

ISLANDNESS

Vulnerability and Resilience in Oceania

JOHN CAMPBELL

University of Waikato, Hamilton <j.campbell@waikato.ac.nz>

Abstract

Pacific and other islands have long been represented as sites of vulnerability. Despite this, communities on many Pacific islands survived for millennia prior to the intrusion of people from Europe into their realm. An examination of traditional disaster reduction measures indicates that traditional Pacific island communities coped with many of the effects of extreme events that today give rise to relief and rehabilitation programmes. Key elements of traditional disaster reduction were built around food security (production of surpluses, storage and preservation, agro-ecological biodiversity, famine foods and land fragmentation), settlement security (elevated sites and resilient structures) and inter- and intra-community cooperation (inter-island exchange, ceremony and consumption control). Many of these practices have been lost or are no longer employed, while other changes in the social and economic life of Pacific island communities are increasing the level of exposure to natural extremes. Pacific islands, and their inhabitants, are not essentially or inherently vulnerable. They were traditionally sites of resilience. Colonialism, development and globalisation have set in place processes by which the resilience has been reduced and exposure increased.

Keywords

Pacific islands, vulnerability, traditional disaster reduction

Introduction

Most Pacific island communities are characterised by exposure to a wide range of natural hazards. Despite this they appear to have survived and, in numerous cases thrived, for a long period of time prior to European contact and colonisation¹. This is in comparison to many contemporary communities that are becoming increasingly dependent upon centralised government assistance, often based on overseas aid, for relief and rehabilitation, when disaster strikes. A number of elements of traditional life enabled Pacific communities to withstand the effects of environmental extremes and some of these no longer exist or have been transformed in ways that make them less effective. These phenomena may be referred to as 'traditional disaster reduction measures'.

Campbell – Islandness: Vulnerability and Resilience in Oceania

It is important to note that tradition is a contested notion and that traditions are fluid and change through time (Linnekin, 1983). In this paper the term 'tradition' is used loosely to refer to social phenomena that existed prior to the cultural change that resulted from the arrival of Europeans in Oceania. However, there are other elements of Pacific Island societies that have more recent origins but are still considered to be traditional. For example, most Pacific Island communities consider themselves to have a strong Christian tradition even, though the religion was introduced by missionaries after western contact. Today, churches are often used as safe havens during tropical cyclones when dwellings fail. Factors such as this are excluded from this study. It is also important to note that Pacific communities were not passive receptors of change. Many resisted some introductions and appropriated others. Many traditions still persist, though some are in modified form.

It is also important to consider what is meant by the term 'disaster reduction measures'. These are social, cultural, political and technical elements of traditional communities that reduced the effects of natural extremes. Many of these practices existed as everyday features of community and household life. Care must be taken not to fall into a simple form of environmental determinism or functionalism in assuming these practices developed as purposeful adaptations to hazardous environments. Many may have been incidental adjustments: social practices that just happen to help ameliorate the effects of environmental extremes. They may indeed have not existed primarily as disaster responses but emerged and were sustained for myriad reasons. While it is not the main theme of this paper, many of these traditional practices fell away as social changes were wrought by contact and colonialism. Nevertheless there were some practices that only declined when disaster relief became an expected governmental response and it may be assumed that these were indeed specifically purposeful hazard reduction measures.

Discourses of Vulnerability and Resilience

The concept of vulnerability has gained increasing usage in the past decade or so, not only in the context of natural hazard reduction and adaptation to climate change but in a number of other areas such as demography, epidemiology, development studies and environmental security. While many researchers (eg Wisner et al, 2004) seek to explain differences in vulnerability and why certain communities are vulnerable, the discursive nature of the term vulnerable (or vulnerability) is rarely examined (see Lewis, this issue, for an examination of island vulnerability). Dictionaries tend to define vulnerability as susceptibility to being harmed or wounded. While often related to a specific threat it tends to be a condition of a particular entity (such as a person, group of people or place). Accordingly the focus of vulnerability reduction lies in reducing the vulnerability rather than limiting the hazard².

Interestingly, the word vulnerable (or vulnerability) does not translate well into Pacific Island languages suggesting that it was not a phenomenon that was considered important.³ Most attempts to reduce vulnerability have focused on the characteristics of the vulnerable entity that give rise to the capacity to suffer harm. Resilience, used in much of the disaster literature as an antonym for vulnerability, refers to the capacity of an entity to recover from harm. In this sense it is not strictly an antonym, as the harm is not necessarily avoided. Nevertheless, the ability to recover may reduce the intensity or duration of suffering. Plumwood's (1993) work on dualisms suggests that dualistic

Campbell – Islandness: Vulnerability and Resilience in Oceania

frameworks underpin discourse, setting up on one side a superior group compared with those on the other. Table 1 shows some of the connotations of vulnerable/vulnerability and their antonyms.

Synonym	Antonym
Weak	Strong
Powerless	Powerful
Insecure	Secure
Passive	Active
Exposed	Covered
Unprotected	Protected
Unstable	Stable
Risk	Safety
Constrained/Limited	Free/Unlimited
Fragile	Robust
Small	Large
Peripheral	Central
Marginal	Important
Dependent	Independent

Table 1. Connotations of Vulnerable / Vulnerability

Islands have long been represented as sites of vulnerability and many of the terms on the left hand side of Table 1 can be found in descriptions of islands and their inhabitants. Examples may be found in various popular forms from literature (*Robinson Crusoe*, *Lord of the Flies*) through myriad ‘desert island’ cartoons to contemporary ‘reality’ television where survivors or castaways are left to struggle in supposedly hostile island environments. In a book on the human geography of islands, Royle states that, “small islands are fragile natural systems. Their size and scale make them also problematic in physical terms for human occupation” (2001: 39). Moreover the people on islands are faced with numerous constraints:

Small islands, bounded spaces, are limited in size, in land area, in resources, in economic and population potential, in political power, by their scale. There are few if any benefits from being of small scale... usually being small scale is simply and obviously a problem. (ibid: 42)

He goes on to observe that, “isolation together with scale, often distance islands from political power” (ibid: 43) and later notes that, “small islands are places without power” (ibid: 57). The term “powerlessness” is twice used as a subheading in the book.

The notion has relatively deep roots. While early European explorers described Pacific islands as gardens of Eden, they were also considered to be sites characterised by considerable prelapsarian instability (Withers, 1999). Island vulnerability is also a well-worn theme in the scientific literature, related to smallness and isolation (eg Fosberg, 1963; MacArthur and Wilson, 1967). Ecological stability, traditionally related to

Campbell – Islandness: Vulnerability and Resilience in Oceania

biodiversity, is a function of island size and extinction rates of island species increase as island size declines. As Fosberg stated in the early 1960s:

Some of the more significant characteristics of the island ecosystem are relative isolation; limitation in size... extreme vulnerability, or tendency toward great instability when isolation is broken down; and tendency toward rapid increase in entropy when change has set in. (1963: 5.)

Geographers, too, have long regarded islands as having high levels of vulnerability. Semple (1911) claimed that island societies were cursed by restricted space and Vidal de la Blanche noted that islands were too small to protect human societies from the “risk of destruction” (1926: 158). This view is not limited to academics: it is also found in international declarations and treaties such as the Hyogo Declaration (on natural disaster reduction) and the United Nations Framework Convention on Climate Change which both single out small island states as being particularly vulnerable, conferring upon them a special status as requiring assistance. Despite these assertions, in Oceania at least, thriving communities appear to have been in existence for hundreds of years if not several millennia, when European ‘explorers’ first intruded. If this was the case, just how vulnerable were the people who occupied the numerous islands that comprise Oceania? In this paper I explore the ways in which many Pacific Island communities traditionally managed their exposure to hazards and enhanced their resilience.

Pacific Island Hazards

The islands discussed in this article are those that are mostly found in the tropical Pacific and comprise the broad regions of Melanesia, Micronesia, and Polynesia. Twenty one political entities that make up this region⁴. They range in size from Papua New Guinea, with an area of more than 462,000km² and a population exceeding 6 million, to Tokelau (1.5 km² and 1,500 people). They have a range of cultural and social characteristics, and islands vary from low-lying atolls to the mountainous oceanic volcanic high islands and the ‘continental’ type mainland of Papua New Guinea and the major islands of Melanesia. There is also a variety of cultural and social settings, historical and colonial backgrounds and levels of integration into the global economy.

There is also a range of exposure to natural hazards as shown in Table 1, which classifies islands according to the typology first developed by Thomas (1963). Islands along the Pacific ‘rim of fire’ are prone to earthquakes and volcanic eruptions. The continental type islands with larger landmasses tend to have well-developed river systems and flooding is a major hazard, particularly during tropical cyclones. Most islands experience tropical cyclones (with the exception of those very close to the equator and inland Papua New Guinea). Given that islands have a high ratio of coastline to land area, coastal hazards are often important. Attention is particularly given to storm surge during tropical cyclones but ‘king’ tides, waves generated by mid-latitude storms, and tsunamis are also potential threats. Although it perhaps gains the least media and research coverage, drought is also a very important hazard in the region, often related to variations in the ENSO (El Niño-Southern Oscillation). Given this considerable diversity the following generalisations should be treated with some caution. Nevertheless, many patterns of social organisation and resource management did serve to offset the impacts of extreme environmental events.

Island Type	Implications for Hazards
<i>Continental</i>	
<p>Large High elevations High biodiversity Well developed soils River flood plains Orographic rainfall</p>	<p>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).</p>
<i>Volcanic High Islands</i>	
<p>Steep slopes Different stages of erosion Barrier reefs Relatively small land area Less well developed river systems Orographic rainfall</p>	<p>Because of size few areas are 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.</p>
<i>Atolls</i>	
<p>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 Convictional rainfall</p>	<p>Exposed to storm surge, 'king' tides and high waves. Narrow resource base. Exposed to fresh water shortages and drought. Water problems may lead to health hazards.</p>
<i>Raised Limestone Islands</i>	
<p>Steep outer slopes Concave inner basin Sharp karst topography Narrow coastal plains No surface water No or minimal soil</p>	<p>Depending on height may be exposed to storm surge. Exposed to fresh water shortages and drought. Water problems may lead to health hazards.</p>

Table 1: Types of Island in the Pacific Region (Source: Campbell, 2006)

Traditional societies and disaster

A key to understanding the resilience of Pacific island communities is their traditional knowledge of the island environment and numerous cultural forms that, whether purposefully or incidentally, reduced the effects of natural extremes and enabled sustained settlement. Mercer et al (2007) suggest that vulnerability reduction in small island states will only be successfully achieved if such measures are amalgamated with contemporary disaster reduction methodologies. Key elements of traditional risk management were based on systems of traditional knowledge regarding three broad areas: maintaining food security, inter- and intra-community cooperation, and protecting settlements and their inhabitants. In addition, traditional environmental knowledge may have helped communities predict adverse weather conditions, as was recorded in early observations from Fiji (Derrick, 1951; Dyer, 1945) and recent research in Samoa (Lefale, 2003).

Food Security. Food security was embedded in a number of traditional practices underpinned by the production of surpluses (Campbell, 1990). This enabled food to be preserved and stored (Pollock, 1992) and, as will be outlined later, formed the basis of inter-community exchange. In those societies where yams were the staple, 'yam houses', some of which were very intricate, stored the staple for several years. In other parts of the region, crops such as taro and breadfruit were buried in leaf-lined pits and left to ferment. On atolls in particular, which have a very narrow terrestrial resource base, fermentation was extremely important; but such practices were not restricted to atolls and have been reported throughout the Pacific region.

Agricultural resilience was also an important factor. This was maintained through what today may be referred to as sustainable agro-ecosystems and which Clarke in an influential 1977 paper called 'structures of permanence'. A key element of such structures was high levels of agricultural diversity: crops are susceptible in different ways to the damage-causing factors of extreme events. Yams (*Dioscorea spp.*) can withstand drought much better than taro and related species (*Colocasia esculenta*, *Alocasia spp.* and *Xanthosoma*), which, in turn, are less susceptible to water-logging. Bananas (*Musa spp.*) may grow quickly upon replanting but are highly susceptible to strong winds, as are breadfruit (*Artocarpus altilis*). In comparison, one of the most popular contemporary staples, cassava (*Manihot esculenta*), is highly vulnerable to strong winds characteristic of tropical cyclones. Ironically, cassava was introduced to a number of Pacific Island communities by colonial governments as relief-planting material following tropical cyclones (Campbell, 1985). Another important way of reducing exposure of crops was to fragment land holdings: often not all parts of an island, or group of islands, will suffer equally from extreme climatic events (Alkire, 1965). Contemporary agriculture 'experts' see such fragmentation as economically inefficient and discourage it. It may be claimed that land fragmentation developed for a number of reasons such as complex land tenure systems and inheritance procedures; nevertheless, it also served to reduce the impact of natural extremes on agricultural production.

A third important element of food security was the use of so-called famine foods. These ranged from wild plants (such as wild yams) that could be gathered from the rainforest to crops that were maintained, though not eaten, during times of plenty, such as sago (*Metroxylon sagu*) and alocasia, both of which need to be treated before being edible. The final element of food security in many Pacific Island communities was control of

consumption through regulating first harvests and placing restrictions on the harvest, hunting or gathering of specific species at certain times. Many communities had specialists such as crop custodians who had significant political and/or spiritual status who helped ensure that crop supplies and surpluses were maintained (Thompson, 1940).

Co-operation. One important reason for producing food surpluses was to enable ceremonial feasting to take place. Such feasting, reported throughout Oceania, enabled communities to exchange obligations and materials. Similar patterns could also be found within communities. Food was redistributed, often between places with different ecological bases, and bonds were formed. Linkages among communities in the region were not just local. Inter-island networks existed, such as the famous kula ring (Malinowski, 1922). Early missionaries in the Banks Islands, northern Vanuatu, reported on how members of the *suge*, a graded society in which men paid their way into positions of higher status using traditional forms of wealth (pigs, shell money, mats). Accumulating wealth involved creating obligations that could be called upon at times of crisis (Codrington, 1863). The Lau group of islands in eastern Fiji were linked together through the *solevu*, ritual events and feasting, again based on exchange of goods reflecting environmental variations. Some, with limited food resources, specialised in forest-based products that were exchanged for various root crops, of which there were surpluses, in other islands (Sahlins, 1962; Thaman, 1990; Thompson, 1940). Accordingly alliances and obligations were created that were called upon for food, temporary resettlement and assistance when extreme events caused devastation to only some islands in the group, which was often the case in respect to tropical cyclones.

One aspect of cooperation is the role of customary systems of community organisation and leadership that were very important when hardship was most pressing. Wilkes (1845) reported rationing of coconuts during a drought on Viwa in Fiji in 1840. This case also reminds us that traditional coping measures were not always successful and hardship was sometimes extreme (see also Buzacott, 1866; Loeb, 1926; Crocombe, 2001). Not all communities were marked by co-operative response to disasters. For example, Spillius (1957) reported theft and the breakdown of ritual and ceremony on Tikopia (perhaps one of the island communities least impacted by colonialism) following a tropical cyclone in 1952.

Settlement factors. In traditional times many Pacific communities did not live adjacent to the coastline. Rather, for defensive purposes many lived inland or at higher elevations, even on small volcanic islands. Accordingly, coastal hazards such as storm-surge associated with tropical cyclones, 'king' tides and tsunami had less social impact. Numerous early observers noted that villages and hamlets seemed haphazard in their layout – an eyesore from the European perspective (Turner, 1984). But neat rows provide useful corridors for hurricane force winds to blow through and wreak havoc.

Perhaps, at least in some parts of the region, one of the most important contributions to hazard reduction came in the design of dwellings. In Fiji, Samoa and Tonga, the traditional buildings (*bure* and *fale*) had a number of wind resistant characteristics. First, the houses were built with relatively steep hipped roofs, well bound together connections and joints (using considerable amounts of sennit), and were quite airtight with no windows and very few doors. Such structures are wind resistant: steep roofs are less likely to be damaged by wind, airtight structures reduce the building up of high

Campbell – Islandness: Vulnerability and Resilience in Oceania

pressure inside the dwelling, which is a common cause of dwelling failure in tropical cyclones, and sennit bindings have proved much stronger than introduced nails. In Samoa, *fale* had no walls and winds could simply blow through the structure. Many Fijian *bure* are built on mounds, called *yavu*, the height of which reflect the importance of the occupant and have considerable cultural and social importance. Some *yavu* were up to a metre high and could ameliorate the effects of storm surge or river flooding. In other parts of the region, notably Melanesia, lighter structures were often found. This may reflect the importance of earthquakes in this region, along the Pacific ‘rim of fire’, and where relatively heavy roof loadings, as in the *bure* type structures, would have increased susceptibility to that hazard.

The erosion of resilience

As we have seen, in many cases traditional resource management arrangements (including social, economic, political, spiritual and knowledge systems) enhanced the resilience of Pacific Island communities. Indeed a case could be made that there was nothing inherently vulnerable about traditional Pacific Island communities, even those who survived for centuries on atolls. So what has happened to these ‘structures of permanence’ that they now require vast amounts of relief assistance when environmental extremes strike?

Pelling and Uitto (2001: 56), in a review of disaster vulnerability in small island states note that ‘modernisation’ (including consumerism and individualism) has adversely affected indigenous practices for disaster reduction. There can be little doubt that the processes of contact, colonisation and now independence in the context of globalisation have brought about the decline of many of the facets of resilience that once existed. This can be attributed to two types of processes. First, there have been many changes that have been brought about by intervention following ‘extreme events’. For example, the provision of relief food reduces the need to ferment or use famine foods. In 1910 following a tropical cyclone on Mota Lava in northern Vanuatu the people processed sago and there was little want for food. The next major cyclone was in 1939 and food relief was supplied by the Condominium of the New Hebrides Government and the Melanesian (Anglican) Mission. By 1980 an elderly man on the island indicated that apart from himself and one or two others, nobody knew how to extract the starch from the trunk of the palm (Campbell, 1990). Several tropical cyclones had affected the island since 1939 but sago was never used again. Many similar cases may be found with fermented foods and other forms of food storage.

But tropical disaster relief was not the only reason that these practices fell into disuse. The second way in which traditional responses were reduced in their importance was through changes brought about that had nothing to do with disaster reduction. The need to store food began to fall away with the institution of the cash economy and imported foods such as rice and cabin biscuits. Other practices were also undermined. For example, the introduction of the cash economy saw systems such as the *suqe* fall away. Moreover, colonial governments and missionaries also worked to reduce the significance of traditional ceremonies and rituals that were seen as either wasteful or un-Christian. As more cash crops were planted, the amount of land set aside for subsistence food production was reduced. Rotation periods dropped, soil fertility fell and, increasingly, throughout all but one or two countries in the region, cassava has been adopted as the principle root crop. While cassava requires much less in soil

fertility and labour, in many areas cassava yields are also declining. Islands that once produced surpluses are now in deficit, increasingly dependent on remittances from emigrants to the urban centres and countries further afield.

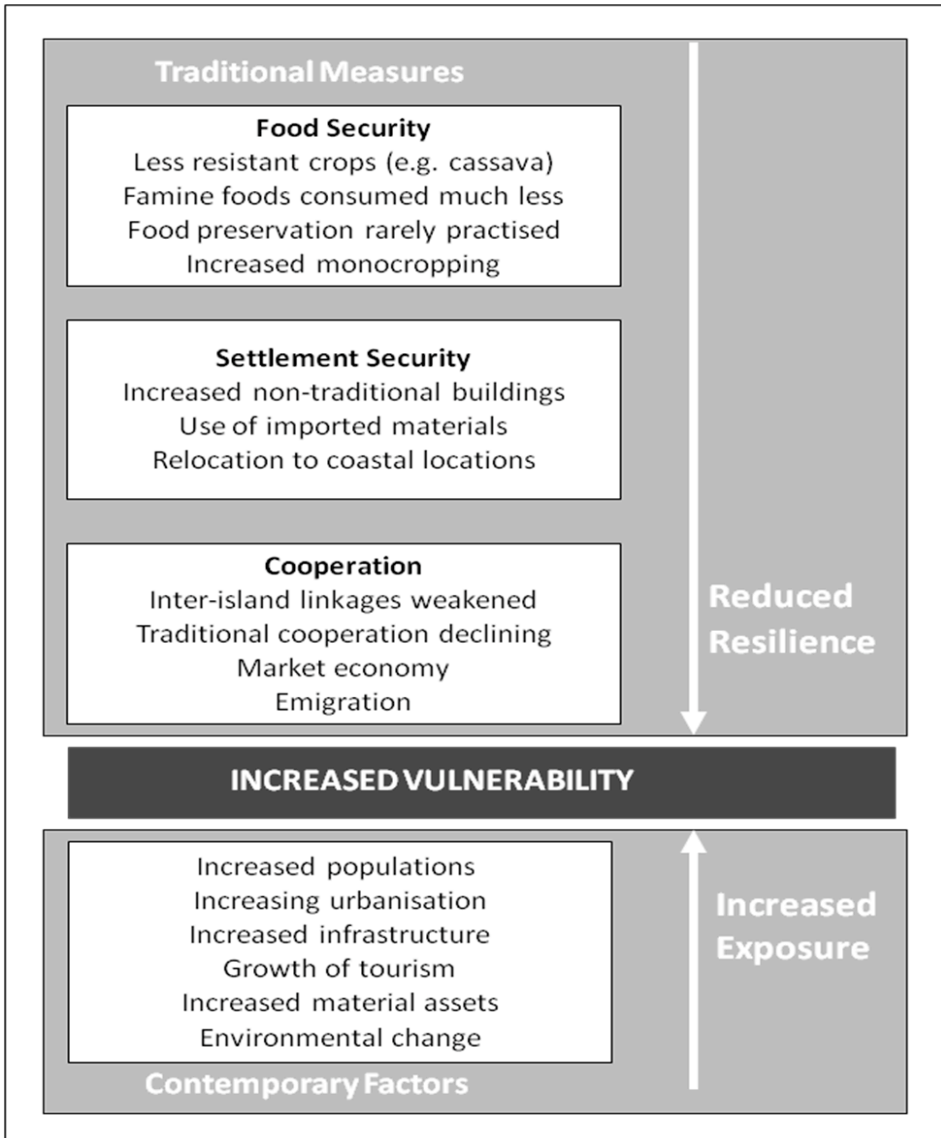


Figure 2. Changing resilience and exposure to hazards in Pacific Island communities.

These two sets of processes can be found in relation not just to food security but also to systems of co-operation and housing and settlement patterns. Both have been transformed by changes that have occurred in centralised disaster response and in non-

disaster related social, political, economic, religious and environmental change. In addition, as is the case everywhere, Pacific island countries and their populations have changed. Populations have increased in most countries, though not so much in many rural areas. Urban centres are expanding rapidly with new sets of resource management and other social arrangements. In all but a few Papua New Guinean examples, urban development has seen the concentration of populations in coastal areas. Pelling and Uitto (2001) note that urbanisation has played a significant role in reducing the vulnerability of many island countries, especially where development has been rapid and not subjected to planning rules and regulations. In many parts of the Pacific, people have increased their material wealth placing themselves in a position to lose more, or perhaps to lose more than can be easily replaced, than was the case in traditional times. Similarly, Pacific island communities are confronted with environmental change, both global and local, which are also likely to increase their exposure to hazard events (South Pacific Regional Environment Programme, 2004). These processes are summarised in Figure 2. On the one hand contemporary communities are becoming more exposed to hazards. At the same time, the structures of resilience are being eroded. Accordingly it might be claimed that contemporary Pacific islands have *become* sites of vulnerability. However, this vulnerability lies not in some essential characteristic of islandness but in the loss of traditional measures that enhanced resilience and the introduction of new ways of life that have increased exposure.

Conclusion

Is vulnerability an essential characteristic of islandness? Traditional disaster reduction measures indicate that vulnerability was not a particularly marked characteristic of island societies and communities and, accordingly, islands are not inherently vulnerable places. On the contrary they were resilient. Even today many communities are relatively resilient. Researchers who spend periods of time in many Pacific island communities find them vital and independent and their members knowledgeable about their environment. Many contemporary communities combine tradition and 'modernity,' and selectively appropriate what is available to them in the current globalised world. It could even be claimed that accepting disaster relief is a similar appropriation, providing access to materials and goods that would otherwise be very expensive. If contemporary island societies are indeed vulnerable today it is a result of changes wrought by exposure to a wider world⁵.

Endnotes:

¹ This is not to suggest that the islands were in a state of ecological balance. As Kirch (2005) notes, the introduction of people to Pacific islands caused considerable ecological disruption. Nevertheless upon 'contact' most inhabited islands appear to have supported reasonably healthy populations.

² This approach fits relatively well in disaster reduction literature as Wisner et al (2004) show. Various processes associated with colonialism and globalisation have rendered most people in many third world countries more vulnerable than in the past. However, it is more problematic in relation to climate change where a focus on vulnerability reduction can divert attention from the real cause of the problem: greenhouse gas emissions.

³ At a conference of Pacific Island disaster managers I asked participants to write down the word in their language that best translated into vulnerable or vulnerability. Nearly all said there was no such word and instead most of the participants used the word in their language for 'weak'.

⁴ These are the 'countries' that fall under the auspices of the Secretariat for the Pacific Community.

⁵ I would like to thank the two reviewers for their helpful comments on this article. The article partly draws from research funded by the GNS Science project, NZ Geological Hazards and Society.

Bibliography

Alkire, W. H (1965) *Lamotrek Atoll and Inter-Island Socio-Economic Ties*, London: The University of Illinois Press

Buzacott, A. R (1866) *Mission Life in the Islands of the Pacific*, London: John Snow & Co

Campbell, J. R (1985) *Dealing with disaster: Hurricane response in Fiji*, Honolulu: Pacific Islands Development Program, East-West Center / Government of Fiji

----- (1990) 'Disasters and Development in Historical Context: Tropical Cyclone Response in the Banks Islands of Northern Vanuatu', *International Journal of Mass Emergencies and Disasters* v8n3: 401-424

----- (2006) 'Traditional Disaster Reduction in Pacific Island Communities', *GNS Science Report* n38

Clarke, W. C (1977) 'The Structure of Permanence: The Relevance of Self-subsistence Communities for World Ecosystem Management', in Bayliss-Smith, T. P and Feachem, R. G (eds), *Subsistence and Survival: Rural Ecology in the Pacific*, London: Academic Press: 363-384

Codrington, R. H (1863) Lecture delivered at Nelson, September 25, 1863, Auckland, Melanesian Mission

Crocombe, R. G (2001) *South Pacific*. Suva: University of the South Pacific

Derrick, R. A (1951) *The Fiji Islands: A Geographical Handbook*, Suva: Government Printing Department

Dyer, W, R (1945) "Preliminary Note on Weather Lore of the Fijian", *Transactions of the Fiji Society of Science and Industry* n3n1: 57-69

Fosberg, F.R (1963) 'The Island Ecosystem', in Fosberg, F.R (ed) *Man's Place in the Island Ecosystem*, Honolulu, Bishop Museum Press: 1-6

Kirch, P. V (2005) 'Archaeology and Global Change, The Holocene Record', *Annual Review of Environment and Resources*, n30: 409-440

Lefale, P (2003) 'Indigenous knowledge in the Pacific', *Tiempo* n49, online at: <http://www.tiempocyberclimate.org/portal/archive/issue49/t49a1.htm>

Lewis, J (2009) 'An Island Characteristic: Derivative vulnerabilities to indigenous and exogenous hazards', *Shima* v3 n1: 3-15

Linnekin, J. S (1983) 'Defining Tradition: Variations of the Hawaiian Identity', *American Ethnologist*, v10 n2: 241-252

Loeb, E. M (1926) *History and Traditions of Niue*, Honolulu: Bernice P. Bishop Museum

MacArthur, R. H and Wilson, E. O (1967) *The Theory of Island Biogeography*, Princeton: Princeton University Press

Malinowski, B (1922) *Argonauts of the Western Pacific*, London: Routledge and Kegan Paul

Mercer, J et al (2007) 'The potential for combining indigenous and western knowledge in reducing vulnerability to environmental hazards in small island developing states', *Environmental Hazards* n7: 245-256

Pelling, M and Uitto, J.I (2001) 'Small island developing states: natural disaster vulnerability and global change', *Environmental Hazards* v3 1: 49-6

Plumwood, V (1993) 'Dualism: the logic of colonisation,' in Plumwood, V *Feminism and the Mastery of Nature*, London, Routledge: 41-68

Pollock, N, J (1992) *These Roots Remain: Food Habits in Islands of the Central and Eastern Pacific since Western Contact*, Honolulu: The Institute for Polynesian Studies

Royle, S. A (2001), *A Geography of Islands: Small Island Insularity*, London, Routledge

Sahlins, M. D (1962) *Moala: Culture and Nature on a Fijian Island*, Michigan: University of Michigan Press

Sample, E. C (1911) *Influences of Geographic Environment on the Basis of Ratzel's System of Anthro-Geography*, London: Constable

South Pacific Regional Environment Programme (2004) *Pacific Environmental Outlook*. Nairobi: United Nations Environment Programme

Spillius, J (1957) 'Natural Disaster and Political Crisis in a Polynesian Society', *Human Relations* n10: 3-27, 113-125

Thaman, R. R (1990) 'The Evolution of the Fiji Food System', in Jansen, A.A.J, Parkinson, S, and Robertson. A.F.S (eds), *Food and Nutrition in Fiji: A Historical View* v1 Suva: The University of the South Pacific: 23-108

Thomas, W. L (1963) 'The Variety of Physical Environments among Pacific Islands', in Fosberg, F.R (ed) *Man's Place in the Island Ecosystem*, Honolulu: Bishop Museum Press: 7-38

Thompson, L (1940) *Southern Lau, Fiji: An Ethnology*, Honolulu: Bernice P. Bishop Museum Bulletin n162

Turner, G (1984) *Nineteen Years in Polynesia*, Papakura: R. Macmillan

Vidal de la Blache, P (1926) *Principles of Human Geography*, London: Constable

Wilkes, C (1845) *Narrative of the United States' Exploring Expedition, during the years 1838, 1839, 1840, 1841, 1842* (Condensed and abridged edition), London: Whittaker

Wisner, B et al (2004) *At Risk* (Second edition), London: Routledge

Withers, C.W.J (1999) 'Geography, Enlightenment, and the Paradise Question', in Livingstone, D.N and Withers, C.W.J (eds) *Geography and Enlightenment*, Chicago: University of Chicago Press: 67-92