of housing can be achieved while not eroding the rights of the local landowners. Often there are tensions between landowners and 'squatters' on their land. Informal lease arrangements are frequently insecure and, for many inhabitants of informal settlements, obtaining stable access to land is difficult.

Most Pacific rural communities have limited infrastructural development and a relatively narrow range of services and utilities. Much local movement on the land is still by foot or horseback. Accordingly, they have much lower levels of exposure. Urban communities on the other hand tend to be much more dependent upon a whole range of services including water supply, sanitation, electricity, communications, bridges, roads and bus transport, all of which can be damaged, destroyed or disrupted. Disaster risk reduction in urban areas needs to incorporate building resilience in the various elements of infrastructure as well as building for preparedness to cope should such infrastructure fail.

A successful national programme to improve disaster risk management would incorporate both urban and rural areas and treat them in respectively appropriate ways. For most countries a 'one size fits all' approach is unlikely to work. Disaster risk reduction is likely to be most successful when measures are incorporated into the everyday activities associated

with communities, taking into account such things as livelihoods, shelter and social interaction. There are distinct differences in these between the urban and the rural. Moreover, urban areas are increasingly characterised as having two sets of communities: those living in formal settlements and those who are not. Disaster risk reduction also needs to take these into account.

Urban Vulnerability Creation

Given that urban settlements do not have a tradition of DRR, any growth in the numbers of urban residents is likely to increase the number of at-risk individuals. But the rapid population growth also contributes to vulnerability creation in other ways as illustrated in Figure 4. As urban populations swell, many immigrants have insufficient access to adequate livelihoods because of unemployment and underemployment. Moreover, in comparison to rural communities, most urban settlements have only limited access to subsistence food resources such as carbohydrates, vegetables, meat and fish. Paid employment, therefore, is more critical for members of urban families. However, in the Pacific region urban employment levels are low and poverty, once a rarity in PICs, is now being commonly recorded (Abbott and Pollard, 2006; Bryant-Tokalau, 1995, 2012, 2014). Wisner et al. (2004) identify lack of access to, or insufficient, livelihoods as one of the key issues in relation to individual and household vulnerability (see Figure 2B). Few urban households have accumulated assets that can be used to help cope with disaster losses. Poor health is also an important factor increasing personal vulnerability to disasters. Informal settlements in urban areas are often characterised by health problems related to poverty, overcrowding, poor sanitation, unsuitable habitats (including disease vectors) and malnutrition (Culpin, 2017; Phillips and Narayan, 2017).

Similarly, secure shelter is at a premium as informal settlements expand and national and urban governments are unable to afford, or choose not to provide, services to these areas. The outcome is that people are rendered vulnerable in terms of their physical environment and their social wellbeing. These processes are complex and beyond the capacities, or indeed mandate, of national disaster planning offices. They are processes of social change that national governments are struggling to manage. Urbanisation is becoming well embedded and urban areas are likely to continue to expand. Increasing numbers of urban residents are being born in the towns and the cities and the old patterns of circular migration are transforming to more permanent forms (Connell, 2017). With small resource bases and limited opportunities for (sustainable) economic development, it will continue to be difficult to provide adequate livelihoods and services. Even if the complex land tenure issues could be resolved, it is likely that many urban dwellers would struggle to have adequate and secure shelter.

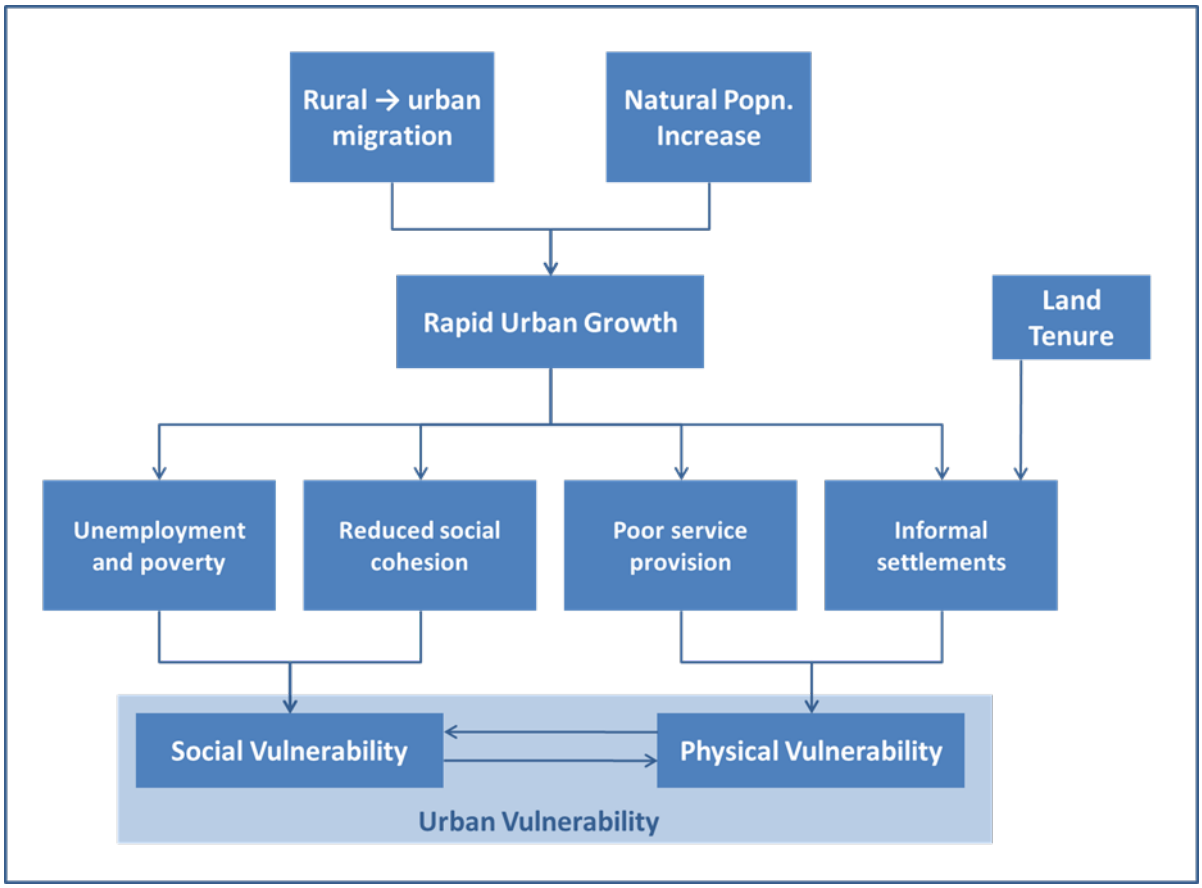

Figure 4: Urbanisation processes that contribute to the creation of urban vulnerabilities both in terms of physical vulnerabilities (housing and infrastructure) and social vulnerabilities (livelihoods and social cohesion).

Ironically, the institutional arrangements for urban management and for DRM contribute to urban vulnerability creation. Both urban management and DRM agencies have tended to be marginalised compared to government departments responsible for priorities such as economic development, education and health. Moreover, they have tended to be largely separated from each other, both in terms of their placement in different government departments and in terms of recognition of their mutual interests. Both also share limited legislative support. Most national DRM tends to focus on emergency management rather than DRR and urban planning legislation tends to be limited and where it is established its implementation is weak (Campbell, 2019b). Urban managers are under pressure to maintain adequate services, often of the most basic type (e.g. roads) and it is difficult for them to see a need for reducing vulnerability to disasters. In similar vein, most disaster managers in PICs are concerned with dealing with the problems of rural communities which are isolated and small. Building their resilience is rightly seen as an important priority. Unfortunately, building urban resilience is often overlooked. In 2010, PICs adopted Joint National Action Plans (JNAPs), encouraging the combination of DRR and Climate Change Adaptation (CCA) but success has been mixed, with challenges confronting attempts in many of the countries (SPREP, 2013) with limited links to urban planning and management.

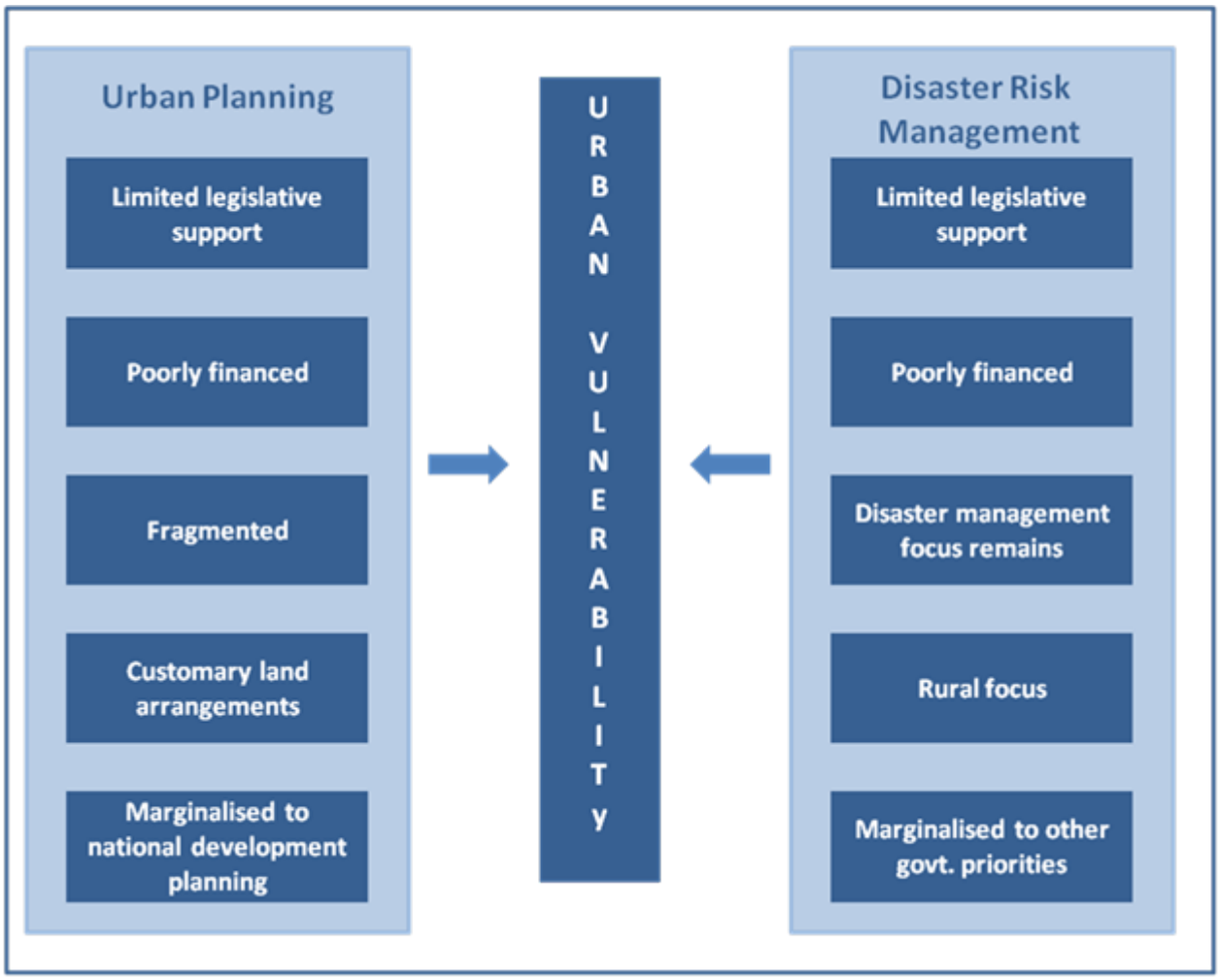

Figure 5. A lack of institutional integration between agencies responsible for urban management and disaster risk management may result in urban areas being overlooked in national disaster reduction planning and disaster risk management being overlooked in urban management. As a result, urban vulnerabilities are not addressed.

Local and Traditional Knowledges in Urban Settings

Interest in traditional knowledge as a disaster reduction tool in developing countries including PICs has grown recently (e.g. Lefale, 2010; McNamara and Prasad, 2014). Most rural communities have lived in their areas for millennia. It is not surprising that they have built considerable repositories of knowledge about them, knowledge that has until recently been transmitted orally. This included knowledge about environmental conditions, about environmental extremes and about how to cope with them. It included localised knowledge of recognised safe havens (e.g. caves in which people could take shelter), agricultural techniques that built crop resilience, food storage and preservation and, as noted above, building techniques (Campbell, 2006).

Despite this growing recognition of the value of traditional ecological knowledge and other local knowledge systems to contribute to DRR in rural areas, local knowledges have been largely neglected in relation to urban vulnerability reduction. This reflects perhaps, a

perception that the traditional knowledges of migrants are not applicable to their new urban settings. However, there remains considerable knowledge among the customary people on whose land informal settlements have been established. For example, Spennemann (1996) shows that traditional settlement patterns on Majuro were much less likely to be adversely affected by typhoons (and associated storm surge) by locating as close to the lagoon side of the narrow strips of land that make up the atoll islets. Contemporary development has seen greater use of areas closer to the coastal fringes, increasing their exposure. Under the high population now evident in Majuro, it is unlikely that the traditional response would be so easily applied today. Spennemann's article is however an important reminder of the importance of traditional knowledge in urban settings.

Migrants to urban areas, and their descendants, also build up considerable reservoirs of local knowledge relevant to their new homes and this also should not be neglected. Trundle et al. (2018) observe that the settlement of some highly marginal areas in Vila and Honiara has resulted in people gaining knowledge of local environmental conditions that are often overlooked by planners and contribute to building adaptive capacity of the informal communities. This points to the need for consultative, bottom-up, approaches to building DRR and climate change adaptation in informal settlements.

It is also important to recognise that the common portrayal of people living in informal urban settlements as being highly vulnerable is problematic. On the one hand, they do indeed face serious difficulties in securing safe and sustainable homes and livelihoods and ignoring this would reinforce existing inequalities. There are pressing issues that exacerbate their exposure and vulnerability to climate change and natural disasters. On the other hand, people living in informal centres often have developed vibrant new communities despite the difficulties they face and successfully engage in the informal economic sector. Creating urban areas (including informal settlements) that are resilient and with capacity to respond to the challenges of natural disasters and climate change, will require that the people of informal communities are recognised, their voice is heard, and they are able to make meaningful contributions.

Considerations for Disaster Risk Management in Pacific Island Urban Areas

There have been several recent developments in the region reflecting growing awareness and concern about the implications of urban growth for DRR and CCA. The difficulties of implementing measures to reduce disaster risk are illustrated by an Asian Development Bank (ADB) project to strengthen disaster and climate risk resilience in PIC towns and cities by incorporating hazards into urban development planning and infrastructure development. The project developed risk assessment tools, and sought to integrate these into urban planning and management and to provide training, including a user manual, for planners in six PICs. While technically considered successful, it was concluded that the project's overall aims had been less than successful as none of the involved countries had updated their urban zoning regulations (ADB, 2016). UN-Habitat has supported several recent projects at different stages of completion under its Cities and Climate Change Initiative (CCCI) in the Pacific region. These include addressing the needs and capacities of all urban people (in formal and informal settlements) (Trundle, 2018; McEvoy et al., 2019).

It is important that efforts to reduce urban disaster risk in PICS are continued in those countries where beginnings have been made and throughout the region. With increasing concentrations of national populations in urban areas, the risk is likely to significantly increase if appropriate measures are not taken. The first decade of the 21st Century has seen two sets of concern emerge for the Pacific Islands region. First, the Pacific Urban Agenda was established in 2003. Second, there has been a move to 'mainstream' disaster risk management into national government development planning activities (SOPAC, 2008) and to combine climate change adaptation (CCA) and DRR. These developments provide a timely opportunity for the incorporation, or 'mainstreaming', of urban management in disaster risk reduction and CCA, and vice-versa. But these issues should not be lost from sight. Improving access to livelihoods is to a large degree dependent upon sustainable economic development, to which there are many constraints. This would perhaps stem the rate of rural to urban migration and provide opportunities for urban dwellers to find sources of income.

Conclusions

There have been significant developments in disaster risk management in recent decades. These have seen considerable improvements in emergency management planning and managing relief and recovery. There has been less success in building disaster risk reduction which requires incorporating hazard management into everyday operations of other government departments and into national sustainable development planning. There has been relatively little attention paid to issues of urban risk reduction. At the same time towns and cities are growing rapidly, causing environmental deterioration and concentrating social and economic problems, particularly in squatter settlements. This area, too, has tended to be neglected among national development planning objectives and activities. As a result, urban vulnerabilities to disaster are growing rapidly and there is some urgency to reverse these trends before a catastrophic urban disaster occurs somewhere in the region, which is an increasing likelihood in the context of climate change.

A number of activities would contribute to reducing disaster risk in Pacific Island towns and cities:

Mainstream disaster risk management into urban planning and management:

- Evaluation of urban disaster risk and identification of areas where there is a high level of exposure to hazard events.
- Evaluation of disaster risk management options using an integrated approach to urban risk reduction, assessing the need for, suitability and practicability of the full range of measures including those that keep the hazard from people (e.g. sea walls and river control), those that keep the people from the hazard (e.g. land-use planning and building guidelines or codes) and measures to deal with the loss burden after disasters.

This will require innovative approaches to deal with the high levels of housing vulnerability in informal settlements.

- These may include land use planning and management in the context of customary tenure systems
- Assistance in retrofitting houses and other buildings
- Development of appropriate participatory approaches to building resilience and adaptive capacity in urban communities.
- Building, or drawing upon existing, urban networks that can be utilised in disaster situations and in developing resilience.

It must be acknowledged that the vulnerability of many urban residents in PICs is a result of broader sets of processes with root causes for which there are no simple solutions for small countries in the context of neoliberalism and globalisation. In addition, any efforts to improve urban DRR will require greater, and innovative, attention to issues of land tenure and poverty in informal urban settlements.

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The Author

John R. Campbell has been researching population and environment issues in Pacific Island countries since the 1970s. He is currently working on the human dimensions of climate change adaptation and disaster risk reduction including environmental migration. He obtained a PhD. at the University of Hawaii where his thesis was on population and environment interrelations on a small island in northern Vanuatu. He has written a book on development and disasters in Fiji, co-authored a book on Climate Change in Pacific Islands and a number of book chapters and articles on disasters, environmental management and global change, especially in Oceania.

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Contact Us
Toda Peace Institute
Samon Eleven Bldg. 5th Floor
3-1 Samon-cho, Shinjuku-ku, Tokyo 160-0017, Japan
Email: contact@toda.org