

# OCEAN CITIES

## REGIONAL POLICY GUIDE Delivering Resilient Solutions in Pacific Island Settlements



# CONTENTS

<b>AUTHORS AND ACKNOWLEDGEMENTS</b> .....	<b>5</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>6</b>
<b>INTRODUCTION TO THIS GUIDE</b> .....	<b>8</b>
<b>SECTION 1 THE OCEAN AND THE CITY</b> .....	<b>9</b>
What are Ocean Cities? .....	9
Introduction to Pacific Ocean Cities .....	9
Context and challenges for Pacific Ocean Cities .....	12
<b>SECTION 2 NATURE-BASED SOLUTIONS IN OCEAN CITIES</b> .....	<b>16</b>
The importance of traditional knowledge and approaches in the Pacific .....	19
Multiple co-benefits of nature-based solutions .....	20
Barriers to and potential options for adopting nature-based solutions .....	26
Valuing nature-based solutions .....	27
Nature-based solutions for concurrent social, economic and environmental benefits .....	28
<b>SECTION 3 ADVANCING IMPLEMENTATION</b> .....	<b>29</b>
Elevating a blue urban agenda .....	30
Building meaningful partnerships with all stakeholders .....	33
Strengthening capacities for building resilience and action .....	36
Improving evidence for action .....	38
Accessing finance .....	40
<b>SECTION 4 CONCLUSIONS AND PRIORITY POLICY ACTIONS</b> .....	<b>47</b>
<b>ENDNOTES</b> .....	<b>51</b>

## Boxes

Box 1	Elements of Resilience .....	11
Box 2	Interlinkages between climate change impacts and human health in Kiribati .....	12
Box 3	Housing quality as a determinant of children's health in Tonga .....	13
Box 4	Leading waste management practices in Pacific island developing States .....	15
Box 5	The seven principles behind nature-based solutions .....	16
Box 6	Evaluating ecosystem-based adaptation options for a peri-urban area: Lami Town, Fiji .....	17
Box 7	Mobilising traditional knowledge for increased resilience in the Pacific .....	19
Box 8	Ocean Cities within the context of Sustainable Development Goals and international policy frameworks .....	29
Box 9	A need for a more strategic approach to managing urbanization .....	31
Box 10	National Adaptation Plan Global Network-supported adaptation planning in Fiji, Kiribati and Solomon Islands .....	32
Box 11	The need for more political leadership on urban issues in Solomon Islands elevated by researchers .....	32
Box 12	Talanoa dialogues: using traditional dialogue practices to address today's climate challenges .....	33
Box 13	Incorporating peri-urban areas into towns to deliver services and improve communities in Fiji .....	34
Box 14	Youth as agents of change in Tuvalu under the Coastal Adaptation Project .....	35
Box 15	Educational Managed Marine Areas in French Polynesia .....	36
Box 16	Integrated policy responses for building resilience in human systems of Ocean Cities .....	38
Box 17	Engaging the community to identify priorities for resilience-building in Honiara .....	39
Box 18	Disaster risk reduction and resilience self-assessment and action planning in Honiara .....	40
Box 19	Resilience and climate action planning as a groundwork for mobilizing adaptation funding .....	43
Box 20	Performance-based incentive payments for catchment ecosystem service management in peri-urban Port Vila, Vanuatu .....	44
Box 21	Savings groups advance community resilience in Arawa, Autonomous Region of Bougainville .....	45

## Figures

Figure 1	Overview of Pacific Ocean Cities .....	10
Figure 2	Ecosystem services .....	21
Figure 3	Key benefits of nature-based solutions .....	27
Figure 4	Relationship between risk factors and building capacities .....	37

## Tables

Table 1	Proportion of urban population and projected annual average rate of change of urban population (2015–20) in selected Pacific island countries .....	11
Table 2	Benefits of nature-based solutions .....	23
Table 3	Barriers to the adoption of nature-based solutions and potential options .....	26
Table 4	Priority policy actions for sustainable urban development in Ocean Cities .....	49

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# EXECUTIVE SUMMARY

## *The ocean and the city*

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) established a partnership with Pacific island developing States to develop an integrated policy approach for ocean-focused and climate-responsive urban development strategies. Concentrating on urban areas in Pacific island developing States, this guide introduces an approach that has been adapted for island systems and local, national, regional and global development plans. Within the context of ongoing urbanization processes in Pacific island developing States, the guide recognizes the important links between the impacts of urban growth and development, climate change impacts, ocean health and coastal systems, and the effect these factors have on the development and resilience of “Ocean Cities”.

Ocean Cities are where urban landscapes and seascapes meet, where built and natural environments near coastlines interface and where human behaviour and urban development have profound impacts on both terrestrial and marine ecosystems. Ocean Cities are at the forefront of the climate change consequences, the urbanization challenges and other development pressures. Cities face many challenges – demographic, climatic, economic – but they also generate many positive opportunities for future action. This guide is about making that future a bright one by harnessing those activities and supporting a Pacific Way for cities that is culturally and environmentally affirming.

Addressing the interlinked issues that are characteristic of Ocean Cities in an integrated, ocean-focused and climate-responsive manner is vital for sustainable development within island systems, including the achievement of Sustainable Development Goal 11 (make cities and human settlements inclusive, safe, resilient and sustainable), Sustainable Development Goal 13 (take urgent action to combat climate change and its impacts) and Sustainable Development Goal 14 (conserve and sustainably use the oceans, seas and marine resources for sustainable development).

The context and some key challenges for Ocean Cities:

- Ocean Cities are the living places of tomorrow, with rapidly growing and youthful populations.
- Ocean Cities are particularly vulnerable and exposed to natural hazards, including storms, tropical cyclones, earthquakes, tsunamis and volcanic activity.
- A changing climate exacerbates several risk and vulnerability factors.
- Most Pacific island communities and economies are dependent on healthy coastal and ocean resources, but these are often depleted by increasing human populations.
- There has been a rapid rise of people living in informal settlements in Ocean Cities and these communities are often at the front-line of climate change impacts.
- Customary land and resulting complex land tenure systems and mechanisms.
- Food, energy and water security are subject to significant pressures, and waste management challenges are also overwhelming many urban systems.

## *Nature-based solutions in Ocean Cities*

Nature-based solutions relate to the goals of increasing human well-being and resilience by working with, conserving or restoring nature and understanding ecological systems across interconnected landscapes, ocean ecologies and socio-cultural systems. Nature-based solutions can be defined as actions to protect,

sustainably manage and restore natural or modified ecosystems while simultaneously providing human well-being and biodiversity benefits. To be really applicable in cities, nature-based solutions have to be more than just about ecosystem protection. They need to involve an awareness of how natural systems work and letting this awareness inform urban design and form.

Nature-based solutions through an ocean-focused lens should be explored for the urban challenges and needs in the small island developing States. If carefully and holistically designed, nature-based solutions can produce win-win situations across multiple connected social-ecological-economic systems. Employing an integrated, participatory nature-based solutions approach to addressing societal challenges is an important way to take into account complex ecological and socio-cultural issues while taking a long-term view to improving human resilience and well-being, with notable additional ecological co-benefits.

The practice of working closely with nature to create human settlements while maintaining healthy ecosystems, and the services they provide, is not new and, indeed, is a cornerstone of many indigenous belief systems. It may not always be possible or appropriate to place financial value on nature-based solutions; economic valuation alone can omit or misinterpret socio-cultural values or environmental benefits. It is thus necessary to take a holistic approach to valuing the various benefits and trade-offs associated with nature-based solutions and to understand that their value will change over time.

### **Advancing implementation**

An enabling environment for the implementation of solutions requires a wide range of resources, partnerships and meaningful engagement from countries and stakeholders at the regional, national and local levels:

**Elevating a “blue” urban agenda:** Ultimately, the strengthening of political will is needed to elevate and adequately prioritize urban issues and resilience in the Pacific region. A strengthened strategic Pacific regional approach to managing urbanization and Ocean Cities’ resilience is also crucial.

**Building meaningful partnerships with all stakeholders:** An all-of-society approach, along with multi-stakeholder partnerships that are aligned with customary practices is necessary. Increasing the engagement of youth, women and vulnerable communities’ is especially important.

**Strengthening capacities for building resilience and action:** Island settlements at the nexus of ocean health, climate change and urban development need to build anticipatory, absorptive, adaptive and transformative capacities in the face of myriad complex risks. Strengthening the role of urban spatial planning and design is also key for increasing resilience.

**Improving evidence for action:** Mapping spatial and socioeconomic vulnerability in urban systems and communities, as well as improving technical capacity for research and data gathering, are crucial first steps towards improving evidence for building resilience in Ocean Cities.

**Accessing finance for major, transformative resilience-building initiatives:** Such initiatives are usually dependent on state-level actions to undertake reforms that empower local governments through intergovernmental transfer systems, efficient revenue collection and support for creditworthiness. This creates more certainty for subnational investment and strengthens municipal decision-making. Leveraging climate finance for ocean-focused sustainable urban development is an opportunity to protect vital carbon sinks and build resilience against climate change impacts in Ocean Cities.

The guide concludes with suggestions for priority policy actions for short-, medium- and long-term planning horizons.

## INTRODUCTION TO THIS GUIDE

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) established a new partnership with Pacific island developing States to develop an integrated policy approach for ocean-focused and climate-responsive urban development strategies adapted to island systems.

At the launch of the Ocean Pathway, at the 2017 Conference of the Parties to the United Nations Framework Convention on Climate Change, ESCAP pledged its support for building resilience, lowering greenhouse gas emissions and protecting ocean health in coastal island cities.<sup>1</sup> The 2017 Ministerial Declaration<sup>2</sup> made at the 2017 Ministerial Conference on Environment and Development and the Regional Road Map for Implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific<sup>3</sup> promote: (i) sustainable urban planning and spatial development to create environmentally sustainable cities; (ii) the sustainable use of the oceans and seas to conserve the environment, protect biodiversity and enhance the welfare of the community; and (iii) build capacity among governments and stakeholders for climate action and resilience through policy dialogues. The United Nations Ocean Conference in 2017 called for strengthened cooperation and partnerships to protect and restore the health of our ocean and ESCAP submitted a voluntary commitment to establish an Ocean Accounts Partnership for the Asia-Pacific region.<sup>4</sup>

This guide introduces an integrated approach for ocean-focused climate-responsive urban development that is adapted to island systems and local, national, regional and global development plans. Within the context of ongoing urbanization processes in the Pacific island developing States, the guide recognizes the important links between the impacts of urban growth and development, ocean health and coastal systems and the effect of these factors on the development and resilience of Ocean Cities. The primary audience is local and national governments in the Pacific island developing States. However, the conclusions and recommendations could also be applied more broadly to Ocean Cities in other regions.

The guide builds on a series of policy briefs, developed in partnership with the Pacific Centre for Environment and Sustainable Development at the University of the South Pacific, on bridging the built and natural environments for urban development in island States, in line with Pacific priorities,<sup>5</sup> a knowledge exchange workshop on promoting nature-based solutions in Ocean Cities (at the University of the South Pacific on 3 July 2018)<sup>6</sup> and on experience from other projects known to the authors and “friends of Ocean Cities” reviewers.

The framework of analysis for this guide derives from a qualitative synthesis of ocean-focused, climate-responsive and nature-based urban development strategies adapted for Ocean Cities. The approach to “blue” urban development strategies was heavily influenced by available literature on nature-based solutions.

Section 1 introduces the ocean city concept and setting for Ocean Cities. Section 2 details nature-based solutions in Ocean Cities and includes examples. Section 3 provides guidance on advancing implementation of an ocean-focused climate-responsive approach, notably by elevating a blue urban agenda and through collaborative partnerships. Section 4 concludes with suggested policy actions. A number of case studies and other illustrative examples are summarized in text boxes throughout. The literature cited in the endnotes and in text hyperlinks provides significant additional source material.



# SECTION 1

## THE OCEAN AND THE CITY

### *What are Ocean Cities?*

“Ocean Cities” are coastal urban centres whose close proximity to the marine environment defines their development pathways and are, in turn, affected positively or negatively by such pathways. Ocean Cities are where urban landscapes and seascapes meet, where the built and natural environments near coastlines interface and where human behaviour and urban development have profound impacts on both terrestrial and marine ecosystems. Ocean Cities in the Pacific are at the forefront of climate change consequences, urbanization challenges and other development pressures. They are a meeting place not only of water and land, but of diverse people and local-national and international systems. It is no accident that these cities are on the ocean front, where trade and commerce is facilitated. Ocean Cities are key to regional connectivity and development.

The concept of Ocean Cities promotes an integrated approach to urban development and planning that recognizes and reinforces links between the natural and built environments to improve urban services, increase climate resilience and conserve marine and coastal ecosystems and the services they provide. This approach combines nature-based solutions, sustainable marine spatial planning, land-use practices and other measures that enhance inclusive urban resilience in coastal settlements and islands. For Ocean Cities, “re-naturing” urban development (introducing more elements from a local natural environment) requires planning based not only on social and cultural considerations but also on the preservation of ecological processes and ecosystem services on land and in the ocean. The aim is ocean-focused, climate-responsive and resilient development in island systems that are protected and sustained for future generations.

Many cities around the world are Ocean Cities. Ocean Cities in small island developing States are mainly located in the islands of the Pacific Ocean and the Caribbean Sea, with some also in the Indian Ocean, the Mediterranean Sea and the South China Sea.

Ocean Cities are diverse, varying significantly in their composition of settlements in terms of size, socioeconomic status, governance arrangements, levels of access to basic services, risks of external shocks and response capacities. This guide particularly refers to the cities of the developing States in the Pacific region,<sup>7</sup> spanning Melanesia, Micronesia and Polynesia.

The Pacific Ocean Cities span a wide range of geographic, demographic, social and economic conditions that are addressed throughout the guide. The traditional and contemporary importance of the ocean for Pacific cultures and identity are critical to the nature of resilience issues for the Pacific Ocean Cities. When integrated into policies and action in a meaningful way, this powerful narrative can connect Pacific Ocean Cities across islands and help to build ownership for its implementation and engage a multitude of stakeholders. The traditional narrative of “we are the ocean”, introduced by the seminal work of Epeli Hau’ofa,<sup>8</sup> is often used by Pacific islanders. The challenge is to channel this deeply rooted relationship with the ocean to accelerate action and enhance the resilience (see box 1) of Pacific Ocean Cities.

### *Introduction to Pacific Ocean Cities*

The majority of Pacific island developing States are rapidly urbanizing, with most of the growth occurring in Melanesia (see table 1 and figure 1). For example, at current urbanization rates, the urban populations of Papua New Guinea, Solomon Islands and Vanuatu are expected to double in 25, 17 and 16 years, respectively.<sup>9</sup> Box 2 summarizes some of the challenges for Pacific Ocean Cities when superimposed on a rapidly urbanizing population in a small country with high climate risk exposure.

**Figure 1**  
**Overview of Pacific Ocean Cities<sup>a</sup>**



<sup>a</sup> Map by Free Vector Maps  
<sup>b, d, e</sup> United Nations Department of Economic and Social Affairs, Population Division, "World Urbanisation Prospects, the 2018 revision". Available at <https://population.un.org/wup/>  
<sup>c</sup> United Nations Department of Economic and Social Affairs, Population Division, "World Population Prospects, the 2017 revision". Available at: <https://population.un.org/wpp/>

**Table 1**  
**Proportion of urban population in 2018 and annual average rate of change of urban population in selected Pacific island regions and countries (2010–2015)**

Region	Percentage of population that is urban (2018) (%)	Average annual rate of change of the urban population (2010–2015) (%)
<b>World</b>	<b>55</b>	<b>1.90</b>
Melanesia	19	2.33
Micronesia	69	1.21
Polynesia	44	0.67
Fiji	56	1.62
Papua New Guinea	13	2.51
Solomon Islands	24	3.91
Vanuatu	25	2.55

Source: United Nations Department of Economic and Social Affairs, *World Urbanization Prospects: The 2018 Revision* (New York, 2018).

### Box 1 Elements of Resilience

Resilience is defined as the ability to absorb and recover from shocks and to adapt and transform people's structure and means of living in the face of long-term stress, change and uncertainty. A resilient society is one that incorporates the ability of individuals, communities and systems to survive, adapt and grow in the face of stress and shocks; to convert risks into opportunities; and to transform when conditions require it.

#### Resilience capacities:

**Anticipatory capacity:** The ability of human systems to anticipate and reduce the impact of shocks through preparedness and planning.

**Absorptive capacity:** The ability of human systems to absorb and cope with the impacts of shocks and stresses.

**Adaptive capacity:** The ability of human systems to change in response to multiple, long-term and future risks and to learn and adjust after a shock materializes.

**Transformative capacity:** The ability to take deliberate steps to change systems that create risks, vulnerability and/or inequality.



(Photo: M Keen).

**Box 2****Interlinkages between climate change impacts and human health in Kiribati**

South Tarawa in Kiribati has a population of more than 56,000 people in a number of linked atoll settlements. Only one of these settlements has more than 10,000 inhabitants, but the total South Tarawa population represents approximately half of the population of Kiribati and is one of the most densely urbanized areas in the world (reported as up to 10,000 inhabitants per square kilometre in some areas). It is also experiencing very rapid growth, having doubled in population three times since 1979. Climate change effects, particularly sea-level rise and changing rainfall patterns rainfall, highlight the population's exposure to coastal erosion, soil salinization, periodic flooding as well as drought.<sup>10, 11</sup>

Stresses and shocks that impact the resilience, health and well-being of residents come from a combination of rapid urbanization, lack of food and energy resources, other development pressures and short- and long-term climate change impacts.<sup>12</sup> Many of these stresses have arisen due to changes in freshwater and lagoon water quality.

McIver and others summarized in 2014 the health impacts of climate change in Kiribati and outlined the assessment methods that could be widely used in Pacific communities, including in the Pacific Ocean Cities. The authors deemed it highly likely that *climate change will amplify current health risks*, and potentially increase the health impacts of a number of communicable diseases (such as waterborne, food-borne and vector-borne diseases; infections of the eyes, skin and respiratory tract; and zoonotic diseases), injuries, non-communicable diseases, heat-related illness, poverty, food insecurity, malnutrition and mental health impacts. Of particular concern in Kiribati is the potential for climate change effects, particularly sea-level rise, to exacerbate overcrowding, freshwater quality, and add to the risk of infectious disease transmission.<sup>13</sup>

Other studies have highlighted sharply increasing rates of particular diseases, such as tuberculosis (TB), in Kiribati. Hoy and others discussed in 2015 the complex mix of risk factors for TB present in the country, including smoking, diabetes, alcohol use, crowded living conditions and poverty.<sup>14</sup> All of them are directly or indirectly linked to the stresses posed by climate change, population growth and rapid urbanization.



Coastal storm inundation, Betio Hospital, South Tarawa, Kiribati. (Photo: RIMAGES).

**Context and challenges for Pacific Ocean Cities**

Many Pacific island countries and their **Ocean Cities are particularly exposed to natural hazards**, including storms, tropical cyclones, earthquakes, tsunamis and volcanic activity. Most Pacific Ocean Cities experience repeated exposure to more than one of these hazards, with some cities in the Melanesian countries subject to a combination of all of them. For example, the World Risk Index ranks countries based on their disaster risks, including exposure to natural hazards. The 2017 ranking<sup>15</sup> indicated that Vanuatu, Tonga, Solomon Islands, Timor-Leste, Papua New Guinea and Fiji were among the 20 countries at highest risk. Other small island developing States, including Mauritius, Guinea-Bissau and Jamaica, were also among

the highest risk countries. Changing climates exacerbate several risk factors, especially rising sea levels, salinisation, greater storm intensity and changing rainfall frequency, leading to longer drought periods.<sup>16</sup>

**Most Pacific island communities and economies are dependent on healthy coastal and ocean resources**, but these are often depleted by rapid and badly managed urban growth. This dependence extends to many of the large urban centres, such as Port Vila in Vanuatu. In Port Vila, heavy harvesting pressure is exerted on reef and coastal ecosystems (such as fish, reef animals and cooking fuel from trees). The depletion of these resources is additional to pressures caused by terrestrial pollution from industrial and agricultural practices, destruction of mangrove and coastal forest habitat during coastal development projects and the already apparent effects of climate change, such as increased lagoon temperatures and acidity levels.<sup>17</sup>

**There has been a rapid increase of people living in informal settlements**<sup>18</sup> in the Pacific Ocean Cities due to the pace of urbanization, combined with a lack of formal, low-cost housing. This brings internal migrants who have no customary land rights into urban and peri-urban areas. In these informal settlements, which typically receive no formal infrastructure services, many inhabitants have strongly heightened vulnerability to short- and long-term climate change impacts due to several factors, including:

- informal settlements are frequently located in areas exposed to environmental hazards (coastal and low-lying areas, floodplains, riverbanks, steep hill slopes) that may be marginal for sustainable human habitation;<sup>19</sup>
- poor quality housing (where temporary and other less-durable construction materials and methods are typically used);
- water, sanitation and hygiene infrastructure deficits, which often result in deleterious health outcomes for residents, including children; and
- poor access to and unsafe electrical connections.

These issues are especially acute for people living in low-elevation coastal zones, where the impacts of climate change are extremely significant, but are only one of a multitude of drivers, with the potential to undermine the resilience of the major Pacific cities.<sup>20</sup> Of specific significance is the acute and increasing squeeze on land, coastal and many other resources exerted by the combination of environmental and climate change stressors, as well as the resource demands of increasing populations. Along with internal migration, natural population increase of urban areas and conversion of rural land to urban are also factors of urban growth.<sup>21,22</sup> Despite these challenges, demographic data from almost every Pacific country, as summarized in table 1, emphasizes the “pull of the cities” and gives a strong indication that people will continue to migrate from rural areas to cities or their peri-urban settlements.

### Box 3

#### Housing quality as a determinant of children’s health in Tonga<sup>23</sup>

Housing is a significant determinant of health in both urban and rural communities, but the relationships between housing quality and health indicators have been under-studied in Pacific island developing States. A recent innovative study in Tongatapu, the main island of Tonga,<sup>24</sup> looked at the nature and extent of health risk factors and behaviours in households from a child’s perspective. In the study, 72 10- to 13-year-old children were randomly selected from 12 schools in Tongatapu. Half of the schools were situated in the Nuku’alofa urban area. Each participating child wore a wearable camera on lanyards around their neck. The device automatically took wide-angled, images of the child’s perspective every seven seconds.

The analysis showed that the majority of Tongan children included in the study live in houses that have structural deficiencies and hazards, including water damage (42 per cent), mould (36 per cent), electrical (89 per cent) and burn risk factors (28 per cent). The average household size in Tonga is 5.7 persons per household.<sup>25</sup>

*continued...*

**Box 3** Continued

The findings suggest that improvements to the housing stock may reduce the associated health burden and increase buildings' resilience to natural hazards. A collaborative approach between communities, community leaders, government and non-government organizations is urgently needed. Reportedly, Western-style houses sustained an overwhelming proportion of damage in recent hurricanes, while the traditional Tongan *fale* remained largely unaffected.<sup>26</sup> **Re-introducing elements of vernacular architecture, traditional building practices and using locally and sustainably sourced materials may be essential in the development of safer and disaster-resilient communities and improving health outcomes for children and adults alike.**



Images from the Tongatapu housing and health study. Left: Poor building quality indicated by holes in the external wall and use of building materials to patch up exterior. Right: electrical extension blocks and power cables next to a washing machine and in the vicinity of a water spill.

(Photos: L. Signal, University of Otago, New Zealand).

**Complexities from customary land and a myriad of land tenure mechanisms persist.** These arise typically due to: intersecting formal and informal land governance mechanisms in adjacent urban and peri-urban areas; the complexity of interactions between traditional landowners and informal settlements; a prevalent tension between constitutional law and cultural law around land ownership; and the frequent unavailability of, or perceived extra risk associated with, formal or informal leases of customary land for urban development. These factors may at times challenge modern urban governance and management mechanisms and impede the deployment of nature-based solutions (see Section 2) and the integrated planning and implementation of sustainable urban development policies.

**Significant pressures on food and water security exist.** Many urban residents, especially persons residing in informal settlements, are still dependent on subsistence methods to obtain resources, both terrestrial and coastal in origin (food raised in gardens and gathered from reef areas, firewood and traditional building materials<sup>28</sup>), resulting in unsustainable pressures on those resources. Away from coastal settlements, a direction of urban expansion sometimes occurs into peri-urban lowland areas formerly used for agriculture. This relates particularly to the development of “bush gardens” for urban residents with customary rights to land. This displacement of peri-urban agriculture can lead to food shortages, both for subsistence consumers and for market consumers, or to higher market prices for the latter. In both cases, higher food prices can lead to poorer nutritional outcomes. Recent data show that the Pacific is the only global region where undernourishment has been reported to have increased over the past 12 years.<sup>29</sup> In addition, the loss of natural coastal barriers and ecosystems have increased the risk of saltwater inundation and intrusion of freshwater lenses through wave action, storm surges and sea level rise, adding to the water and food security pressures on atolls.

The dependence of urban residents on subsistence resources underscores the importance of taking a systems approach, spanning a whole island and its ecosystems. For example, destruction and pollution of coastal and marine ecosystems and fish-breeding grounds in Ocean Cities can negatively impact the biodiversity and health of ecosystems central to food security for the population within and outside of cities. Because of the linkages between the urban, peri-urban and rural zones, this can end up pushing more people into cities.

### **Waste management challenges are overwhelming urban systems and exacerbating resource scarcity.**

Limited land and resources for the development of sanitary landfills, a lack of recycling facilities and waste management awareness led to insufficient capacity of Pacific island waste management systems, and can, for example, result in unmanaged plastic waste issues. These factors, combined with proximity to the ocean and marine debris pollution from land-based sources rapidly entering the ocean,<sup>30</sup> deforestation of mangroves which act as “natural filters” of pollution, and storms-driven disposal of solid waste (often from informal settlements) into the ocean, amount to significant waste management challenges. The discharge of untreated black and grey wastewater in some Pacific Ocean Cities also compounds the challenges. However, as summarized in Box 4, there are innovative examples of waste management in the region.

#### **Box 4**

#### **Leading waste management practices in Pacific island developing States**

In the face of limited land availability and myriad other challenges, many Pacific Ocean Cities are working towards more sustainable waste management in the following countries:

- Fiji: The climate-proofed landfill in Labasa provides good practices in disaster waste management, green waste collection and composting green waste.
- Kiribati: The introduction of successful recycling initiatives, notably the *kaoki maange* (return rubbish) system that has operated since 2005.<sup>31</sup>
- Papua New Guinea: Initiatives like the Go Green Programme educate people to be responsible for their own waste and dispose of waste properly.
- Samoa, Vanuatu, Cook Islands, Niue, Papua New Guinea and Fiji: A range of initiatives to ban or reduce single-use plastic products, such as straws and bags, have been planned or initiated.<sup>32</sup>
- Samoa: Promotion of recycling, reuse and composting.



Port Vila landfill. (Photo: M Pedersen Zari).

## SECTION 2

# NATURE-BASED SOLUTIONS IN OCEAN CITIES

**Nature-based solutions relate to the goals of increasing human well-being and resilience by working with, conserving and restoring nature and understanding ecological systems across interconnected landscapes, ocean ecologies and socio-cultural systems.** The aim is to produce multiple societal, cultural, health and economic co-benefits for people while conserving or improving ecological health. Underlying nature-based solutions is the acknowledgement that biodiversity and the health of ecosystems are fundamental to human survival. But also, working with nature rather than against it or without it can lead to more effective, economical and culturally appropriate solutions to societal challenges while concurrently conserving or restoring ecological values. Nature-based solutions, to be really applicable in cities, must be more than just about ecosystem protection. It is about an awareness of how natural systems work and letting this inform urban design and form.

Nature-based solutions are defined by the International Union for Conservation of Nature as “actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits.”<sup>33</sup> This definition emphasizes that conserving or restoring ecosystems should be central to nature-based solutions.

Nature-based solutions is a term closely related to several other concepts, such as: ecosystem-based adaptation; green and blue infrastructure; ecological restoration; ecological engineering; forest landscape restoration; ecosystem-based mitigation; ecosystem-based disaster risk reduction; natural capital; ecosystem services and potentially biomimicry and biophilic design.<sup>34</sup> Overall, what unifies the nature-based solutions concept is an understanding of the benefits that humans derive from ecosystems (often defined as ecosystem services), an acknowledgement that people can learn from nature and a recognition of the strategic importance of strengthening ecosystem health and human-ecosystem relationships to increase human well-being and society’s ability to adapt to various changes.

Box 5 summarizes the relevant principles and operational parameters for nature-based solutions.

### Box 5

#### The seven principles behind nature-based solutions

- 1. Ecological complexity:** Nature-based solutions maintain or promote complexity at different ecological scales and typically work within existing conservation norms.
- 2. Long-term thinking:** Nature-based solutions are typically interventions that can persist over many years and maintain biological and cultural diversity and the ability of ecosystems to evolve over time.
- 3. Broad-scale intervention:** Nature-based solutions are typically implemented at a scale that helps mediate “upstream and downstream” relationships as well as dependencies and benefits and are often landscape-scale interventions. An example is the “ridge to reef” approach, which recognizes the impacts and links of water management practices from a water source all the way to the sea, across multiple habitats and ecosystems.
- 4. Leveraging local contexts:** Nature-based solutions respond to and work within site-specific ecological and cultural contexts and are developed using traditional, local and scientific knowledge.
- 5. Direct societal benefits:** Nature-based solutions support the delivery of tangible and substantial streams of direct societal benefits. Nature-based solutions recognize and address the trade-offs between the production of immediate economic development benefits and future options for the production of the full range of ecosystem services.

*continued...*



**Box 5 Continued**

**6. Interdependence:** Nature-based solutions can be implemented alone or in an integrated manner with other non-nature-based solutions to societal challenges. Nature-based solutions should be an integral part of the overall design of policies and measures or actions to address a specific challenge.

**7. Adaptive governance:** Nature-based solutions are supported by flexible institutional and decision-making arrangements to meet the changing needs of the people who manage and rely on local ecosystems, as well as changing environmental conditions. Nature-based solutions should be designed to work in a fair and equitable way and in a manner that promotes transparency and broad participation.



Mangroves, Mele Beach near Port Vila, Vanuatu. (Photo: M Pedersen Zari).

**The exploration of nature-based solutions through an ocean-focused lens applied to urban challenges and needs in small island developing States presents itself as an opportunity to develop effective solutions in Ocean Cities.** To date, many nature-based solutions (including ecosystem-based adaptation) projects have related to rural areas and to situations in which the unique characteristics and challenges of Ocean Cities, in particular, those in the Pacific region, are not taken into account. Even so, there are a growing number of project concepts and pilot cases of nature-based solutions that can be drawn upon for adoption for Ocean Cities, as showcased in this guide (boxes 6). Examples of nature-based solutions within complex Pacific small island developing States contexts include: ridge-to-reef river restoration projects; coastal and estuarine mangrove restoration; urban food forests; rehabilitation or establishment of urban green spaces (such as the Honiara Botanical Gardens rehabilitation<sup>35,36</sup>); and combinations of natural and built infrastructure to improve water management through sustainable housing development.

**Box 6****Evaluating ecosystem-based adaptation options for a peri-urban area: Lami Town, Fiji**

Lami Town is located on the eastern side of Viti Levu, the largest island in Fiji. It is flanked by Suva City to the south-east and extensive mangroves and rural areas to the west. Steep mountainous terrain, Draunibota Bay and Suva Harbour constrain potential sprawl to the north and south. Topographical features, such as volcanic coastal plains, a mountainous interior with fast-rising elevation and three river deltas are ideal for the investigation of nature-based solutions with an emphasis on adaptation to climate change. Lami Town's coastal zone is prone to flash flooding during heavy rains and storm surges resulting from tropical cyclones. Ecological resources, such as upland forest, mangrove forest, seagrass beds, mud flats and coral reefs provide a range of ecosystem services, including coastal protection from extreme weather events and support of subsistence and commercial fisheries.

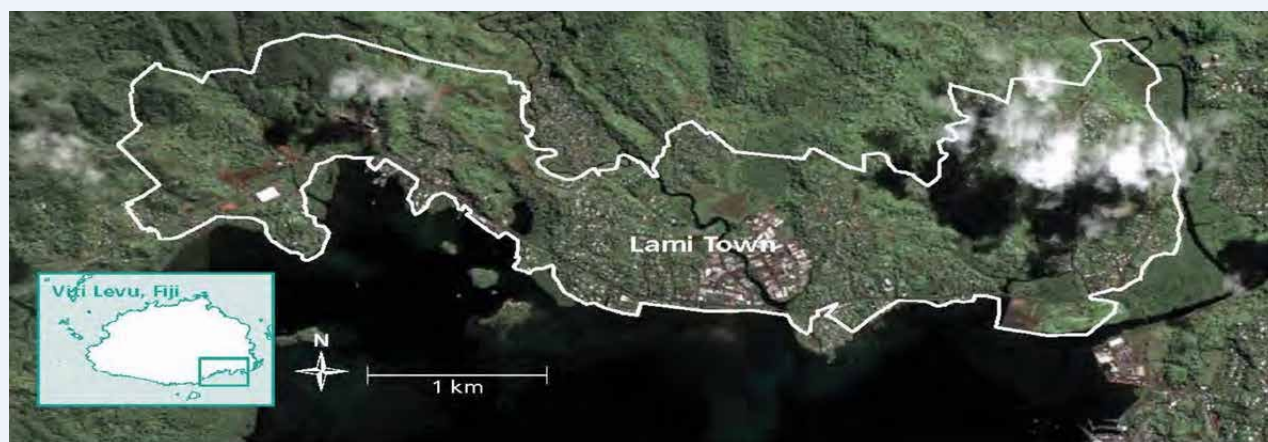
*continued...*

**Box 6 Continued**

Lami Town is an example of growth in informal low-income settlements on the economic fringes of an urban centre. A diversity of land uses includes informal settlements, residential areas and industrial and commercial zones bound by social, economic and political criteria. Lami Town's geographic location offers several options for climate change adaptation, including a range of traditional engineering, ecosystem-based adaptation and urban planning interventions. The Lami Town Council Five-Year Strategic Plan is addressing concerns relating to climate change through cross-sector collaboration, coordination and better management of resources among stakeholders through environmental management. In particular, it addresses disaster risk reduction, climate change planning and "greening" operations to reduce erosion. Adaptation interventions, such as coastal protection, infrastructure and mangrove protection, are administered at the national level.

Women, children and informal and ethnically marginalized populations are generally more vulnerable to disasters. This means that addressing issues of income inequity and discrimination based on race, ethnicity or gender is integral to climate change adaptation. Land tenure systems (crown lease, state land, freehold and native or *iTaukei*) also affect the governance of the resources and management of risks that are important to climate change adaptation.

An economic analysis of ecosystem-based versus conventional engineering adaptation options for building resilience to climate change was completed for Lami Town.<sup>37</sup> The options with the greatest benefit-to-cost ratios were the protection and maintenance of intact mangroves, forests, seagrass, mud flats and coral reefs. It was noted that the development of an adaptation plan focused on ecosystem-based options, combined with targeted grey engineering options, as well as the inclusion of social outcomes and lessons learned for policy-makers, will provide a high benefit-to-cost ratio in terms of avoided damages in natural disaster and climate change-related events, as well as provision of secondary ecosystem services and therefore increased overall benefits to people.



Lami Town and surrounding peri-urban area, Viti Levu, Fiji. (Source: adapted from Google Earth).

Nature-based solutions deliberately seek tangible approaches to problems or challenges, such as: biodiversity conservation; climate change mitigation and adaptation; disaster risks; coastal management; water, food and energy security; human physical and psychological health issues, such as air quality, green space management, human public health and poverty eradication; social justice and cohesion; participatory planning and governance; and sustainable economic and social development in general.

With nature-based solutions, using future scenario planning and other related techniques is important to ensure that the proposed strategies are proactive rather than reactive. This is particularly important in the Pacific because of the unique governance challenges present in many parts of the region as well as the speed of change occurring in terms of: human population growth accompanied by high densities; ocean and weather systems; food and water security issues; and environmental pressures associated with ineffective land use planning, poor waste management and pollution. For example, a recent project planning implementation of ecosystem-based adaptation projects for Port Vila in Vanuatu used this future scenarios method.<sup>38</sup>

## The importance of traditional knowledge and approaches in the Pacific

Although the widespread use of the term ‘nature-based solutions’ is relatively new, the practice of working closely with nature to create effective human settlements while maintaining healthy ecosystems is not – indeed, it is a cornerstone of many indigenous belief systems (see box 7). This is certainly still true of many communities in the Pacific, despite the recent rapid urbanization of many of these populations. Many traditional practices, particularly among communities that retain a sense of indigeneity and close intergenerational connection to specific places, should be acknowledged and explored within a nature-based solutions project context. Incorporating elements of traditional nature-based knowledge and customary practices into ecological solutions may offer more acceptable, appropriate and long-term solutions in the Pacific context.

### Box 7

#### Mobilising traditional knowledge for increased resilience in the Pacific

People and islands of the Pacific are consistently portrayed as merely victims of climate change, although in many ways, they are also actively addressing the challenge as agents of change. As Bryant-Tokelau wrote: “Pacific islanders have much to teach other countries about resilience and coping and are determined to use their knowledge to maintain ancient traditional practices.”<sup>39</sup> Examples include the centuries-old practice of building artificial islands in the Federated States of Micronesia (such as Nan Madol, now a UNESCO World Heritage site) and Solomon Islands (Lau and Langalanga Lagoons in Malaita) and the methods of crop preservation during times of natural disaster. Bryant-Tokelau also makes the point that urban dwellers in the Pacific, contrary to some stereotypes, do have strong social and traditional networks that are important for climate change adaptation and disaster planning, along with effective community and institutional cooperation.<sup>40</sup>



Tokelau Warriors are fighting for the future of their communities in Nukunonu, Tokelau. (Photo: 350.org via Flickr).

Nature-based solutions represent an opportunity for the preservation of, or renaissance in, traditional knowledge and practice. As ESCAP pointed out: “Nature-based solutions could be an opportunity to revitalize a cultural connection to the ocean, which is weakening in cities in the process of urbanization, and to raise awareness, educate youth and engage communities.”<sup>41</sup> A critical question in tailoring nature-based solutions to Ocean Cities, and more specifically to the Pacific, is therefore: How can nature-based solutions work with or be integrated with traditional concepts and practices? Or in other words, how can they best utilize local knowledge?

## **Multiple co-benefits of nature-based solutions**

Nature-based solutions are well suited to address complex and interconnected problems, due to their advantageous ability to simultaneously provide multiple co-benefits. Nature-based solutions projects primarily seek to reduce the negative impacts of ecosystem changes and increase the quantity or quality of ecosystems services but typically concurrently address other issues that negatively affect human well-being. This means, **if carefully and holistically designed, nature-based solutions can produce win-win situations in Ocean Cities across multiple connected social-ecological-economic systems.** Also important is nature-based solutions' potential ability to enable vulnerable societies to better adapt to climate change and natural disasters as well as food and water security issues in a more culturally appropriate manner with higher long-term effectiveness and resource efficiency than with other types of solutions. This is of great relevance to an Ocean Cities context and to the Pacific region.

A useful framework to understand the potential benefits of nature-based solutions is the ecosystem services framework (see figure 2). Creation or preservation of these ecosystem services could be potential goals for and then benefits of nature-based solutions projects. Each ecosystem service is related to others in complex webs of potential co-benefits and trade-offs. This means benefits should be understood holistically so that increases in provision of one ecosystem service do not mean reductions in another. While many ecosystem services come from non-urban ecosystems, the preservation and creation of urban ecosystem services, primarily through carefully designed and managed urban green and blue spaces, are vital to urban resilience and to the well-being of urban dwellers. This is particularly true in a small island settlement context, where demarcations between rural and urban areas may not always be clear. Recent proposals of ecosystem-based adaptation projects in Port Vila, Vanuatu evaluated their potential benefits using the ecosystem services framework.<sup>38, 42</sup>

**Figure 2**  
**Ecosystem services**

### Provisioning services

- Food (*urban and peri-urban subsistence gardens and animals; commercial agriculture and farming; hunting; freshwater farming and fishing; coastal, reef and deep-slope marine fishing*)
- Biochemicals (*medicine and others*)
- Raw materials (*firewood, building materials, sand and aggregate*)
- Fuel and energy
- Freshwater
- Ornamental resources (*mats, baskets, clothing, jewellery, cultural objects*)
- Genetic information



### Regulating services

- Pollination and seed dispersal
- Biological control (*invasive species, disease*)
- Climate regulation (*greenhouse gas storage and sequestration, ultraviolet protection, temperature regulation*)
- Prevention of disturbance (*wind, wave, flood, drought, erosion of slopes and coastlines*)
- Decomposition
- Purification (*water, air, soil*)



### Supporting services

- Soil (*formation, retention, fertility*)
- Fixation of solar energy (*above and below ground and in water*)
- Nutrient cycling
- Habitat provision (*including breeding and nursery*)
- Species maintenance (*biodiversity*)



### Cultural services

- Artistic and spiritual inspiration
- Aesthetic value
- Creation of a sense of place
- Cultural diversity and history
- Education and knowledge
- Psychological well-being
- Tourism and recreation



Source: Adapted from M. Pedersen Zari, *Regenerative Urban Design and Ecosystem Biomimicry* (Oxon, UK, Routledge, 2018).

The other major benefit of the nature-based solutions approach to development issues is that the initial analysis of a given situation typically reveals multiple drivers of change. For example, a cause of ecosystem degradation, which in turn is creating or exacerbating a particular societal challenge, could be related to both climatic changes and to the activities of local people. In many cases in developing countries, these local human-caused drivers of change of ecosystems are often as big as, if not larger than, current climate change-induced changes in ecosystems. This is one of the reasons that ecosystem-based adaptation (an aspect of nature-based solutions) has been adopted by a growing number of agencies and projects in the Pacific,<sup>43,44</sup> where negative impacts of both climate change and rapid, often unplanned, urbanization converge to create degradation of ecosystems and therefore reduced resilience. Within this context, nature-based solutions can be highlighted as a tool for simultaneously increasing community resilience and climate change mitigation goals, in line with the emerging low-carbon resilience approach.

The potential co-benefits (and trade-offs) of nature-based solutions relate to the societal challenges targeted in a given project and the specific cultural-ecosystem-climatic context as well as the temporal and spatial scales in question. This means it is not possible to produce a list of definite benefits and co-benefits of nature-based solutions without a specific context. Table 2 lists benefits that have been identified in nature-based solutions projects. They are then mapped onto the societal challenges targeted, with case studies or precedents demonstrating the benefits. Note that not all projects drawn on in table 2 were conducted in Ocean Cities but are considered to have relevance, given that in a Pacific context, clear delineations between urban and rural ecosystems are at times not present. The co-benefits listed in table 2 are not exhaustive but were the most common or easily identified benefits of the nature-based solutions projects surveyed.

**Table 2**  
**Benefits of nature-based solutions**

Targeted societal challenge	Nature-based solutions <i>*more common in the Pacific</i>	Potential co-benefits	Selection of case study examples <sup>45</sup>
Biodiversity conservation	Actively monitor, protect and restore natural infrastructure (dunes, mangroves, forests, slopes, wetlands, coral reefs). Payment for ecosystem services.	<p><b>Social:</b> Increased resilience to storm surge, flooding, drought, heatwave and impacts of climate change; increased urban amenity and beauty; increased psychological well-being; increased cultural identity; increased citizen participation in conservation projects; improved governance of ecosystems and biodiversity; celebration and creation of “identity”; increased social inclusion</p> <p><b>Economic:</b> Increased tourism and fisheries; alternative incomes.</p> <p><b>Ecological:</b> Increased carbon sequestration and storage, reduced deforestation; increased water infiltration and storage.</p>	<p><b>Yanweizhou Wetland Park.</b> China. Urban multi-functional nature-based watershed management and ecosystem restoration of wetlands in Jinhua city.</p> <p><b>Wanang Conservation Area.</b> Papua New Guinea. Lowland rainforest protected area. Community-led educational focus.</p> <p><b>Gau Island forest protection.</b> Fiji. Preservation of cloud forest and coastal habitat using ecosystem-based management, participatory approaches and integrated resource management.</p> <p><b>Socio Bosque Programme.</b> Ecuador. Conservation agreements and economic incentives to owners of native forests. Priority given to areas critical for the maintenance of ecosystem processes that generate benefits for society as well as areas with a high incidence of poverty.</p> <p><b>Healthy Reefs.</b> St. Eustatius, Caribbean. Research, data gathering and education.</p> <p><b>Red Sea Corals and Climate Change Project.</b> Egypt. Tourism industry project addressing anthropogenic activities on marine habitats and climate change. Monitoring, education and training activities.</p> <p><b>Biodiversity and Protected Areas Management Programme.</b> Seventy-nine African, Caribbean and Pacific island developing States. Long-term conservation and sustainable use of natural resources through better monitoring of information and capacity development in management and governance.</p>

<p>Climate change mitigation and adaptation; disaster risk reduction; resilience to natural hazards</p>	<p>Conservation, restoration, management of forests, mangroves, wetlands and oceans to reduce storm surge, coastal inundation or tsunami impacts.*</p> <p>Management of slope vegetation to reduce landslide and erosion.*</p> <p>Combining “green-blue” and “grey” infrastructure.</p>	<p><b>Social:</b> Preservation of traditional knowledge and cultural practices; protection of cultural sites of significance; protection of vulnerable communities; education and capacity building; addressing waste, sanitation and pollution issues; better public health outcomes.</p> <p><b>Economic:</b> Maintenance of fisheries; protection of buildings; provision of firewood and building materials; alternative income.</p> <p><b>Ecological:</b> Habitat conservation; carbon sequestration; increased ecosystem health; healthier coral reefs; trapping of sediments; maintenance of salinity levels; support of the critical role of connected ridge-to-reef ecosystems.</p>	<p><b>Mangrove Ecosystems for Climate Change Adaptation and Livelihoods.</b> Pacific region. Projects addressing challenges of mangrove management to increase the resilience of the Pacific people to climate change and improve livelihoods.</p> <p><b>Pacific Mangrove Initiative.</b> Pacific region. A partnership-based initiative promoting investment and action for sustainable mangrove futures in the Pacific islands.</p> <p><b>Nakau Programme.</b> Vanuatu. Reducing exposure to climate-related risks, poverty, and natural disasters by helping indigenous landowners sell carbon offsets and conservation credits instead of timber as a way to deliver economic development to communities.</p> <p><b>Mangrove Restoration Project.</b> Costa Rica. A project to restore the structure and functions of the Térraba Sierpe National Wetland mangrove ecosystem and help empower local communities to responsibly manage the non-timber resources offered by the mangrove. This is also an example of a ‘payment for ecosystem services’ solution.</p> <p><b>Mangrove Rehabilitation for Sustainably Managed Forests.</b> Papua New Guinea. This ongoing project attempts to decrease deforestation and forest degradation and increase the resilience of communities to the negative effects of climate change.</p> <p><b>Resilient Islands Project.</b> Dominican Republic and Jamaica. Development of an adaptation tool kit to promote better decision-making and resilience through disaster management that integrates nature-based solutions. The ongoing project implements innovative nature-based interventions within coastal communities across the Caribbean.</p>
<p>Water security, increased water quality, reduced water pollution, flood-risk reduction</p>	<p>Management of floodplain and riverine vegetation for flood management and/ or increased freshwater quality and quantity.*</p> <p>Combined natural and engineered infrastructure.</p> <p>Green roof schemes, wetland restoration, rainwater harvest.</p> <p>Reduced soil erosion and sedimentation load in streams and land-use diversification.*</p>	<p><b>Social:</b> Enhanced food security from improved fisheries; delay of peak flood events to allow for evacuation and preparation; increased green space; increased air quality and localized heat reduction; clarification of land tenure; increased trust and cooperation between government, citizens and businesses; better public health outcomes.</p> <p><b>Economic:</b> Protection of buildings from extreme flood events; increased or alternative income generation; private and public sector collaborations; green roofs can mean a reduction in maintenance and long-term roofing costs; reduced building energy demand; reduction in size of stormwater facilities; reduced costs of hydropower generation.</p> <p><b>Ecological:</b> Increased quantity and quality of wildlife habitat; carbon sequestration; reduced sediment flows and erosion; increased water quality and pH balance; increased urban biodiversity; potential connection of fragmented urban green spaces into corridors.</p>	<p><b>Building integrated green roofs and water management.</b> Philippines. Various building-integrated technologies and green infrastructure strategies demonstrated in an urban office building designed to work towards protecting the Laguna Lake area.</p> <p><b>Medmerry Realignment Scheme.</b> England. Providing increased protection against flooding for communities on the south coast of England by realigning sea defences up to 2 km inland while creating a new intertidal area for improving the region’s wildlife habitats.</p> <p><b>Water and Nature Initiative.</b> Fiji and Samoa. Projects focused on good governance, payments for ecosystem services and learning and leadership, with the aim to improve the quality and sustainability of water resources in the region.</p> <p><b>Kabukuri wetlands and rice paddy restoration.</b> Japan. Development of “agricultural wetlands”, encompassing both agricultural and wetland functions while restoring important waterfowl habitat.</p>



Food security, poverty eradication	<p>Urban agroforestry, including food crop trees to create multipurpose green spaces in cities.</p> <p>Improved bush gardens and community garden facilities.*</p> <p>Urban aquaculture and mangrove rehabilitation initiatives.</p>	<p><b>Social:</b> Diversification of food and income sources; less reliance on external inputs (chemicals and aid); increased traditional medicine sources; increased well-being and recreation opportunities; addressing land tenure issues.</p> <p><b>Economic:</b> Maintenance of production stability (after disasters); reduced pests and diseases; production of firewood and building materials; increased employment opportunities; increased yields.</p> <p><b>Ecological:</b> Carbon sequestration; increased habitat, biodiversity and pollination; cooler local micro-climate.</p>	<p><b>Forest restoration.</b> Ecuador. Various information and participatory initiatives related to complicated land tenure and legal land deed situations for indigenous peoples in forests.</p> <p><b>Montpellier Agroforestry.</b> France. A project to make food production more efficient, sustainable and able to cope with the projected effects of climate change by using diverse tree planting.</p> <p><b>Silvofisheries Projects.</b> Indonesia. Allows for mangrove conservation while capitalizing on the economic benefits of low input, integrated brackish water aquaculture.</p>
Increase human physical and psychological well-being	<p>Increase or improve urban green spaces and infrastructure.*</p> <p>Improving and intensifying urban home gardens and bush gardens.*</p>	<p><b>Social:</b> Increased social cohesion; increased physical activity and health benefits; opportunities for recreation; reduced violence; education and outreach opportunities; access to food; maintenance of cultural heritage; increased public health.</p> <p><b>Economic:</b> Increased productivity.</p> <p><b>Ecological:</b> Increased habitat; carbon sequestration; reduced peak water flow; increased air quality; reduced heat.</p>	<p><b>Living Melbourne: Metropolitan Urban Forest Strategy.</b> Australia. Intended outcomes are to create resilient landscapes, community health and well-being, and a liveable, sustainable city.</p> <p><b>Barcelona Green Infrastructure and Biodiversity Plan.</b> Spain. Creating “a genuine network of green spaces”, conceived as green infrastructure serving both environmental and social functions.</p>
Social justice and cohesion	<p>Development of alternative participatory biodiversity management plans.</p> <p>Establishment of youth-oriented Educational Managed Marine Areas.*</p>	<p><b>Social:</b> Conflict resolution; preservation of traditional knowledge; preservation of cultural identity; involvement of youth and women; mutual learning and relationship building; educational opportunities; improved governance structures.</p> <p><b>Economic:</b> Balancing competing use demands (such as tourism and fishing sectors).</p> <p><b>Ecological:</b> Increased carbon sequestration; reduced pollution; improved habitat quality.</p>	<p><b>EMMA network.</b> French Polynesia. Small coastal areas managed in a participatory way by primary school pupils to help young people better understand and protect the marine environment.</p> <p><b>Cape Town Environmental Education Trust.</b> South Africa. Supporting the preservation of biodiverse natural heritage through education, training and conservation initiatives.</p> <p><b>Restoration of Hima system.</b> Jordan. Use of a historical and traditional system of land management that encourages the sustainable, shared use of common resources among communities for the preservation of ecosystem services.</p> <p><b>Marine Protected Area.</b> Faial-Pico Channel. Azores, Portugal. Biodiversity management planning in collaboration with local fishers and divers.</p>
Green economy stimulation	<p>Diversify land-use and livelihood options.</p> <p>Alternative energy generation.*</p>	<p><b>Social:</b> Bridging social and economic priorities; increased employment; education opportunities.</p> <p><b>Economic:</b> Alternative income; cheaper and more resilient infrastructure.</p> <p><b>Ecological:</b> Reduced pollution and waste; healthier ecosystems; reduced biological maladaptation.</p>	<p><b>Rewarding Upland Poor for Environmental Services Project.</b> Indonesia. Payment for environmental services schemes in coastal and watershed contexts.</p> <p><b>Kai Project.</b> Fiji. Improving livelihoods through increasing economic benefits from kai fishery by addressing food safety issues.</p>

## Barriers to and potential options for adopting nature-based solutions

As discussed, there are often significant benefits to taking a nature-based solutions approach to development and resilience in a Pacific small island developing State context. Because of the geographical and topographical nature of the islands, the global and local drivers of ecological and climatic changes and the complex cultural contexts, considerable challenges exist. Table 3 lists some of the major barriers to be aware of when exploring nature-based solutions for Ocean Cities, particularly in a developing Pacific country context. Included are suggestions for options as a starting point for further experimentation, discussion and planning.

**Table 3**  
**Barriers to the adoption of nature-based solutions and potential options**

Barriers to nature-based solutions	Potential options
<b>Rapid unplanned urbanization; high population densities; informal settlements; high youth unemployment; and increasing inequality.</b>	<ul style="list-style-type: none"> <li>• Integrated whole-of-city or whole-of-island systemic detailed spatial urban planning with regard to the functional view of the city and future ecological and social well-being.</li> <li>• Inclusion of informal settlements into urban planning strategies.</li> <li>• Future scenarios planning as the basis of development projects.</li> <li>• Research to gain a holistic understanding of the drivers of urbanization.</li> <li>• Development rules and policies that include long-term well-being goals.</li> <li>• More strategically planned urban-regional connectivity, including transport, financial and value-chain infrastructure.</li> <li>• Projects focused on empowering women and youth as change agents.</li> </ul>
<b>Rapidly increasing urban ecological footprints; and increasing per capita consumption and waste.</b>	<ul style="list-style-type: none"> <li>• Research to gain a holistic understanding of the drivers of increasing greenhouse gas emissions, consumption behaviours, pollution, etc.</li> <li>• Policy formulation and enforcement to curb ecologically damaging behaviours.</li> <li>• Formulation of national ecological footprint, carbon emission and other ecological state goals and monitoring.</li> <li>• Projects to facilitate positive ecological relationships between urban and peri-urban areas.</li> </ul>
<b>Strained, degraded, or destroyed natural ecosystems resulting in decreased resilience.</b>	<ul style="list-style-type: none"> <li>• Thorough spatial GIS mapping and ecological state research and data gathering.</li> <li>• Ecological history analysis (where ecosystems have been removed).</li> <li>• Strategically planned conservation and revegetation of ecological infrastructure.</li> <li>• Integrated approaches utilizing technologies and social-political strategies alongside nature-based solutions.</li> <li>• Recording, understanding and using, where appropriate, local knowledge relating to ecology and climate.</li> </ul>
<b>Lack of effective governance structure or mandate; and weak or fragmented local and national government structures.</b>	<ul style="list-style-type: none"> <li>• Allocation of more financial and human resources for resilience strategies at both the national and local levels of government.</li> <li>• Increased responsibilities or authority for local government to effect change.</li> <li>• Creation of clear strategies to integrate traditional governance structures and practices with national ones effectively so that rapid change can occur.</li> </ul>
<b>Lack of secure land tenure and related land-use issues; and complex power dynamics in terms of ownership and leadership.</b>	<ul style="list-style-type: none"> <li>• Complex land ownership structures, transfer of ownership or right to use land and water and traditional understanding of human-nature relationships must be clearly understood, recorded and mapped before the commencement of nature-based solutions projects to ensure their long-term success.</li> <li>• Investigation of methods of working with these structures differently or changing them if they are actively preventing nature-based solutions.</li> </ul>
<b>Lack of funding and resources; and political economy issues.</b>	<ul style="list-style-type: none"> <li>• Exploration of non-traditional funding models, such as payment for ecosystem services.</li> <li>• Utilization of international aid funding.</li> <li>• Strategic building of capacity and relationships with the private sector.</li> </ul>
<b>Inability to influence or control the impacts of climate change.</b>	<ul style="list-style-type: none"> <li>• Outward, internationally focused communication of the impacts of climate change on small island developing States.</li> <li>• Contribution to international systemic political change actions and campaigns.</li> </ul>

## Valuing and evaluating nature-based solutions

It may not always be possible or appropriate to place financial value on the multiple benefits of nature-based solutions (Figure 3). **Economic valuation alone can have limitations, and can omit or misinterpret socio-cultural and environmental values.** On the other hand, nature-based solutions are often deemed to be maintained in perpetuity after implementation, therefore proper accounting of the benefits provided over their lifetime and discounting the incurred costs is not a straightforward exercise. This means that while economic value or the initial cost of an investment remains an important aspect of assessment and is often vital to build a business case, it is not the only kind of value that is likely to be important in nature-based solutions projects, particularly in a Pacific context.

There are a range of tools and methods available to evaluate nature-based solutions including: ecological economics tools and methods; cost-effectiveness assessments; multi-criteria analysis; and the social cost-and-benefits approach. Several other approaches and frameworks have been used to value aspects of specific nature-based solutions projects. For example, biophysical and economic values of ecosystem-based approaches to development have most commonly been derived through an ecosystem services framework. Other researchers have called for nature-based solutions evaluation to take into account diverse worldviews and interactions between social and economic systems or complex feedback between different benefits over time and spatial scales.<sup>46</sup>

The EKLIPSE Expert Working Group on nature-based solutions and the European Union Horizon 2020 Project devised an impact evaluation framework to support the planning and evaluation of nature-based solutions projects. This interdisciplinary work was designed to identify types of nature-based solutions across 10 societal challenges, indicators of their impacts and units of measurement. Results showed that the benefits and impacts of nature-based solutions can be evaluated in multiple ways, including through environmental (chemical, physical, biological), social (progress, physiological, health, justice) and/or economic (monetary, productivity) lenses. Corresponding metrics range from dollar costs to amounts of annual emissions and to the number of jobs created and perceived levels of trust. This demonstrates that just as a holistic approach to designing and implementing nature-based solutions is required, so, too, is an integrated multidimensional approach to monitoring and evaluating them.

**Figure 3**  
**Key benefits of nature-based solutions**



Determining which methods for valuation are appropriate for a particular project should be based on the cultural and ecological context and scale of the project. In complex situations, such as those typically found in the developing cities of the Pacific region, **it is necessary to take a holistic approach to valuing various benefits and trade-offs of nature-based solutions and to understand that their value will change over time.** The discipline of ecological economics is particularly useful in this regard.<sup>47</sup> Nature-based solutions projects are seldom “finished” but continue to evolve over time and should therefore be monitored and assessed in ongoing stages.

## ***Nature-based solutions for social, economic and environmental benefits***

There is a need to understand the interconnected nature of relationships between people, the places where they live, ecosystems (both terrestrial and marine) and the abiotic physical world, including climate, if people are to create ecologically and socially sustainable urban environments. In the context of Pacific Ocean Cities, this is particularly important because of the interrelated converging drivers of change in the region, including rapid urbanization, economic and environmental pressures related to human well-being and the increasing impacts of climate change. This is likely to be true of developing Ocean Cities in other regions. **An integrated, participatory nature-based solutions approach to addressing societal challenges can take into account the complex environmental and socio-cultural contexts and thus provide long-term benefits of improved human resilience and well-being, as well as notable environmental co-benefits.**

In the social-cultural sphere, nature-based solutions offer ways to improve the lives of people physically and psychologically while reinforcing strong cultural connections to ecosystems and, in the context of the Pacific, vital connection to the ocean itself. Nature-based solutions have the potential to drive more community participation in planning and resource management development decisions. This can lead to increased social justice, inclusion and cohesion outcomes and a shift towards communities becoming active development partners rather than continually being relegated to remain passive recipients of foreign aid or expertise.

Finally, nature-based solutions provide potential pathways towards building partnerships between the government, the private sector and other stakeholders and to develop appropriate governance and policy structures. In this sense, the holistic ongoing valuation of nature-based solutions projects is important and will likely remain so in the Pacific context.

## SECTION 3

# ADVANCING IMPLEMENTATION<sup>48</sup>

People of Pacific Ocean Cities have a strong cultural and socioeconomic connection to the ocean that unites thousands of islands, connects cities and provides opportunities for trade, tourism, fisheries and migration. In line with the Pacific Islands Forum Framework for Pacific Regionalism, built on a shared Blue Pacific identity, local authorities and urban planners would benefit from revitalizing a common ocean narrative in urban communities. **Drawing on traditional knowledge and local experiences to develop an ocean-friendly approach to urban resilience would promote nature-based solutions, integrated coastal zone and marine spatial planning, and community engagement in Ocean Cities to protect ocean-based livelihoods.**

Recent international and regional frameworks (see box 8) have strengthened regional leaders' efforts to reframe the global perception of Pacific island countries from small island developing States to potential leaders in the ocean-sustainability space, which carries an empowering focus on blue or ocean economies. However, targeted policy measures through collaborative partnerships that reduce risk exposure and increase the resilience of Ocean Cities are critical to continue building on this momentum.

### Box 8

#### Ocean Cities within the context of Sustainable Development Goals and international policy frameworks

Ocean Cities concept has the potential to advance Sustainable Development Goals (SDG) 11, 13 and 14:

- SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable
- SDG 13: Take urgent action to combat climate change and its impacts
- SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

In addition, there are a number of relevant policy frameworks that provide guidance and support for advancing a "blue" urban agenda for Ocean Cities:

- The Regional Road Map for Implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific (2017) promotes the sustainable use of the oceans and seas, builds capacity for climate action and resilience through policy dialogue and identifies a number of opportunities that are relevant to Ocean Cities.
- The Pacific Roadmap for Sustainable Development (2017) outlines how the region will track and report on its progress against regional actions and highlights the means of implementation for sustainable development in the Pacific. It provides for the ongoing identification and dissemination of good practice, and progressive strengthening of institutional capacities.
- The New Urban Agenda (2017) promotes the important vision of "cities for all", meaning all urban dwellers can inhabit just, safe, healthy, accessible, affordable, resilient and sustainable cities and human settlements to foster prosperity and quality of life for all. The New Urban Agenda does not specifically concentrate on small island developing States.

*continued...*

### Box 8 Continued

- The Framework for Resilient Development in the Pacific (2016) is a voluntary guide to support national and local governments, the private sector and civil society towards achieving climate resilience and low-carbon pathways. The three priority goals underpinning the framework are:
  1. Strengthened integrated adaptation and risk reduction to enhance resilience to climate change and disasters.
  2. Low-carbon development.
  3. Strengthened disaster preparedness, response and recovery.
- The Pacific New Urban Agenda (2015) contributes to the New Urban Agenda and is described further in this section.
- The Sendai Framework for Disaster Risk Reduction (2015) was adopted at the United Nations International Strategy for Disaster Reduction Global Platform meeting and focuses on reducing loss and damage from disasters. It includes “ten essentials” for building disaster resilience in cities and communities, of which one essential is to “safeguard natural buffers to enhance the protective functions offered by natural systems”.
- The Framework for Pacific Regionalism (2014) acknowledges the overarching common sense of identity and purpose for the Pacific region. It calls for a region of peace, harmony, security, social inclusion and prosperity so that all Pacific people can lead free, healthy and productive lives. In 2017, the Pacific Islands Forum leaders endorsed the Blue Pacific identity as the core driver of collective action to advance this vision. The Blue Pacific seeks to re-capture the collective potential of the region’s shared stewardship of the Pacific Ocean, based on explicit recognition of its shared ocean identity, ocean geography and ocean resources.
- The SAMOA Pathway (2014) is a widely supported international platform for sustainable development of small island developing States. SAMOA is an acronym for SIDS accelerated modalities of action but is aptly named in light of the Pacific country’s leading role in sustainable development initiatives. While an integrated platform, the declaration makes little reference to the urban areas of small island developing States, other than in relation to transport policies.



Caubati Topline informal settlement, Nasinu, Fiji. (Photo: L Kiddle).

### Elevating a blue urban agenda

Ultimately, **the strengthening of political will is needed to elevate and prioritize urban issues and resilience in the Pacific region.** In many countries of the Pacific, a rural bias has persisted, and genuine political engagement with urban issues has largely been absent. This is despite the increased economic importance of cities and future scenarios of Pacific settlements becoming increasingly urban.<sup>49</sup> It is time to accept the reality of continued urbanization, acknowledge and build upon its positive aspects (including a positive correlation to economic growth and the benefits from increased connectivity between urban and rural areas). This calls for increased funding and resources for local governments at the forefront of urbanization pressures and management efforts and adequate planning for the transformation that will usher in an increasing share of the Pacific’s population residing in Ocean Cities.

The most recent Pacific Urban Forum (2015) aimed for a “new urban agenda” that would galvanize attention and critical action. Four recommendations were endorsed: (i) enhancing social equity; (ii) more comprehensively addressing issues of environment, resilience and urbanization; (iii) harnessing the urban economy; and (iv) strengthening urban governance. These four recommendations were articulated further as:

1. Undertaking housing and settlement upgrading programmes and improving access to land through partnerships (thus building social equity).
2. Addressing climate change through comprehensive urban vulnerability assessments and associated planning.
3. Recognizing the importance of urban economies in the Pacific.
4. Improving urban governance through policy development, supportive legislative frameworks and capacity building.<sup>50</sup>

This Pacific urban agenda will be critical for building resilience in Pacific Ocean Cities. In addition and amid the recognition that Ocean Cities are where landscapes and seascapes meet and merge, the urban agenda is also a vital implementation framework for action on ocean health.<sup>51</sup> **Strengthening the Pacific voice through a strategic regional approach to managing urbanization and Ocean Cities resilience is also crucial**, particularly for mobilizing support, resources and finances from the international community, but in a way that is led by Pacific island developing States. Boxes 9 and 10 describe strategic approaches to managing urbanization. Box 11 provides an example of the prior research that may be needed to establish a basis for strategic initiatives and establishing a voice for urban agendas.

### Box 9

#### A need for a more strategic approach to managing urbanization

Within the Pacific region, strategic approaches to managing urbanization have been inconsistent. Arrangements for urban governance across Pacific island developing States are generally fragmented and often politicized.<sup>52</sup> Concepts of urban planning, public interest and what can be gained from good planning and design policies are not well understood. Some countries, such as Fiji, Papua New Guinea, Samoa and Tonga, have developed national urbanization policies, but few have been implemented. Other Pacific island developing States are in the process of developing one.

Only Fiji, Papua New Guinea and Samoa have dedicated government ministries for housing and urban development. The Samoan model of urban management has been one of the most successful, introducing an institution, legislation and policies since the beginning of the new millennium. Fiji continues to address its urban growth challenges and has the most successful urban squatter policies and plans in the Pacific region. Papua New Guinea adopted its National Urbanization Policy in 2011 but has been slow to implement key aspects. Solomon Islands and Vanuatu are advanced with their urban policies, but issues of land tenure and complexities of urban growth have slowed progress. As the 2015 Pacific Urban Forum recognized, it is critical that the managed growth of cities and towns be enabled through local strategic policies and legislative frameworks and institutions with suitable capacity, leaders and professionals.<sup>53</sup> National urbanization policies are important tools for achieving these goals and should promote Ocean Cities, nature-based solutions and the blue urban agenda.



Port Vila peri-urban villages and settlements. (Photo: M Pedersen Zari)

**Box 10**

**National Adaptation Plan Global Network-supported adaptation planning in Fiji, Kiribati and Solomon Islands**

The National Adaptation Plan Global Network aims to enhance national adaptation planning and action in developing countries through coordination of bilateral support and in-country actors. Its secretariat is the International Institute of Sustainable Development. The Global Network has supported work to develop integrated vulnerability and adaptation assessments in Fiji, Kiribati and Solomon Islands. The methodology employed builds on the Pacific Islands Integrated Vulnerability Assessment Framework<sup>54</sup> developed by PACE-SD at the University of the South Pacific.

The Integrated Vulnerability Assessment Framework is an instrument used to evaluate the risks posed by climate change and other disasters to a community. The assessment recognizes that climate change and non-climate change factors should be assessed in a multi-sector vulnerability framework. It concentrates the assessment of exposure, sensitivities and adaptive capacity within a sustainable livelihoods framework. This gives special attention to people’s access to natural, infrastructure, human and financial resources to support their livelihood needs and the institutional structures and processes that influence resource access and use.

(Photo: M Pedersen Zari).



**Box 11**

**The need for more political leadership on urban issues in Solomon Islands elevated by researchers**

Recognizing how challenging it is to get urban issues onto the political agenda in Solomon Islands, the Australian National University undertook research aiming to do just this. The final report, *Urban Development in Honiara: Harnessing Opportunities, Embracing Change*,<sup>55</sup> made several important points:

- Cities are powerful drivers of national development.
- Inclusive and well-coordinated urban development efforts are at the heart of a vibrant city.
- Achieving urban development goals requires attention to policy and planning cycles.
- Urban land and housing pressures are mounting and need locally generated responses that emphasize affordability and equitability.
- Informal settlers can make a valuable contribution to setting priorities.
- Youth make up more than half on Honiara’s population, thus are an essential stakeholder.
- Neighbouring Guadalcanal Province is a player in managing urban growth.
- National prosperity can benefit from urban development.

Condensed housing, Ontong Java settlement, Honiara. (Photo: L Kiddle).





## Building meaningful partnerships with all stakeholders

**Partnerships, especially partnerships promoting the Pacific Way, are vital for advancing implementation to build resilience in Pacific Ocean Cities.** The Pacific Way embraces community ownership, communal responsibility and creating consensus through dialogue. The Pacific Way also builds from the rich bodies of traditional knowledge in the region, shared identities and the shared connection with the ocean — the Blue Pacific. In resilience-building approaches, the Pacific Way can be incorporated by responding to citizens' priorities in a manner that embraces shared island and ocean identity by employing a multi-value approach, using the principles and operating parameters of nature-based solutions (see box 5). Box 12 describes how the Pacific Way and related principles can be applied at many levels, up to multinational forums.

### Box 12

#### Talanoa dialogues: using traditional dialogue practices to address today's climate challenges

*Talanoa* Dialogues were introduced by Fiji during their presidency of the 23<sup>rd</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), also known as COP23. They are based on traditional meeting and problem-solving practices, where all stakeholders have a place at the table, all views are equally valued, and everyone is able to contribute and learn. *Talanoa* uses storytelling as an accessible way to exchange individual perspectives and generate solutions. The word *talanoa* refers to a style of dialogue practised in Pacific island countries that is open and inclusive. The basis of the dialogues is to bring together diverse groups who may not traditionally interact, to discuss cross-cutting challenges in a space conducive to participatory and transparent communication.

The purpose of Fiji's climate *talanoas* was to enable discussions between different levels of government and other actors to determine how to accelerate a country's implementation of their Paris Climate Commitments. It is a form of consultation well suited to island cultures and can also be readily applied to any urban development challenge.

*Talanoas* are structured around three simple questions:

- Where are we now?
- Where do we want to go?
- How will we get there?

*Talanoas* can also be used to create an enabling financial environment to support city resilience-building. A synthesis report on the *Cities and Regions Talanoa Dialogues in Africa*<sup>56</sup> found that actors from all sectors agreed that: "In order to maximize access to finance, all tiers of government, the private sector and civil society need to pool their knowledge" regarding available financing strategies and technical expertise. This conclusion does not imply that additional funding opportunities are necessarily needed, but that the local uptake of already available funding and sustainability investment opportunities needs to be increased.



Talanoa Dialogues conducted at the Fiji Pavilion, COP 23. (Photos: S Gawler).

Land in Pacific Ocean Cities is typically held under a range of tenure categories, including customary, state and freehold. Associated land governance is an often complex and sometimes fragmented blend of formal land tenure and more traditional or informal systems of tenure. Much recent urban development expanded into peri-urban land, which is often in customary ownership. The challenges of urban management are particularly pronounced in the peri-urban areas, where urban growth is “characterized by a contest for space, changing social structures and fragmented institutions”.<sup>57</sup> It is vital to permeate customary governance structures and engage citizens across and beyond urban communities within island systems, including with communities in peri-urban areas outside of formal municipal boundaries. It is also important to engage with persons living in rural areas given the general fluidity of urban-rural boundaries and the small island make-up of many Pacific island developing States. Engaging with customary governance structures in peri-urban communities may involve strengthening urban community governance regimes and structures, but it also requires aligning them to any urban and provincial and regional planning policy and legislation (see box 13).

### Box 13

#### Incorporating peri-urban areas into towns to deliver services and improve communities in Fiji

The Government of Fiji is extending the boundaries of some larger towns to incorporate peri-urban and rural areas. These areas effectively form the hinterland for towns, like Nadi and Lautoka, and provide critical lifelines for the total urban system in the form of housing for workers, food and water supply. However, there are a number of informal settlements within the new boundaries that have not benefited from the usual range of local government services.

Nadi and Lautoka are now developing service plans for their new areas to improve solid waste collection, access roads, drainage and environmental protection. Early priorities include reviewing the city land-use plans to control development into the hinterland and to develop cost-effective waste-collection systems. While both cities are setting up waste collection containers in central locations in the villages, they are concerned that this could inadvertently discourage diversion of products that should be recycled, such as white goods, clothing and green waste. They also acknowledge the need to introduce community-awareness programmes to promote effective waste management.

While the local authorities are accustomed to working with landowners and leaders in the traditional villages, the informal settlements bring additional challenges because they may not have such well-developed traditional local governance structures. It can, for example, be more difficult to communicate with residents and to identify local groups or committees for assisting with disaster risk reduction, water and sanitation programmes and other community development initiatives.



Caubati Topline informal settlement, Nasinu, Fiji. (Photo: L Kiddle).

In the Pacific, customary landowners and communities are critical stakeholders to engage with closely, specifically as active participants rather than as beneficiaries only. **Facilitating community-led action and community-based solutions is vital for advancing implementation.** Early engagement with landowners, chiefs and other community leaders should enable this. But all groups need to be engaged, including the marginalized and/or silent voices. Entry points include formal and informal arrangements through government development processes, public consultation, traditional governance systems, activities of civil society and faith-based organizations and groups for women, men, youth and others (see, for example, boxes 14 and 15). This can help ensure actions are well coordinated, resources are shared and partnerships are fostered between communities, government, the private sector, municipal councils and other organizations. Additionally, participatory processes often lead to solutions that receive higher community buy-in levels and increased ownership and accountability for actions. In addition to greater integration and coordination between the agencies and groups, improved urban institutional coordination is also needed at the government level – within sector agencies and with local government, climate change offices and disaster management offices.

**It is imperative to increase youth and women's engagement in efforts to build resilience in Pacific Ocean Cities. Overall, a whole-of-society approach is necessary.** The demography of Pacific cities, for example, is increasingly youthful, with many of these young people underemployed. In addition, young people, many of whom have only known city life, can be disconnected from other important aspects of Pacific society and identity, including the cohesiveness, strength and safety net of traditional village life and customary land, as well as the ocean itself. In addition, it is critical to engage women, given the gender norms around traditional roles and that they are typically the depository of traditional knowledge. The work of United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women)<sup>58</sup> has shown that women are particularly excluded and affected by the inequalities in cities, as long as the informal sector and informal settlements remain largely unsupported and beyond typical planning frameworks.

#### Box 14

#### Youth as agents of change in Tuvalu under the Coastal Adaptation Project<sup>59</sup>

The Government of Tuvalu is implementing measures to reduce the impacts of climate-induced sea-level rise and intensifying storm events on infrastructure, such as homes, schools and hospitals. Funded by the Green Climate Fund and implemented in cooperation with the United Nations Development Programme, one of the project components involves funding up to six students to study a discipline relevant for coastal resilience at a specialized university, with the prospect of working on the project upon completion of their studies. By engaging youth and building their skills in this field, the initiative supports Tuvalu's efforts to address the impacts of climate change in coastal settlements and improve the livelihoods and resilience of young generations of Pacific islanders.

Youth can play an active role in improving the resilience of coastal settlements. (Photo: L Kiddle).



**Engaging the private sector is also crucial for advancing momentum,** especially given the relatively limited central and local government resources. Local business and private developers can be incentivised as leaders or partners in nature-based solutions for climate change adaptation, for example, particularly if attention is paid to valuing such solutions, as discussed in Section 2. Public-private partnerships offer potential for waste management, supporting urban livelihoods and possibly urban renewal and should be explored further by Pacific governments, provided such partnerships are strategic and ensure that communities are also meaningfully involved in the process.

**Overall, multi-stakeholder partnerships aligned with customary practices.** Buy-in from within local communities is absolutely crucial, and engagement from national and local governments, local organizations and the private sector is needed to advance implementation. The creation of incentives appealing to different stakeholder interests could be used as vehicles for cooperation, including the promotion of alternative business practices in combination with revenue schemes or building on narratives of cultural values, responsible land ownership in communities and common ocean identities.

**Box 15**  
**Educational Managed Marine Areas in French Polynesia<sup>60</sup>**

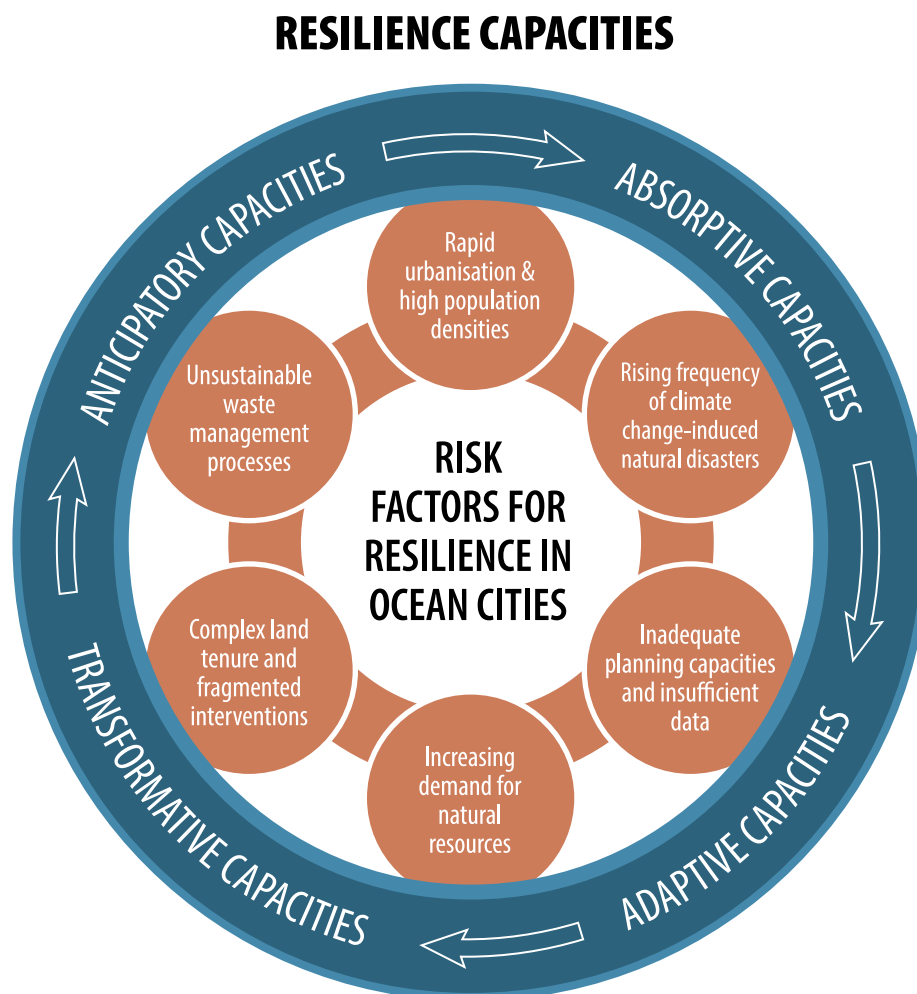
Educational managed marine areas are coastal areas managed in an ongoing participatory manner by local school groups. Supported by scientists, local organizations and government authorities, school students manage their area through learning developing and applying management practices and rules, such as fishing regulations or mooring bans in certain areas. Today, 120 children across six Marquesan islands are the honorary custodians of six educational managed marine areas in Vaitahu, Hanauai, Hakahetau, Hanaiapa, Anaho and Hane bays.

***Strengthening capacities for building resilience and action***

**Island settlements at the nexus of ocean health, climate change and urban development need to build anticipatory, absorptive, adaptive and transformative capacities in the face of myriad complex shocks and stressors.**

The types of partnerships introduced here are necessary for building resilience. Building urban resilience also means reducing exposure and increasing absorptive and adaptive capacity of the urban system as a whole, while paying special attention to the needs of its most vulnerable and other disadvantaged groups. Sectoral efforts to improve well-being and build capacity, for example in education, health care and livelihoods, will also likely contribute to enhanced urban resilience. Figure 4 and box 16 showcase the relationship between risk factors in Ocean Cities and building capacity for action, and box 17 summarizes a systems approach to planning for resilience building.

**Figure 4**  
**Relationship between risk factors and building capacities**



Source: ESCAP, "Ocean Cities of the Pacific Islands: Policy Brief #2: Building Community Resilience (Bangkok, 2018). Available at [www.unescap.org/sites/default/files/Ocean%20Cities%20of%20the%20Pacific%20Islands\\_PB2\\_UNESCAP\\_USP\\_0.pdf](http://www.unescap.org/sites/default/files/Ocean%20Cities%20of%20the%20Pacific%20Islands_PB2_UNESCAP_USP_0.pdf) (accessed 14 Feb. 2019).

The countries of the Pacific have different laws, policies, regulations and programmes in place that often function to build urban resilience, though they are not often recognized for this purpose. These government interventions can take the form of environment laws, building codes, adaptation and mitigation frameworks, gender inclusive strategies, decentralization laws and the provision of social services. Communities in the Pacific have developed traditional and informal patterns of resilience based on kinship networks, systems of mutual aid and reciprocity (such as the *wantok* system in Melanesia) and engagement in the informal economy. Within the region, these are often underestimated and are rarely integrated with more formal legislative and regulatory frameworks. Overall, state-generated responses and community-based actions form a network of intertwined efforts to build resilience in Ocean Cities, to increase adaptive capacity and to reduce exposure to environmental, social and economic stresses.

To function effectively, resilience systems in Pacific Ocean Cities must also be based on: sufficient integration of cross-cutting issues; understanding and creating interlinkages between related frameworks, policies and actions; appropriate formal and non-formal capacity building; effective monitoring; and continuous updates to accommodate rapid social and environmental changes. This requires complex multi-level governance structures that include community representation, as noted previously, not simply as consultees but as decision-makers and resource allocation managers.

### Box 16

#### Integrated policy responses for building resilience in human systems of Ocean Cities<sup>61</sup>

Local authorities and governments can enable individuals, communities and systems to turn risks into opportunities and minimize the negative impacts in partnership with urban communities and relevant stakeholders through a practical three-step approach to resilience thinking:

1. Identify hazards – sources of existing and emerging risks in society.
2. Map out the critical systems in society that these hazards could affect and establish who will be most at risk.
3. Formulate policy responses that can enhance resilience capacities.

Addressing climate change impacts and natural disasters in Ocean Cities, for instance, could involve:

- Opting for policies that reduce people’s exposure, particularly the most vulnerable persons to natural hazards, by preventing, for example, informal settlement in flood-prone areas.
- Reducing people’s vulnerability by developing nature-based solutions, suitable green and blue infrastructure and services to support their ability to cope with hazards.



Peri-urban garden and residence, Port Vila, Vanuatu. (Photo M Pedersen Zari).

**Key also for increasing resilience in Pacific Ocean Cities is strengthening the role of urban spatial planning.** This requires articulating a vision that stakeholders have for Ocean Cities, including on the roles of both formal and customary systems of tenure. It also requires investment by national governments and development partners in building greater capacity in planning through targeted skills and knowledge development within a long-term human resource development strategy. For example, Pacific island developing States generally lack sufficient urban designers and planners, landscape architects and civil engineers, all of whom are critical for the effective design, planning and management of urban growth and infrastructure development to increase urban resilience.<sup>62</sup> Box 17 provides an example of collaborative spatial planning, and box 18 shows how planning approaches can be related to disaster risk reduction and resilience.

### Improving evidence for action

Mapping spatial and socioeconomic vulnerability in urban systems and capacity is one of the crucial first steps in improving evidence for building resilience in Pacific Ocean Cities. Considerable work has been completed across the Pacific,<sup>63</sup> but there is potential to build on these data by including socioeconomic systems indicators (including citizen-generated data and traditional knowledge) to inform community resilience initiatives and wider social inclusion, health, education, housing, water and sanitation strategies, as well as awareness programmes. There is also value in standardizing methodologies for assessing vulnerability because this will facilitate more targeted allocation of resources to address the specific needs of the most marginalized and vulnerable persons in society.

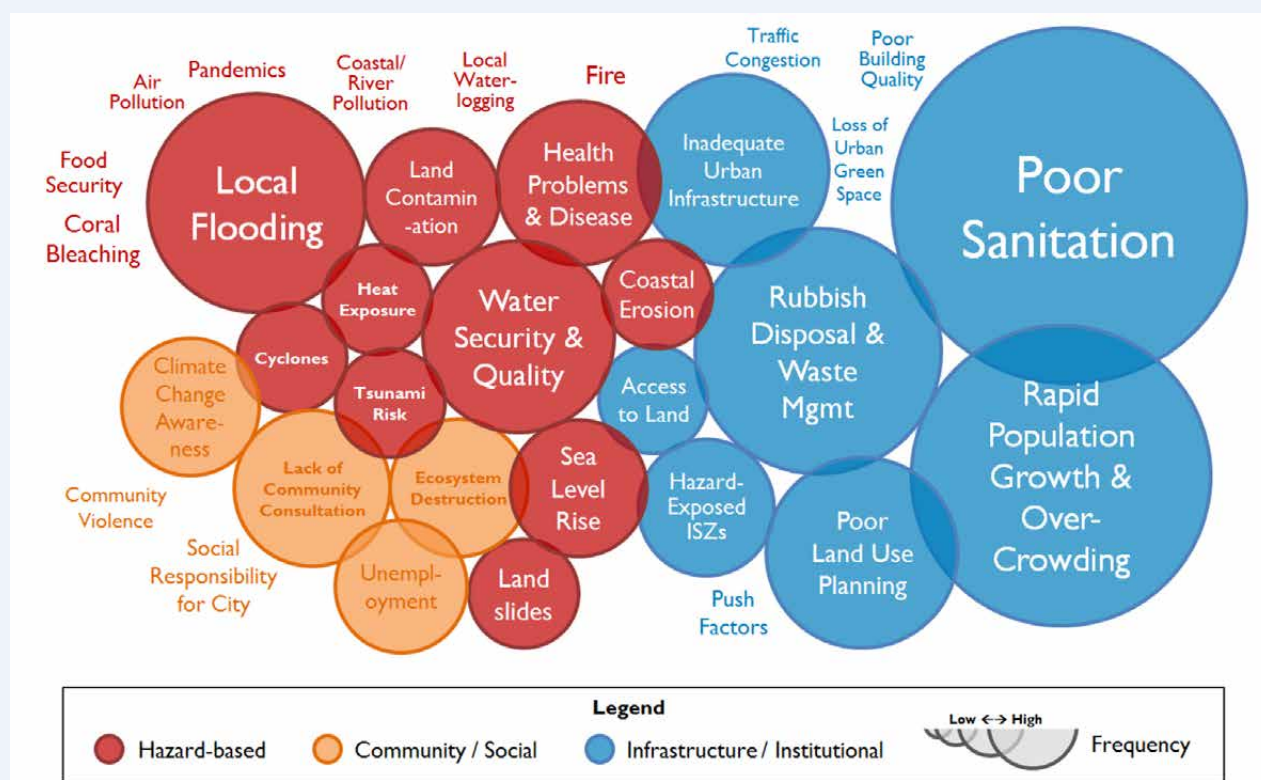
**Box 17**

**Engaging the community to identify priorities for resilience-building in Honiara<sup>64</sup>**

Urban resilience promotes an integrated consideration of multiple shocks and stresses that act on the urban system, both now and into the future. Such a holistic approach is critical in the Pacific, with its complex regional landscape and where multiple drivers impact on the unique social, cultural, economic, environmental and governance dimensions of urban areas. This is recognized by the Framework for Resilient Development in the Pacific.

UN-Habitat-funded Planning for Climate Change work was done between 2014 and 2017 in vulnerable “hotspot” communities across Honiara. The range of different issues and concerns that were elicited from these communities illustrated the need for a broader resilience approach; one that integrated disaster risk reduction (current-day climate and non-climate shocks), climate change adaptation (longer-term shocks and stresses) and development agendas (changing societal exposure and vulnerability to the hazards). Even though it was recognized that the impacts of future climate change are important and need to be explicitly considered, climate change is only one of many drivers with the potential to undermine the resilience of Pacific cities. There are many more immediate needs that require action to provide an initial platform for climate adaptation planning and sustainable urban development. This is illustrated by the graphical representation of priority community resilience issues that were identified by informal settlers in Honiara shown below. These findings provide evidence of the overriding emphasis on addressing short-term development needs (sanitation, overcrowding, waste management, etc.) as a precursor to climate resilience (the main priorities being flooding and water security), and have provided a framework for integrated climate change and urban resilience action planning efforts for Honiara.

**Community-level priority issues in Honiara**



Source: see note 64

**Box 18**

**Disaster risk reduction and resilience self-assessment and action planning in Honiara**

In partnership with the United Nations Office for Disaster Risk Reduction, ICLEI Local Governments for Sustainability have taken the UN-Habitat work in Honiara one step further. Using the Sendai Framework’s Ten Essentials scorecard, the Honiara City Council, with ICLEI assistance, conducted a disaster risk reduction self-assessment and action planning exercise. The self-assessment exercise is based on workshops and meetings with many relevant stakeholders, including other levels of government, NGOs, the private sector and utility providers. By adopting this approach, the city is guaranteed to attract the attention of urban actors, and it is an effective way to begin broader discussions and planning for urban resilience, that does not rely solely on the actions implemented by the Honiara City Council.

Even though the exercise emphasizes disaster preparedness, response and recovery, the questions in the process trigger very useful thinking around many broader urban development issues, such as: urban risk assessments; valuing ecosystems as natural buffers to disasters; designing and building more resilient infrastructure; harnessing the capacity of villages, communities and partner institutions; and the importance of planning for whole systems beyond municipal boundaries.

The resulting disaster risk reduction action plan will ensure that some of the Honiara Urban Resilience and Climate Action Plan recommendations are turned into action and also provides a way of integrating disaster risk reduction with climate change adaptation. This is one of the principles of the Framework for Resilient Development in the Pacific. ICLEI is also partnering in the Adaptation Fund work, ensuring effective links between the city and the wards and villages.



Honiara City Council staff and others at UNISDR Disaster Risk Reduction workshop, Honiara, Solomon Islands. (Photo: S Gawler).

**Accessing finance**

**A challenge facing all island cities is to secure the finance needed for major, transformative resilience-building initiatives.**

Experience from developing countries indicates that the successful securing and leveraging of finance is dependent on state-level actions to undertake reforms that empower local governments through rational and predictable intergovernmental transfer systems, efficient own-source revenue collection and support for creditworthiness of cities within a borrowing framework. These types of initiatives create certainty for subnational investment and take pressure off municipal decision-making. If local governments are constrained in their basic functions – planning, design and revenue – and institutionally hampered by functional and geographical fragmentation, their ability to access finance will be limited. On the other



hand, if local governments are respected, transfer their share of taxes and enhance their fiscal governance structures and institutional capacity to manage long-term debt, they can be expected to leverage their own finances, reduce risk and exposure and develop needed resilience-enhancing infrastructure.

There is a range of internal or external financing options available to cities for large-scale infrastructure building, whether that be traditional grey infrastructure or blue and green infrastructure, including:

- reallocation of existing city budgets for blue and green infrastructure investments;
- fundraising through special levies, taxes, or performance-based incentives (see box 20);
- fundraising from the domestic finance sector or development banks via traditional loans, “soft” loans and guarantees, or raising green bonds;
- investigating partnering with the insurance sector to fund risk-reduction initiatives;
- securing loans or grants from international funds (such as the Adaptation Fund and the Green Climate Fund) or donors (see box 19);
- “land-value capture” mechanisms, such as special levies on new urban developments;
- partnering with the private sector through public-private partnerships or other mechanisms to build resilience into private or commercial development and initiatives; and
- other innovative approaches, such as debt swaps.

While it is beyond the scope of this guide to explore all these options in detail, an excellent analysis is available in the International Finance Corporation’s 2018 report *Climate Investment Opportunities in Cities: An IFC Analysis*.<sup>65</sup> This report outlines the magnitude of investment required for city resilience building and reforms needed to leverage private sector innovation, management know-how and capital. It also describes new and innovative models that cities can deploy to narrow the financing gap, including public-private partnerships, land-value-capture mechanisms and green bonds.

**Leveraging climate finance for ocean-friendly sustainable urban development is an opportunity to protect carbon sinks and build resilience against climate change impacts in Pacific Ocean Cities.** Pacific island countries are increasingly accessing global climate funds for adaptation and mitigation projects. For example, the Cook Islands, Fiji, Papua New Guinea, Samoa, Tonga, Tuvalu and Vanuatu have already accessed approximately \$250 million for adaptation and mitigation programmes. There is, however, considerable opportunity for larger and more city-focused projects and programmes.

Globally, there have been some constraints to accessing finance for long-term climate resilience. Overall, there is a continuing lack of capacity or knowledge at the local level to develop and report competitive, bankable<sup>66</sup> projects. This is often compounded by weak political will from local governments due to the perceived lack of mandate from the electorate, competing priorities or lack of understanding of the benefits of climate change adaptation-focused projects. Other barriers include lack of experience or track record in managing major projects, city leaders’ fear of raising debt, low or no credit-worthiness and the difficulty of achieving the necessary level of close collaboration needed between sectors, projects and public and private actors to achieve integrated solutions.

Common barriers for financing climate projects cited by local governments include: low understanding of the various financial instruments and their requirements; slow bureaucratic processes for assessing and approving applications; limited local technical or institutional capacity to pursue direct funding opportunities when they do arise; lack of a clear understanding of what “bankability” means and lack of evidence to show project bankability; and lack of capacity-building support for local governments.

In the Pacific region, it has been difficult for individual cities and local authorities to access international finance, even when they have done systematic risk assessments and sound project design. The majority of climate funds have gone directly to national governments and are allocated according to national priorities, which mean cities' priorities can be sidelined. However, there are some initiatives, such as the United States Agency for International Development's Adapt Asia Pacific<sup>67</sup> and the ICLEI Transformative Actions Programme, which are targeted at cities to enhance their abilities to have direct access to resilience-investment finance. The Transformative Actions Programme is an initiative that aims to catalyse and improve capital flows to cities, towns and regions and strengthen their capacity to access climate finance and attract investment. Projects in the pipeline receive support from ICLEI and its partners to develop their infrastructure project concepts into highly transformative, robust and bankable projects ready for financing and implementation.

In general, however, international funds often find it difficult to find good local investment opportunities, and funding pools are often not fully allocated. This is a large missed opportunity. Cities can boost their chances of securing international finance by:

1. Ensuring that any funding application is based on a thorough analysis of risks and opportunities, using credible data sources and analytical tools. It may be important to seek external assistance because these skill sets may not be available within the city administration. Universities may be excellent partners for this step.
2. Take good ideas and spend some time developing them into well-designed project proposals, to be prepared when new calls for applications are issued. External assistance may again be required. If possible, conduct a pre-feasibility study to test the concept before presenting the proposal to funding agencies. The Adapt Asia Pacific Programme is well placed to assist cities with these steps.
3. The international funds will often have minimal thresholds for investment, which can be too high for individual local projects. For example, a city may hypothetically have a waste management facility project costed at \$3 million, whereas a given fund only accepts projects needing more than \$10 million. Two ways to address this are to:
  - bundle together a number of related projects within the city, such as drainage, roads, waste and urban greening, to reach the threshold; or
  - collaborate across boundaries to aggregate similar projects, such as water and waste management, between several contiguous or neighbouring cities.

**Box 19****Resilience and climate action planning as a groundwork for mobilizing adaptation funding**

The UN-Habitat-funded Framework Convention on Climate Change work in Honiara resulted in the Honiara Urban Resilience and Climate Action Plan (see box 18).<sup>68</sup> The plan was used to help secure \$4.4 million from the Adaptation Fund for the Enhancing Urban Resilience of Climate Change Impacts and Natural Disasters Project. Starting in 2019, this project has an overall goal to enhance the resilience of Honiara and its inhabitants to current and future climate impacts and natural disasters, with emphasis on pro-poor adaptation actions that involve and benefit the most vulnerable communities in the city.

Objectives of the plan are to:

- support the implementation of prioritized resilience actions in vulnerability-hotspot communities;
- strengthen the capacity of local communities to respond to climate change and natural hazards through awareness raising and capacity-development training;
- support the implementation of resilience actions that target women, youth, urban agriculture, food security and disaster risk reduction;
- strengthen the capacity of ward officials and councils to lead climate change adaptation and disaster risk reduction planning activities, in support of increased urban resilience; and
- strengthen institutional arrangements at the city level to respond to climate change and natural disasters through mainstreaming and improved partnership working.

While the upcoming Adaptation Fund work in Honiara will be important for improving resilience in selected vulnerable communities, there remains a strong need to connect closely with the priorities of Honiara and adjacent Guadalcanal Province (where considerable amounts of Honiara's peri-urban growth extends into).



Informal peri-urban settlement on erosion-prone land at Aekafo planning area, Honiara, Solomon Islands. (Photo: L Kiddle).

**Box 20**

**Performance-based incentive payments for catchment ecosystem service management in peri-urban Port Vila, Vanuatu**

The financial model for project delivery is a fundamental element of any programme or project. On the peri-urban fringe of Port Vila, Vanuatu, the Tagabe Riparian Corridor Regeneration Project Implementation Plan<sup>69</sup> provides an example of how a performance-based model for financing could work. The project aims to restore riparian vegetation along the lower reaches of the Tagabe River. Restoration will primarily concentrate on reducing erosion of the river banks and subsequent flooding of the Blacksands community. This is a long-term project, so mechanisms are required to ensure the longevity of the project beyond the donor’s funding cycle.

One option to ensure sustainability is through a performance-based financing system. This was the approach proposed for the Tagabe River project. The system targets the business model on the delivery of measurable outcomes rather than activities and effort. This reduces inefficiencies and accentuates innovative ways to deliver the greatest quantum of measurable benefits per dollar spent. A performance-based model depends on demonstrably measurable delivery outcomes as a condition of project financial flows. This then reduces non-delivery risk to the buyer and funder, motivating the outcome delivery supplier to perform in a verifiable manner. It also enables measurement, reporting and verification to become integral to project design and delivery.

One way to devise performance-based financing systems is to break down the project cycle into three stages:

1. Project development (funded by grant-implementation readiness).
2. Supported project implementation (funded through performance-based payments for ecosystem services).
3. Self-financing project implementation (self-financing new regime of changed behaviour).

**Project cycles of performance-based financing systems**



Source: M. Pedersen Zari and others, *Ecosystem-based Adaptation (EbA) Project Implementation Plans, Port Vila, Vanuatu* (Wellington, Victoria University of Wellington, 2017).

The Tagabe Implementation Plan proposed financing supported project implementation (payment for environmental management services) in a way that accommodates the cash flow needs of the early stages, through the following financing structure for a five-year project:

1. Outcome supply agreement for performance-based payments based on verified outcomes, with periodic verification (such as annual verification and annual payments). First performance-based payments due early second year, following early second year verification of the first year’s outcome delivery.
2. Cash flow implementation activities for the first year through concessionary (unsecured) loan, with a term equivalent to the project period (such as a five- or ten-year term).

*continued...*

**Box 20** Continued

3. Second year verified outcome delivery triggers performance-based payment. Payment covers 20 per cent of the loan repayment (first annual instalment) plus funds to use for the second year's implementation activities.
4. Repeat annually until loan is repaid and short-term outcomes are delivered and verified.



River riparian reaches in peri-urban zone of Port Vila, Vanuatu. (Photo: S Chape©).

Financing mechanisms at a micro scale are equally important for community-based resilience initiatives. Box 21 illustrates an example of such mechanisms applied in the Autonomous Region of Bougainville, Papua New Guinea.

**Box 21****Savings groups advance community resilience in Arawa, Autonomous Region of Bougainville**

**Savings for Transformation** (S4T) groups are a simple, transparent and autonomous way to provide people with access to savings, micro loans and micro insurance in contexts in which other financial facilities are not available or accessible. By having a local and secure method of saving and borrowing readily accessible to them (like a box with three locks), households have access to finance when needed. Within the region, this model is being used by World Vision in Papua New Guinea, Solomon Islands, Timor-Leste and Vanuatu. An integrated flipchart training programme was recently launched in these countries for use by staff and community agents of the S4T groups.

In Papua New Guinea through the **Financial Literacy and Inclusion** Project, funded by Australian Aid, World Vision has trained and established 85 S4T groups with 2,080 members (1,082 women). In Arawa, Bougainville, the Koremaring (which means "saving for the future") is one of these groups. At their first meeting (1 October 2017), they had a total of 17,673.80 kina (\$5,420) in their cash box, 14,738 kina in their loan fund (for loans to members) and 842 kina in their social or insurance fund (for small grants to members during emergencies).

There are 14 members of the Koremaring group, 3 men and 11 women who live in Section 10, 2nd street, Arawa. They have their savings meeting once a month, and members help each other to generate income for savings through the sale of market produce. The group has an all-female management committee and decided to conduct their annual share-out (the group shares out each member's savings with interest generated from loan repayments) in January to pay for their children's school fees.

*continued...*

Box 21 Continued



Source: Adam Trau, Resilience and Livelihoods Technical Advisor, World Vision Pacific and Timor-Leste, 2018.

Despite there being the Bank of South Pacific in Arawa, members have chosen the S4T group to save their money. With this approach, as opposed to the bank, there is no need to complete any forms or provide formal identification, which are major barriers across Melanesia for people trying to access formal financial services. The S4T group also brought them together as a family after the Bougainville civil crisis of 1988–1998 and motivated them to generate increased income for saving.

## SECTION 4

# CONCLUSIONS AND PRIORITY POLICY ACTIONS

Ocean Cities are at the frontline of interconnected development challenges linked to climate change, urbanization and ecosystem degradation. Destructive human behaviour and urban development processes in coastal settlements profoundly impact the health of terrestrial and marine ecosystems, endangering the very foundation Ocean Cities are built on. Addressing the interlinked issues that are characteristic of Ocean Cities in an integrated, ocean-focused and climate-responsive manner is vital for sustainable development in island systems, including the achievement of SDGs 11, 13 and 14.

Urban Pacific island communities and economies are heavily dependent on healthy coastal and ocean resources, even where city dwellers have a less-direct connection with the marine environment. Pacific island developing States are confronted with significant challenges, both at the national and local levels. These challenges include: natural hazards and elevated risk from a changing climate; increasing numbers and areas of informal settlements; complexities from dual land tenure mechanisms, both formal and traditional, that can impede integrated planning and the implementation of urban development policies; poor connectivity within urban areas and between them and their peri-urban surroundings; food and water security pressures; waste management and pollution challenges; and social changes in value systems, where communities, particularly the youth, are abandoning traditional values, beliefs and customs for a more Western world view.

“Re-naturing”, or bringing living ecosystems back into urban development, along with a realignment of values to ensure that the development of urban space can coexist with environmentally responsible and sustainable action, is critical for building climate resilience and improving ocean health. Nature-based solutions to societal challenges, which are actions to protect, sustainably manage and restore natural and modified urban ecosystems, can provide significant human well-being and biodiversity benefits. Although in small island contexts the distinction between rural and urban areas is often blurred, in the Pacific there are already many examples of effective nature-based solutions across both contexts. These tend to have multiple co-benefits and are built upon the vast wealth of traditional knowledge held within the region.

Enhanced urban management and governance is critical to creating better social, economic and environmental urban outcomes for Ocean Cities. Raising the profile, increasing resources and determining clear mandates of local authorities and the urban sector, in both national and international political discussion, are necessary precursors to improved management and governance. Recognizing the intersecting roles of all sectors of society and of customary governance structures is necessary to making sustainable changes in the governance framework, however.

Pacific island developing States have shown leadership in awareness-raising of, and actions to mitigate, many of the stressors impacting these countries. The factor that is limiting the mitigation of many of the stressors is finance. Increasing access to climate funds, at both the national and city levels, is essential. Innovative approaches to funding resilience-building activities need to be found, but most importantly, these funding mechanisms need to be sustainable.




The ocean connects the Pacific and is the foundation of Pacific identity. Rapid urbanization in the Pacific means that elevating a blue urban agenda in responsible levels of government at the local, provincial and national levels is critical. Also essential are partnerships involving all stakeholders beyond national and local governments, such as local communities and organizations, churches, customary structures, traditionally marginalized groups (such as women and youth) and the private sector.



This guide concentrates on Pacific Ocean Cities. But given the commonalities between small island developing States and the essentially global nature of climate change impacts, some of the case studies and messages from the Pacific are highly likely to be relevant to other ocean city regions and coastal towns.

Table 4 presents important possible short-term, medium-term and long-term policy actions at the national level for advancing momentum. It is critical, however, for individual Pacific island developing States to first complete comprehensive policy and action planning, with prioritization and time frames specified.



**Table 4**  
**Priority policy actions for sustainable urban development in Ocean Cities**

Policy agenda	Actions		
	Short-term	Medium-term	Long-term
<p><b>Elevating a blue urban agenda</b></p> 	<p>Develop government policy statements on the vision for Ocean Cities, linking to SDGs 11, 13 and 14.</p> <p>Develop national urban and urbanization policy and spatialized urban plans.</p> <p>Progressively extend basic services, including water, sanitation, solid waste collection and electricity, into informal settlements.</p> <p>Pursue waste management policies for “quick wins”.</p> <p>Promote the “5 Rs” (refuse, reduce, reuse, repurpose, recycle) and other effective waste management concepts.</p> <p>Prioritize urban adaptation initiatives, including nature-based solutions and greening.</p>	<p>Update the legislative framework for the management of urban growth.</p> <p>Assign an existing or new government agency to strategically manage sustainable urban growth.</p> <p>Progressively extend basic services, including water, sanitation, solid waste collection and electricity, into informal settlements.</p> <p>Prioritize policy and actions to address current and future ocean health, with a focus on awareness, formal education and enforcement.</p>	<p>Develop modern sanitary landfills.</p> <p>Increase the supply of affordable and sustainable housing.</p> <p>Upgrade informal settlements.</p>
<p><b>Building effective partnerships with all stakeholders</b></p> 	<p>Employ urban stakeholder participation, consultation and talanoa processes.</p> <p>Begin and build dialogue with peri-urban customary landowners.</p> <p>Assess options for appropriate public-private partnerships or other financing options.</p>	<p>Pilot and begin work to value nature-based solutions.</p> <p>Begin or consolidate partnerships with the private sector.</p>	<p>Consider extension of town boundaries where required to ensure better management of urban and (current) peri-urban areas but manage urban sprawl.</p> <p>Consider tenure and governance structures for informal settlements on customary peri-urban land.</p>
<p><b>Strengthening capacities for resilience and action</b></p> 	<p>Assess and prioritize capacity needs.</p> <p>Develop a long-term human resource development strategy.</p>	<p>Target capacity building through skills development and education, with emphasis on women and youth.</p>	<p>Increase government positions for urban planners, urban designers, landscape architects, engineers, etc.</p>

Policy agenda	Actions		
	Short-term	Medium-term	Long-term
<p><b>Improving evidence for action</b></p> 	<p>Complete or generate accurate GIS and spatial data sets for urban areas (including reefs, if present) where they are lacking.</p> <p>Complete spatial, socioeconomic and ecosystem services vulnerability assessments of urban areas.</p> <p>Consider standardizing methods for vulnerability assessments.</p> <p>Develop national and regional repositories for traditional knowledge.</p> <p>Determine barriers to taking effective urgent action regarding increasing resilience and adapting to climate change and determine potential solutions.</p>	<p>Research the city's growth patterns, processes and implications for future adaptation and growth strategies.</p>	<p>Strengthen national statistical offices and local data collection capacities to better target more effective planning and investments in Ocean Cities.</p>
<p><b>Accessing finance and making financing sustainable</b></p> 	<p>Develop a clear national and city vision for an ocean city as well as a collective regional vision.</p> <p>Consider climate change adaptation and mitigation priorities.</p> <p>Expedite work with partners to access international climate funds.</p> <p>Investigate more effective generation of local funds, such as rates, taxes and green tourist levies.</p>	<p>Finalize climate change adaptation and mitigation priorities.</p>	<p>Enhance the powers of cities to improve their own revenue sources, rationalize intergovernmental transfers and provide the regulations for a borrowing framework to attract long-term capital and contribute to positive municipal reforms</p>

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- <sup>17</sup> D. McEvoy and others, *Greater Port Vila: Social Mapping and Analysis of Ecosystem Use* (Apia, Secretariat of the Pacific Regional Environment Programme (SPREP), 2017), p. 90.
- <sup>18</sup> The term “informal settlements” in the Pacific is sometimes used interchangeably with “squatter settlements”. Although distinction is sometimes made between squatter settlements as areas initially settled without agreement of the State or other landowners and informal settlements as areas on customary land often reflecting more traditional village structures, both squatter and informal settlements share similar characteristics.
- <sup>19</sup> For example, satellite imagery analysis from Honiara in Solomon Islands shows that between 1984 and 2010 informal settlements on: low-lying land increased in total size from 26 ha to 309 ha; on floodplains increased from 5 ha to 131 ha; and on slopes of 15–25° from 5.5 ha to 41 ha and slopes of 25–50° from 3.5 ha to 29 ha. See R. Reuben, “Spatial analysis of informal settlement growth and disaster management preparedness: A case study in Honiara City, Solomon Islands,” Master’s thesis (Suva, University of the South Pacific, 2013).

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- <sup>29</sup> Food and Agriculture Organization of the United Nations and others, *The State of Food Security and Nutrition in the World 2018: Building Climate Resilience for Food Security and Nutrition* (Rome, 2018).
- <sup>30</sup> The UK-based Commonwealth Marine Litter Programme is looking at this issue in Vanuatu and Solomon Islands, where urban household waste audits have been undertaken and then related to coastal debris audits. See <https://www.cefas.co.uk/clip/> (accessed 30 Jan. 2019).
- <sup>31</sup> See <https://www.sprep.org/news/kiribati-kaoki-maange-system-over-decade-operation> (accessed 29 Jan. 2019). When aluminium cans, PET bottles and lead-acid car batteries are imported, buyers are charged a levy deposit, which goes into a dedicated fund. When those items are returned to a recycling depot some money is paid back to the consumer with the remaining paid to the waste recovery operator to meet the operational costs of recovering and recycling waste materials.
- <sup>32</sup> The situation as of July 2018 was summarized in [www.loc.gov/law/foreign-news/article/several-pacific-countries-announce-bans-on-single-use-plastic-bags/](http://www.loc.gov/law/foreign-news/article/several-pacific-countries-announce-bans-on-single-use-plastic-bags/) (accessed 30 Jan. 2019). Since July 2018, Cook Islands have also announced an intent to ban single-use plastic bags. See <https://environment.gov.vu/index.php/environmental-protection/plastic-ban> for details of the process adopted in Vanuatu, the first Oceania country to announce a ban on single use plastic bags, plastic straws and polystyrene takeaway boxes.
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- <sup>62</sup> ADB, "Moving from risk to resilience: sustainable urban development in the Pacific", *Pacific Paper Series* (Manila, 2013).
- <sup>63</sup> For a list of past initiatives see: *Pacific Climate Change Portal* (n.d.). Available at [www.pacificclimatechange.net/topics/vulnerability-0](http://www.pacificclimatechange.net/topics/vulnerability-0) (accessed 30 Jan. 2019).
- <sup>64</sup> FA. Trundle and D. McEvoy, *Honiara Urban Resilience & Climate Action Plan: Report for UN Human Settlements Programme (UN-Habitat) Cities and Climate Change Initiative*. (2016).
- <sup>65</sup> A. Maheshwari and A. Malik, *Climate Investment Opportunities in Cities: An IFC analysis* (Washington, DC, World Bank, 2018).
- <sup>66</sup> A project is considered "bankable" if lenders are willing to finance it.

<sup>67</sup> A USAID funded initiative that integrated knowledge transfer, capacity building and technical assistance to link climate funding organisations with eligible Asia-Pacific countries and help prepare projects that increased resilience to the negative impacts of climate change. Adapt Asia Pacific ended in 2017.

<sup>68</sup> UN-Habitat, Honiara Urban Resilience and Climate Action Plan (Fukuoka, Japan, 2016).

<sup>69</sup> M. Pedersen Zari and others, Ecosystem-based Adaptation (EbA) Project Implementation Plans, Port Vila, Vanuatu (Wellington, Victoria University of Wellington, 2017).