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Urbanization in the Pacific: environmental change, vulnerability and human security

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Summary

The world is in the midst of a substantial urban transition, but the impacts of this on the environment and human societies are not fully understood. Very little attention has been paid to urbanization processes in developing countries with smaller populations, despite the evident problems associated with urbanization. There are both biophysical and social vulnerabilities associated with urbanization in the South Pacific and these vulnerabilities affect human security. The biophysical vulnerabilities include the fragile environments of the island nations, limited land resources, shortages of basic resources, and the risks associated with global warming. The ability to respond to these problems is constrained by social vulnerabilities, notably weak economies, difficulties associated with land ownership, and institutional limitations. There is a need for institutional reform, improved planning, better urban resource management, and greater regional cooperation, if Pacific island nations are to respond effectively to rapid urbanization and global change.

Keywords: human security, urbanization, environmental change, South Pacific islands, vulnerability

Introduction

In 1987 the Brundtland Commission noted that over the 35 years since 1950 the number of people living in cities had tripled, reaching a total of just under 2 billion (WCED 1987). The urban population of the developed world had doubled, while in the less developed world it had quadrupled. A decade later it was recorded that 'The world is in the midst of a massive urban transition unlike that of any other time in history' (World Resources Institute 1996). It was predicted that within a decade, 3.3 billion people would live in urban places and that by 2025 almost two-thirds of the world's population, close to 5 billion people, would be urban dwellers (World Resources Institute 1996). Most of the growth in urban population will occur in the developing world and, as the Brundtland Commission had observed 10 years before: 'Few city governments in the developing world have the power, resources, and trained staff to provide their rapidly growing populations with the land, services and facilities needed for an adequate human life: clean water, sanitation, schools and transport. The result is mushrooming illegal settlements with primitive facilities, increased overcrowding, and rampant disease linked to an unhealthy environment' (WCED 1987, p. 238).

For developing countries, the processes of rapid urbanization and industrialization place enormous stress on urban infrastructure, human well-being, cultural integrity and socio-economic arrangements. Urbanization also exerts tremendous stress on the hinterlands of cities, imposing what Wackernagel and Rees (1996) have called 'ecological footprints', which are typically far larger than the cities themselves (see also Rees 1992). According to Pirages (1997), the cities of the developing nations are consuming vast quantities of resources, food, and water, thus exerting substantial demands on the countryside that surrounds them.

To date, most of the attention has been focused on the world's megacities such as Sao Paulo, Mumbai, Karachi, Jakarta, Cairo, Delhi, Mexico City, Manila and the others that are already, or promise to expand to, human populations of 10 million or more each in the near future. In comparison, the small and medium-sized cities of the developing world have been overlooked, yet they also face significant environmental and social problems as a consequence of urbanization. The cities of the South Pacific, for example, are tiny relative to the world's megacities; indeed, the populations of entire island nations are many times smaller than those of some cities in other developing nations. However, the rates of urbanization and the population densities in some Pacific urban settlements (Table 1) rival those of Asia, Africa, and South America (Table 2). The urban population growth rates in several Pacific nations for example, exceed 4% (Table 1). Of the nineteen countries listed in Table 1, only four record urban growth rates of less than 2%. Compared to the average rates of urban population growth for major world regions (Table 2), the rates for the Pacific islands are relatively high. Moreover, in several Pacific nations the proportions of populations living in urban centres are relatively high (Table 1). The result is that South Pacific cities are experiencing problems of poverty, unemployment, rural to urban migration and homelessness, that are similar to the megacities, but these problems are situated in very different social and physical contexts, which give rise to geographically situated vulnerabilities that are worthy of separate study.

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Table 1 Population statistics for Pacific island nations, 1998 (Source: ESCAP 1998).

	Total population 1998 (thousands)	*Population growth rate (%/yr)*	*Urban population 1998 (% of total)*	*Urban population growth rate (%/yr)*
American Samoa	59	3.1	51	3.9
Cook Islands	21	0.9	64	1.6
Fiji	822	1.6	42	2.4
French Polynesia	231	1.9	57	2.1
Guam	160	2.3	39	2.3
Kiribati	83	1.9	37	2.7
Marshall Islands	61	3.5	71	4.2
Micronesia (Fed. States)	113	1.9	29	4.2
Nauru	12	2.2	100	2.2
New Caledonia	189	1.5	63	2.2
Niue	2	0.5	30	0.5
Northern Mariana Islands	70	5.6	55	5.6
Palau	19	2.5	72	1.7
Papua New Guinea	4600	2.2	17	3.9
Samoa	167	0.5	22	1.7
Solomon Islands	416	3.2	19	6.1
Tonga	89	−0.5	44	2.8
Tuvalu	10	1.3	46	4.4
Vanuatu	182	2.5	19	3.5

Table 2 Urban population statistics for major world regions (Source: World Resources Institute 1997).

Region	*Urban population 1995 (thousands)*	*Per cent urban 1995*	*Urban population growth rate 1990–95 (%/yr)*
Africa	250 276	34	2.0
Europe	535 052	75	0.6
North and Central America	331 761	68	1.8
South America	249 331	78	2.5
Asia	1 197 970	35	3.3
Oceania	20 063	70	1.5

This paper is concerned with urbanization in the South Pacific. Our analysis is framed by the contemporary literature on environment and security and, specifically, concepts of human security. Recent definitions of human security emphasize choice and options, options for people and communities to mitigate or adapt to threats to their well-being, an ability to exercise these options, and the freedom to participate in attaining these options (Lonergan 1999). Such a definition implies a need to identify threats to human well-being, the vulnerability of people and communities to these threats, and the options they have to end, mitigate or adapt to these threats. The general aim of the paper, then, is to identify the environmental threats to human security that are presented by urbanization processes in the Pacific and to consider prospective interventions that would improve human security.

Urbanization, the environment and human security

The relationships between environment and security have been the subject of extensive debate within both academic and policy communities. Within the literature, urbanization has been identified as a process that has implications for both environment and security. Brennan (1999), for example, aimed to identify the linkages between population growth, urbanization, public health, the environment, and international security. Pirages (1997) also referred to the links between urbanization, environment and security, noting that urbanization in the less economically developed countries could increase 'ecological insecurity'. He suggested also that a combination of crowding within cities and a lack of economic opportunities poses a threat to social order. Implicit within these statements are somewhat different conceptions of what is meant by security, although they are not necessarily contradictory ones. Brennan (1999) refers to the prospects of crime and violence arising out of economic disadvantage, overcrowding, and social exclusion; social dislocations within cities have the potential to lead to wider instabilities, which might extend across national borders. Pirages (1997) on the other hand focuses on 'ecological insecurities', noting that these have social as well as biophysical dimensions. The acknowledgment of these interrelationships between the biophysical and the social underpinnings of vulnerability is integral to our conceptual framework in which we associate urbanization, environment and human security.

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Linking environment and security has arisen from a broadening of the concept of national security (Griffiths 1997; Lonergan 1999). Although extended concepts of national security date back several decades, it was not until the 1980s that people began to explicitly link environment with security, and papers by Ullman (1983), Myers (1986), Matthews (1989) and Westing (1989) were amongst the first to make this association. Myers (1986, p. 251), for example, argued that: 'The notion of national security can no longer be centred so strongly on simple considerations of military prowess. It increasingly entails key factors of environmental stability that underpin our material welfare.' Shortly after, Westing (1989, p. 129) wrote that 'comprehensive human security has two intertwined components: *political* security on the one hand (with its military, economic, and social/humanitarian sub-components); and *environmental* security on the other (with its protection-oriented and utilization-oriented sub-components).' Noting that during the 1970s concepts of national security had been broadened to encapsulate international economics, Matthews (1989) asserted that definitions of national security would have to be extended to include resource, environmental and demographic issues.

As a result of these perspectives, the linkages between environment and security were becoming clearer conceptually, but the need remained to verify and substantiate the arguments put forward by Ullman (1983), Myers (1986), Matthews (1989) and Westing (1989). A number of studies aimed at establishing the nature of the relations between environment and security with greater conceptual and empirical clarity followed. Probably the best known examples of this work are the studies on the role of environmental change and resource degradation in causing violent conflict carried out by the Peace and Conflicts Studies Programme at the University of Toronto (Homer-Dixon 1991, 1994; Homer-Dixon *et al.* 1993). The central issue for this group was the question of whether and how environmental scarcities caused by environmental change, population growth and the unequal social distribution of resources might lead to violent conflict (Homer-Dixon 1991, 1994). According to Homer-Dixon (1994), being able to avoid violent conflict and social turmoil arising from environmental scarcities depends on social and technical ingenuity. However, 'Poor countries start at a disadvantage: they are under-endowed with the social institutions – including the productive research centres, efficient markets and capable states – that are necessary for an ample supply of both social and technical solutions to scarcity. Moreover, their ability to create and maintain these institutions may be diminished by the very environmental stress they need to address, because scarcity can weaken states . . .' (Homer-Dixon 1994, p. 11).

Similar conclusions were drawn recently by the US 'State Failure Task Force', which suggested that countries with social vulnerabilities arising from limited governmental or social capacity faced the risk of state failure as a result of environmental hazards (Esty *et al.* 1999, p. 49). The notions of social capacity and options to respond to threats to which Homer-Dixon and the State Failure Task Force refer are central to our analysis of urbanization and human security in the South Pacific.

Other programmes are now exploring how human security can be achieved in the face of changing environments and human living conditions. The International Human Dimensions Programme on Global Environmental Change (IHDP) has recently established a project on environment and security, the Global Environmental Change and Human Security project (GECHS). The GECHS project of the IHDP is focused explicitly on human security and how options and social capacity can be developed in the face of global change.

The GECHS interpretation of human security and its achievement refers to the active engagement of people in responding to threats and reducing vulnerabilities (Lonergan 1999): Accordingly, individuals and communities will enjoy human security if they:

- Have the options necessary to end, mitigate, or adapt to threats to their human, environmental, and social rights;
- Have the capacity and freedom to exercise these options; and
- Actively participate in attaining these options.

Three premises underlie this definition, namely: (1) human perceptions and the use of environments are socially, economically, and politically constructed, (2) environmental problems must be addressed from a perspective that encompasses world poverty and issues of equity, and (3) the appropriate spatial level in which to deal with both environmental and security concerns is not necessarily the nation-state, but a level at which the knowledge base is the greatest, which will often be the local level (Lonergan 1999).

Although not the same, the GECHS definition of human security places it close to what others have called an 'ecological approach' to security. 'An ecological approach to security is anchored in a broader conception of threats to human well-being. Ecological security moves beyond preparations to repel military assaults from enemy states to ensuring safety from other kinds of ecological and economic challenges' (Pirages 1997, p. 37). According to Griffiths (1997), the ecological perspective is a key to understanding global environmental problems at the level of causes rather than symptoms.

There are many associations among the processes that contribute to urbanization processes, the consequent vulnerabilities are numerous, and there are thus many ways in which mitigation and adaptation might reduce the resultant human insecurities (Fig. 1). Existing insecurities (e.g., income inequalities, environmental degradation, lack of services etc.) are catalysts in the process of urbanization (Fig. 1). Rural to urban population movements, however, give rise to vulnerabilities within urban places, including pollution, exposure to hazardous substances, resource scarcities and

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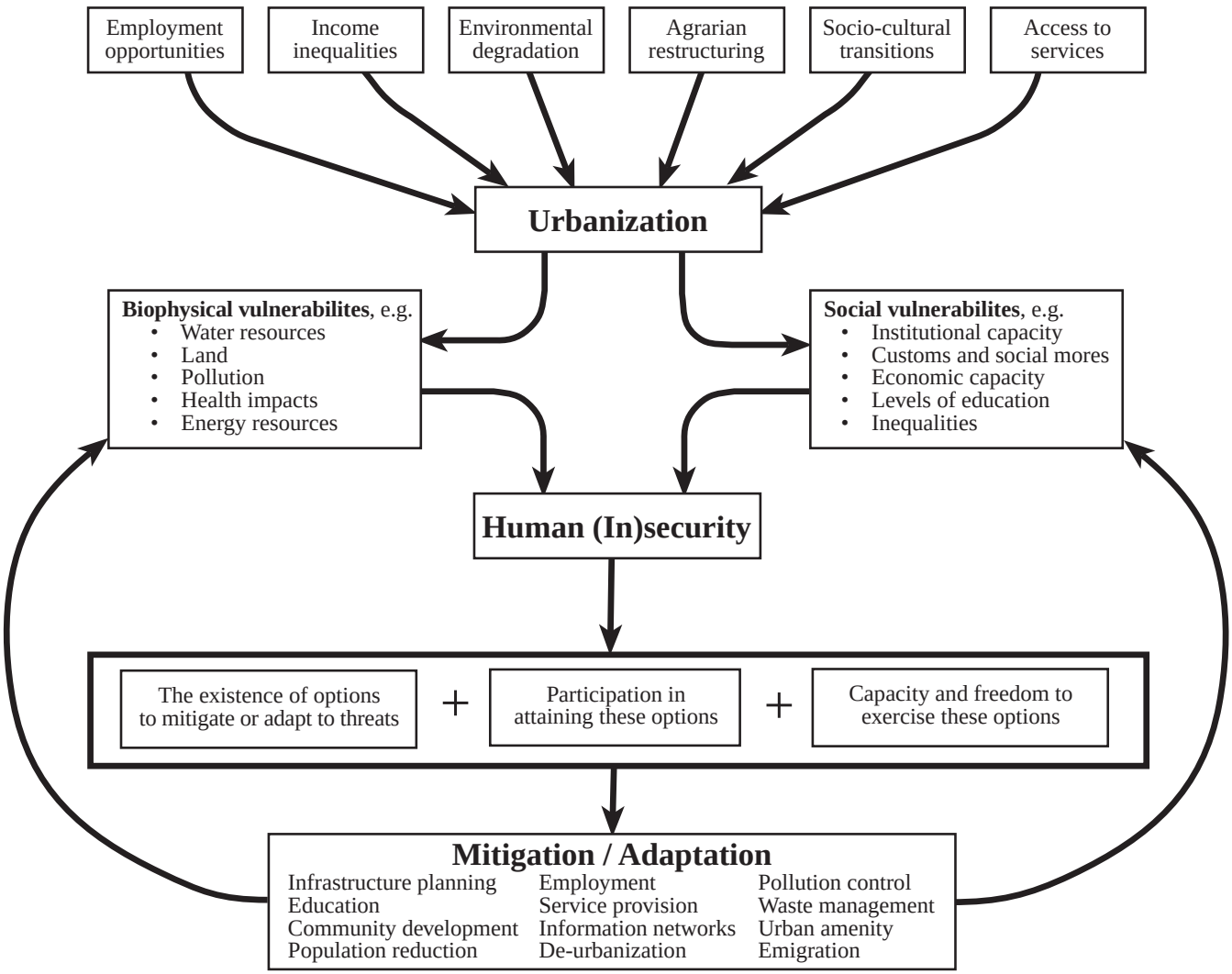


Figure 1 Urbanization and human security.

inequalities. Vulnerability is defined in Figure 1 as having biophysical and social components (Cutter 1996). Biophysical vulnerability refers to the potential for loss from environmental threats. This requires an explicit consideration of the social relationships with the environment in a particular location, in other words the nature of human occupancy, as well as the physical dimensions of the threat itself, including magnitude, duration and frequency. Social vulnerability refers to the social and institutional capacity that defines both the susceptibility and the ability to cope with environmental threats. Cutter (1996) argued that it is the interaction of social and biophysical vulnerability that contributes to the vulnerability of specific places. As places are geographically and socially located, the specific characteristics of systems must be considered in order to fully understand the nature of the vulnerabilities and how people might respond to them.

At the centre of Figure 1 is the essence of our definition of human security, specifically in the context of urbanization. The definition suggests that the state of human security will be determined by environmental threats, referred to in the figure as biophysical vulnerabilities, which in an urban setting would include scarcities of basic resources, such as water, land and energy, and degradation of environmental quality. These threats have the potential to undermine human security in myriad ways, but include most notably their implications for human health and physical wellbeing, economic welfare, nutrition levels, and access to adequate housing. The definition makes reference also to the social vulnerabilities, which are the social and institutional capacities to cope with environmental threats. A key aspect of the definition of human security, then, is the notion of vulnerability, in both its biophysical and social dimensions. The definition we employ also borrows from the GECHS interpretation of human security, in that it makes reference to the existence of, and the capacity to exercise options to mitigate or adapt to environmental threats to human security. In a particular place, these options will be determined directly by the extent and intensity of the environmental threats and by the social and institutional capacities. In short, therefore, human security is defined with reference to the nature and extent of vulnerabilities, both biophysical and social, in a

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particular place and the options that individuals and groups have with respect to mitigating or adapting to environmental threats.

Unlike those who have approached the environment and security issue from the perspective of national security and the potential for violent conflict, the definition here is much more broadly based. Approaches such as this have been subject to criticism by some authors on the basis that the concept of security encompasses too many issues and thus the term is devoid of conceptual clarity and lacks value as an analytical tool (Deudney 1991; Levy 1995). In retort, Lonergan (1999) pointed out that this simply reflects variable expectations in terms of the standards and purposes that are demanded of the concept of environmental security. More substantively, Lonergan also points to the potential for improved theorisation of the concept of human security, as well as its application in a wide range of contexts in order to better understand how environmental changes do in fact influence peoples' sense of security. The position taken here is that the environmental threats associated with urbanization have the potential to undermine senses of personal and community security because of their implications for health, welfare and wellbeing. The concept of human security therefore provides an appropriate conceptual framework within which to examine the nature and implications for people of environmental changes associated with urbanization.

In the remainder of this paper, our objective is to analyse the respective threats, vulnerabilities and insecurities that exist in the context of urbanization in the Pacific islands. Referring to the definition of human security above, we are interested also in the options that Pacific islanders have to limit threats and vulnerabilities associated with urbanization. Towards the end of the paper, our objective is to identify measures in terms of planning, adaptation and mitigation that offer the prospect of reducing human insecurities arising from urbanization.

Urbanization in the Pacific islands

Prior to colonial rule, there is no evidence of urban development in the Pacific islands (Connell & Curtain 1982; Buchholz 1983; Ward 1998). The history of urbanism within Pacific island societies is therefore relatively short, and urban places represent a significant departure from patterns of settlement and social organization that prevailed in pre-colonial times. As Table 1 reveals, however, the populations of many Pacific nations are now concentrated in urban centres. Nauru is an extreme, with the entire population effectively urbanized, but there are several other nations such as the Marshall Islands, Palau, the Cook Islands and New Caledonia in which the populations are also predominantly urban-based. While only about 20% of Samoa's population is urbanized, Storey (1999) reported that on the island of Upolu about 72% of the population is urbanized. Many of the urban inhabitants of this island live in sprawling peri-urban settlements that extend over quite extensive areas. The housing conditions of these people are generally poor, and many live in low-lying, swampy areas which are prone to flooding, contamination by sewage, and where diseases are widespread (Storey 1999). As Storey (1999) also reports, though, only thirty years ago the housing conditions in this same city were evaluated as adequate. The conditions found in contemporary urban Samoa are commonplace throughout the Pacific.

The urbanization of Pacific island people began with colonial rule, which began in the 16th century, but reached its zenith in the 18th century. According to Burt and Clerk (1997, p. 5), the colonial governments established settlements to serve their own purposes and not local priorities and interests. The urban centres were largely populated by foreigners and used as points from which to export natural resources and import Western ideas concerning religion and progress. Thus, they were an aberration on the cultural and social landscape, rather than an integral part of the society. In many cases this has given rise to a cultural schism between urban and rural regions within nations.

The colonial influence in the Pacific resulted in the relatively unusual situation wherein only one major city exists in which paid employment, government services and business opportunities are concentrated. Furthermore, unlike its Asia-Pacific neighbours, the urbanization process in the Pacific was largely separate from the processes of industrialization (Chandra 1992), making the absorption of urban migrants into the paid economy heavily reliant on government activities, which in turn depend largely on foreign aid and investment. Industrial activities that did emerge are based overwhelmingly on resource harvesting (e.g. mining, forestry and fisheries), which, under growing economic pressures, have become ecologically unsustainable (Cocklin 1999). Manufacturing is undiversified, concentrated in only a few urban centres and consists mainly of oligopolies and monopolies (Chandra 1992). Thus, the economies of Pacific cities are relatively undiversified and supported by stressed ecosystems, rendering them less able to respond to changes in local needs or global markets.

Over recent years, the terms of trade have been deteriorating. Because Pacific countries are only small suppliers to world markets, they have little influence over market prices and supplies; this is a situation which is not helped by the weak regional arrangements for economic cooperation. An additional factor contributing to the trade imbalances is the rising demands of Pacific Islanders for imports, including non-traditional foods. The FAO (1996) expressed concern over the high level of dependence on imports, particularly of basic food products, because of the vulnerability to changes in international markets. Price rises in basic foodstuffs impact particularly hard on urban populations not only because of their lack of access to gardens, but also because the resulting trade deficits affect the governments' abilities to provide services, basic urban infrastructure and employment.

The socio-economic and cultural changes occurring in

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urban areas are familiar, but certain aspects of the Pacific add complicating factors that profoundly affect the functions and structure of the urban systems. Connell (1984) identified these factors as the small size in terms of both population and area of the Pacific nations, their limited natural resources, isolation from each other and from major markets and a relatively short experience of capitalism. As Connell (1984) suggests, there is a close link between the intervention of western capitalism and the emergence of new settlement patterns centred on urban places, which lack the flexibility and diversity to adapt to changing circumstances. The fragile states of the Pacific islands' economies has in turn contributed to their inability to deal with localized problems of urban poverty, high levels of unemployment, and squatter settlements.

From both an environmental and a social perspective, one of the characteristics of urbanization in the Pacific that is of concern is informal and unplanned residential developments at the peripheries of towns and cities (Ward 1998; Storey 1999). These squatter settlements are a response to the pressures of population on limited land resources, but their origins lie also in the institutional problems associated with the customary ownership of land (Table 3), which constrain the transfer and development of urban land. Customary tenure can be defined superficially as land that is held in trust by community members for future generations. Although it can be used by the community members or those granted rights by the community, it is not individually owned and cannot be bought and sold at will. 'The peri-urban developments exert increasing pressure on nearby communities to house newcomers and to provide food; they also use whatever land is available either by squatting or through informal arrangements with traditional owners, who take no responsibility for the facilities these new communities require' (Thistlethwait & Votaw 1992). Thus, the traditional land tenure system is not very responsive to the needs of new urban migrants, and this form of tenure limits the ability of government or markets to respond, if they have the will.

Table 3 Land ownership in selected Pacific island countries (Source: UNDP 1996). [1]All land is government owned on Kiritimati Island in the Line Group, while only some is government owned in the Phoenix Group. All urban land in South Tarawa is traditional, with all the main urban villages leased by government. [2]Refers only to Pohnpei State. Freehold includes land owned by private as well as some customary land. [3]All land in Tonga is owned by the Crown with user rights vested in families. [4]Approximately half the urban lands are owned by government with rural lands owned by the Vanuatu nationals.

Country	*Customary land (%)*	*Government land (%)*	*Freehold (%)*
Fiji	83	9	8
Kiribati	40[1]	60[1]	–
Marshall Islands	100	–	–
FSM	–	60[2]	40[2]
Solomon Islands	97	3	–
Tonga	–	100[3]	–
Vanuatu	98[4]	2[4]	–

In practice, governments often neglect the needs of these settlements, in some cases purposely not providing water in a deliberate attempt to discourage the expansion of squatter settlements (Bryant 1993). However, these settlements are continuing to grow throughout the Pacific. Bryant (1993) refers to research indicating that in Vila, Vanuatu, population densities were as high as 19 000 people per km^2, and that over 25% of the urban population of Vanuatu lived in slums and squatter settlements lacking basic services. It is in these peri-urban areas where poverty and vulnerability is greatest, that population growth persists. The institutional and community arrangements within the urban system have failed to respond to the needs of these settlements.

In some cases, peri-urban development has extended across small island states such that for all intents and purposes, the entire country is urbanized (for example Nauru, see Table 1). In atoll countries such as Kiribati, the Marshall Islands and Tuvalu, the land area available for urban settlements is so limited that urban crowding is a significant problem. In this type of urban settlement pattern, social and biophysical vulnerabilities are amplified over time because any disaster (e.g. urban fire, flood, severe storm or economic downturn) can overwhelm the already-stressed infrastructure and impact on the concentrated population. The rapidity of the urbanization process (Table 1) means that social and institutional capabilities lag ever further behind.

The social and cultural dislocations of urbanism and urbanization are intense in the urban peripheries. For some individuals, the obvious response is to move to the cities of New Zealand, Australia and the United States. Remittances are a mainstay of many communities throughout the region. There are associated social and cultural costs, however, since as Ward (1998) suggests, many Polynesians and Micronesians living in their home islands are likely to know more about the cities of New Zealand, Australia and North America, than about their Pacific neighbours. This feature of Pacific island urbanization at once contributes to economic resources that can be mobilized to respond to social and biophysical vulnerabilities, while at the same time it has undermined the social and cultural integrity of island societies, reinforcing the outward focus of cities and the schism between urban and rural societies.

The social and biophysical vulnerabilities must be better understood and planned for in order to improve human security. This might involve the implementation of programmes that build internal social and cultural networks, diversify economies through regional growth and strategic planning, and mitigate against the escalation of biophysical vulnerability through the pooling of scarce resources. We turn to these and other options for improving human security towards the end of the paper.

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Biophysical and social vulnerabilities

Urban systems impose significant demands upon the environment in terms of resource use and the output of wastes. Biophysical characteristics of the Pacific islands also contribute to the vulnerabilities associated with urbanization. In particular, fragile ecosystems, limited land resources, and shortages of basic resources (particularly water) all have bearing on the biophysical vulnerability of urban systems in the Pacific. Of note also are the risks posed by climate change. As well as the prospect of inundation by the sea of some low-lying islands and atolls, the possible effects of a rise in sea level include accelerated coastal erosion, salt water intrusion into freshwater reservoirs, and an increased landward reach of storm waves (McLean 1992). Climate change is also expected to contribute to increased storm activity in the region. There is some question as to the likelihood and extent of sea level rise induced by climate change (for example see Hay 1997), and McLean (1992) suggested that current estimates actually lie within the range of past variations in sea levels. This may mean that some predictions of drowned islands are perhaps overstated, but even so many urban centres will be affected by higher sea levels and also by an increase in the frequency and extent of major storm events. The nature of these and urban vulnerabilities in the region associated with water supply, urban pollution, and human well-being are discussed below.

Water supply is a problem that affects much of the Pacific, and particularly the atolls. The atolls rely primarily on freshwater lenses for potable water, the supplies of which are affected by rainfall, seepage and rates of abstraction (Thistlethwait & Votaw 1992). There is a risk of concentrated populations over-pumping these lenses, which can result in saltwater intrusion and the contamination of the lenses through the porous soils on which many urban areas are built. In the Kiribati National Development Plan 1992–95, for example, it was observed that: 'The increasing urban population in South Tarawa is placing a strain on the limited water resources available. Most of the closest, suitable lenses have been utilised . . .' (Republic of Kiribati 1992, p. 186). Fears are also held that sea level rise induced by climate change might lead to the salt-water contamination of these precious water supplies (Hay 1997; McLean 1992).

For both the atolls and the high islands, water contamination by urban pollution is a serious environmental threat. Garbage, sewage and industrial wastes are the main sources of contamination within urban areas (Table 4). Contaminated waste reaching water bodies will continue to be a problem so long as most countries in the South Pacific fail to put into place regulatory standards for industrial (or any other) effluent discharges to the environment (Morrison 1997). Non-point pollution sources, such as biocides and sediments in rural catchments, also pose threats to urban water supplies, but the existing government institutions have been unable to create policy frameworks that address rural-urban pollution transfers.

Water pollution is in turn associated with ill health. A vulnerability to waterborne diseases has been associated with problems in maintaining clean water and a lack of effective sanitation and hygiene, problems that are compounded by climatic events such as cyclones, floods and droughts (Russell *et al.* 1998). These events are likely to increase in frequency due to the greenhouse effect. Problems of water contamination extend to the marine environment as well. Thistlewait and Votaw (1992), for example, reported discharges of sewage directly into lagoons or onto reefs, and toilets built directly over the sea on some atolls. Local contamination of the marine environment by sewage and other wastes has led to bacteriological health problems, the closure of swimming areas, and food poisoning. Some time ago Brodie and Morrison (1984, p. 333) commented that: 'The 'concentration effect' of increased industrial development occurring alongside major urban growth leads to considerable coastal pollution from industrial waste discharge in the very areas where population increases, with the associated subsistence fishing, are [*sic*] leading to irreparable damage to coastal ecosystems.' For example in Suva, the largest Fijian city, 95% of mangrove shellfish collected at eight sites were found to exceed World Health Organization limits for human consumption (Bryant-Tokalau 1995). Pollutants in the marine environment are of considerable concern in the Pacific given the reliance on its ocean resources for food (Samou 1999).

Waste disposal is a problem that extends beyond water contamination, however. Limited land resources mean that there are few options for the disposal of wastes and the geology of the islands is in many places not well-suited to land fills. Morrison *et al.* (1996) found that poor waste manage-

Table 4 Water contaminants from industrial sources (Source: Morrison 1997, p. 125).

Industry	*Sources of contaminants*	*Types of contaminant*
Food canneries	Fruit and vegetable preparation	Suspended solids, colloidal material, dissolved organic matter
Breweries, distilleries	Grain, distillation	Dissolved organic matter, nitrogen compounds
Abattoirs	Slaughtering, cleaning	Dissolved organic matter, blood, fats, proteins
Sugar mills	Handling of fluids	Dissolved sugar and protein
Soft drinks	Cleaning, washing, spillage	Dissolved organic matter, suspended solids
Laundries	Washing fabrics	Colloidal material, alkaline liquids
Photographic premises	Spent developer and fixer	Dissolved organic matter, alkaline and reducing fluids
Metal plating	Cleaning and plating	Suspended solids, acids, metals
Garages, filling stations	Spillages, cleaning	Suspended solids, oils, petrol

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ment was a major contributor to soil and land contamination by oils, pesticides and heavy metals. In a report on Palau, but applicable to many South Pacific countries, it was noted that many of the dumping sites are located in low-lying swamp or mangrove areas (SAGRIC International 1995).

Contaminants which reach the hydrological cycle can be transported considerable distances, and in some cases can bio-accumulate in food sources used within cities. The lack of monitoring in the Pacific means that potential threats of this nature can go undetected. This is all the more significant because, as Brodie and Morrison (1984) observed, many of the island ecosystems are fragile.

Not only does urbanization lead to health problems associated with overcrowding, inadequate sanitation, water pollution and inadequate waste disposal, but it is also leading to a growing gap between the rich and the poor. The Pacific report to the Habitat II conference noted that: '... marked inequities in cash incomes, have become more obvious, particularly in urban areas. ... over the last decade rates of economic growth have been low and stagnant, while population growth has continued to climb. The countries of Fiji, Solomon Islands, Vanuatu and Kiribati all experienced negative per capita income growth in the 1980s and into the 1990s, despite high levels of foreign resource inflows such as aid' (United Nations Development Program 1996, p. 6).

This growth in inequality increases the vulnerability of low-income groups, women and youths. Bryant-Tokalau (1995) observed that urban unemployment is increasing everywhere in the Pacific, with a particularly high incidence of youth unemployment that in some countries exceeds 50%. In Fiji, one of the wealthier Pacific nations, 10% of the population received 50% of the income in the mid-1980s and this inequality has grown in the 1990s (Bryant-Tokalau 1995). Should this concentration of resources and wealth continue, accompanied by the increasing incidence of crowd-related diseases and urban land scarcity, social instability may follow.

The resources to address increasing inequities, however, are scarce. The World Bank (1991) reported for the 1980–88 period that the average growth rate in real GNP of Fiji, Kirbati, the Solomon Islands, Tonga, Vanuatu and Western Samoa was only 0.6% per annum, while average population growth was 2% per annum. Thus, economic development has not kept pace with urbanization and population growth generally. Weak economic performance has contributed to environmental degradation and a decline in the quality of urban living. The United Nations Development Program (1996) highlighted a number of environmental vulnerabilities:

- declining standards of urban infrastructure,
- rising numbers of squatter settlements and informal housing,
- increasing poverty (i.e., percentage of urban population under the poverty line),
- increasing environmental degradation,
- burgeoning urban unemployment, and
- declining quality of life in all Pacific urban centres.

Despite these problems, people continue to gravitate to towns and cities throughout the islands. This is because urban centres do offer certain advantages, including better employment opportunities, better educational and health facilities, and freedom from traditional social and cultural obligations (Connell & Lea 1995*a*; Ward 1998; Storey 1999). From the point of view of economic and social planners, urbanization is not entirely bad either. It holds the prospects of improved service delivery, better opportunities for waste collection and processing, and reduced pressure on rural land resources. However, population influxes have heavily taxed existing urban infrastructure such as water, electricity, housing, and waste disposal facilities, making the urban system vulnerable to biophysical and social perturbations (Connell & Lea 1993, 1995*a*; Storey 1999). The ability to respond to these problems is fundamental to maintaining human security.

Adaptation and mitigation: prospective policy responses

At present, biophysical and social vulnerabilities associated with urban systems in the Pacific are not being managed adequately. Current approaches to urban planning are inadequate and fail to address the full range of sustainability issues that underpin economic, social and ecological wellbeing (United Nations Centre for Human Settlements 1996). The discussion is now turned to examining the options for how urban policy and planning might be redirected towards ameliorating the threats to human security that are posed by environmental and social changes associated with urbanization.

Part of the explanation for the failure is that urbanization is in some respects a product of global processes, particularly economic and industrial transformations, which are beyond the direct control of any one city, or even nation states. Even social and cultural responses to urbanization are increasingly affected by international markets and communication networks. With respect to communication networks, the rapid sharing of information can be a powerful and positive catalyst for change within urban environments, as demonstrated by the International Council for Local Environmental Initiatives (ICLEI) which is supporting northern and southern municipalities around the world to try new planning approaches that are compatible with the goals of Agenda 21 and share their experiences through a global network. However, global exchanges of information often do not lead to innovation, but rather to passive acceptance of urban planning approaches which are not equally applicable to the range of urban environments existing in today's world. Uncritical adoption of generic responses to rapid urbanization can increase the vulnerability of urban populations that do not share the same characteristics of cities in which these models are developed.

South Pacific cities have tried approaches developed elsewhere in dealing with rapid urbanization, despite their

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relative lack of resources, the different characteristics of their waste streams, the different geological and physical features of the islands, and the different cultural traditions which relate to urban settlements and their role in the wider society. This approach to urban management is increasingly subject to the question of whether there might be a better 'Pacific Way' that recognizes the unique circumstances of these cities (South Pacific Regional Environmental Program 1992). In the South Pacific the current nexus between rapid urbanization and increased human vulnerability may be more easily broken if geographic and social particularities are incorporated more effectively into urban management. The key to breaking this nexus may not be in applying present responses common to rapid urbanization more rigorously, but rather by applying a different approach that better accommodates geographic and social peculiarities of place.

Underpinning some of the problems associated with urbanization in the Pacific are institutional features. Two are of particular note. One is the previously mentioned issue of customary tenure. To adapt to new pressures on the urban system, a Pacific approach will be needed that is not totally divorced from customary land tenure. The solutions will have to emerge from discussions between traditional and political leaders; this dialogue has yet to even begin in earnest.

The other problem relates to the lack of capacity to manage urban environments. Urban management is piecemeal and there is little coordination, particularly between economic and physical planning agencies (Connell & Lea 1993; Jones 1996; Overton & Storey 1999). To reduce vulnerabilities, integrated planning frameworks will be needed that are strongly supported by social structures that are well understood in the Pacific. Highly centralized planning, typical of the colonial era, will need to be replaced by a more grassroots planning process, incorporating traditional institutions that govern access to land and resources.

Bryant-Tokalau (1994) has elaborated on the consequences of inadequate planning in terms of urban degradation of soil, fresh water, coastal and land-based food supplies, inadequate sanitation, deterioration of housing and disease related to overcrowding. Participatory arrangements that work with locals in urban environments, rather than against them, have been shown in many places to be the only effective way of dealing with local urban environmental issues (Bryant-Tokalau 1994). This is consistent with the conclusion of the GECHS programme discussed earlier, namely that there is a need to create options for the future through the active participation of communities.

Building human capacity, individually and collectively through the reform of institutions, will remain an important social response of Pacific cities if urban vulnerabilities are to be reduced and human security increased. While local participation is necessary to address urban environmental problems, and to ensure that new initiatives are sustained over the long term, more than this will be needed. The issue of urbanization cannot be dealt with by exclusive attention to urban areas, because many of these 'vulnerabilities of place' are strongly related to variables external to the local urban system. For example, development in rural areas needs to be encouraged to help stem migration from the countryside to cities. In terms of population, this is the most useful intervention since urbanization in most Pacific island countries is being driven more by migration than by rates of population growth (Table 1). Therefore, quite apart from the social and cultural issues associated with attempts to limit overall rates of population growth, the more effective intervention would be to slow down migration from the countryside to the cities. Because of the small populations and markets, the encouragement of rural 'growth poles' has failed, though, and the stimulation of unfamiliar economic activities by government programmes has been equally unsuccessful. Regional cooperation could help to expand the markets for indigenous goods and services and improve the competitiveness of Pacific goods in foreign markets. In general, much stronger linkages between rural and urban areas need to be stimulated to ensure that the needs of rural areas are better served by cities, and that cities can benefit from the healthy operation of the rural economy. As long as the inequalities between urban and rural areas persist and increase, urban population growth rates that are unstable will continue in some parts of the Pacific.

Within the cities, more attention needs to be given to the coordination of urban management. Housing, water supply, waste disposal and health are all intimately related. Given the scarce financial, physical and human resources of these cities, the fragmented approach to urban management needs to be replaced with a more integrated view of urban issues (Ross 1998). In Melanesia, this may ultimately involve the rationalization of government departments and agencies, and better coordination between levels of regional, national and local governance. In Polynesia this could be facilitated by the establishment of urban authorities to manage urban affairs, as well as the development of urban plans around which urban regulations and building codes can develop (Connell & Lea 1995*b*). As long as the urban environment remains unregulated, planning will be sectoral and strongly influenced by investors; neither is likely to result in an integrated strategy.

Strategic planning for urban futures will require much better monitoring of key indicators of urban change so that scarce revenues can be spent in a more efficient manner. The lack of attention to resource flows into and out of cities, including the accumulation of wastes/resources, means that valuable resources exist untapped in these cities, while others are being under-utilized or wasted. For example, in most Pacific countries waste streams are not separated and even the most rudimentary means of waste management or minimization is lacking in most cases. Management of human and other wastes tends to be linear, and the wastes are rarely reintegrated, for example as nutrients for use in agriculture or as recycled products for urban consumers. Better waste management, especially composting of organic waste which

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makes up a large percentage of the islands' wastes, could help to reduce the need for expensive, and at times ecologically damaging, agricultural imports. Ultimately, island nations may also have to ban certain consumer goods because of their inability to recycle or dispose of them safely within their environments. In his early contribution to the literature on environment and security, Westing (1989, p. 130) observed that 'without an inflexible commitment to the sustainable development of resources and the sustainable disposal of wastes there can be no environmental security'.

The strategic planning of urban systems in the Pacific must extend to regional bodies (Cocklin 1999). Organizations such as the South Pacific Regional Environment Program (SPREP), South Pacific Commission (SPC), and the South Pacific Forum, have played significant roles in addressing regional environmental management and economic issues. To date, however, little direct attention has been given by any of these organizations to urbanization issues in the Pacific from a systemic and integrated perspective. There are also few opportunities for Pacific and other small-island states to exchange information about their specific urban management issues. Organizations such as ICLEI, the UNESCO Man and the Biosphere (MAB) programme, the Asia Pacific Network for Global Change (APN), and the IHDP, could play a key role in supporting comparative urban studies within the Pacific region, and indeed throughout small island countries facing increasing human insecurities from global and regional change. Greater dialogue on urbanization and how it contributes to the vulnerabilities and insecurities of the South Pacific region may also open up more opportunities for regional diversification through inter-urban trade, inter-urban alliances, and urban-rural integration within and between nations.

Conclusions

Urbanization is one of the most significant demographic, social, economic and environmental transformations affecting the world's populations and environments. Although most western nations have already experienced the urban transition, for most countries and for most of the world's population this is yet to occur, but it will not be long before it happens. The transition to urbanism is being driven by multiple forces, namely inequalities between rural and urban people, perceived employment prospects in urban places, access to services, declining fortunes in rural areas, socio-cultural transformations, environmental degradation, resource shortages, and agrarian change. However, while rural-urban migrants may perceive improved opportunities in urban centres, the reality in much of the developing world is that the capacity of cities to absorb increases in population is limited; the inevitable results are social, economic and environmental dislocations.

With good reason, the international interest in the future liveability of cities is focused on the burgeoning urban populations of Africa, Asia and South America. In these places, the population pressures are enormous, urban infrastructures are unable to cope, and the prospective problems are daunting. Less visible in the discussions of urban futures are the Pacific islands, but as observed here, they are also experiencing rapid rates of urbanization, with associated social, economic and environmental problems that are just as great.

We have examined the 'urban problem' of the Pacific islands against the backdrop of human security. The concept, as it has been defined by the IHDP project on environmental change and human security (GECHS), emphasizes the idea of options, namely those to end, mitigate or adapt to threats and vulnerabilities and the capacity to exercise these options. What we have attempted to demonstrate through this overview of urbanization and the associated environmental risks is that the people of the Pacific islands are indeed vulnerable to environmental and social threats posed by urbanization. The threats are compounded by limited capacities to cope, in other words the existence of social vulnerabilities, and natural environments that are in many places fragile and unable to meet the demands for resources and waste disposal that are being exerted by rapidly growing cities; these are the biophysical vulnerabilities.

What interpretation can we give to the circumstances of the Pacific in relation to the definition of human security? As our discussion above suggests, there are in fact options for the people of the Pacific to curb the adverse effects of urbanization. Improved urban planning, stemming migration through the provision of opportunities in rural areas, learning how to reduce wastes, improved sanitation, and the better integration of social planning with environmental conservation and management are identifiable options that would reduce both social and biophysical vulnerabilities. Moreover, the islands are generally blessed with relatively benign climates, abundant marine resources, and robust social structures, and, compared to people in many parts of Africa, Asia and South America, the Pacific islanders are reasonably well fed. However, it is the capacity to exercise the options to reduce vulnerabilities that is more in doubt. Effective urban planning is beset by problems of land ownership and tenure that have proven difficult to resolve, the economies are weak, and institutions in many countries are not sufficiently well-resourced or developed to cope with the urban transitions. In order to enhance human security in the face of urbanization, the emphasis must be on capacity building, including the minimization of social vulnerabilities. This should open up the opportunity and provide the capacity to participate in the options for limiting the negative consequences of urbanization.

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