

SPECIAL REPORT

A Pacific disaster prevention review

A S P I

Edited by Dr Paul Barnes

June 2020

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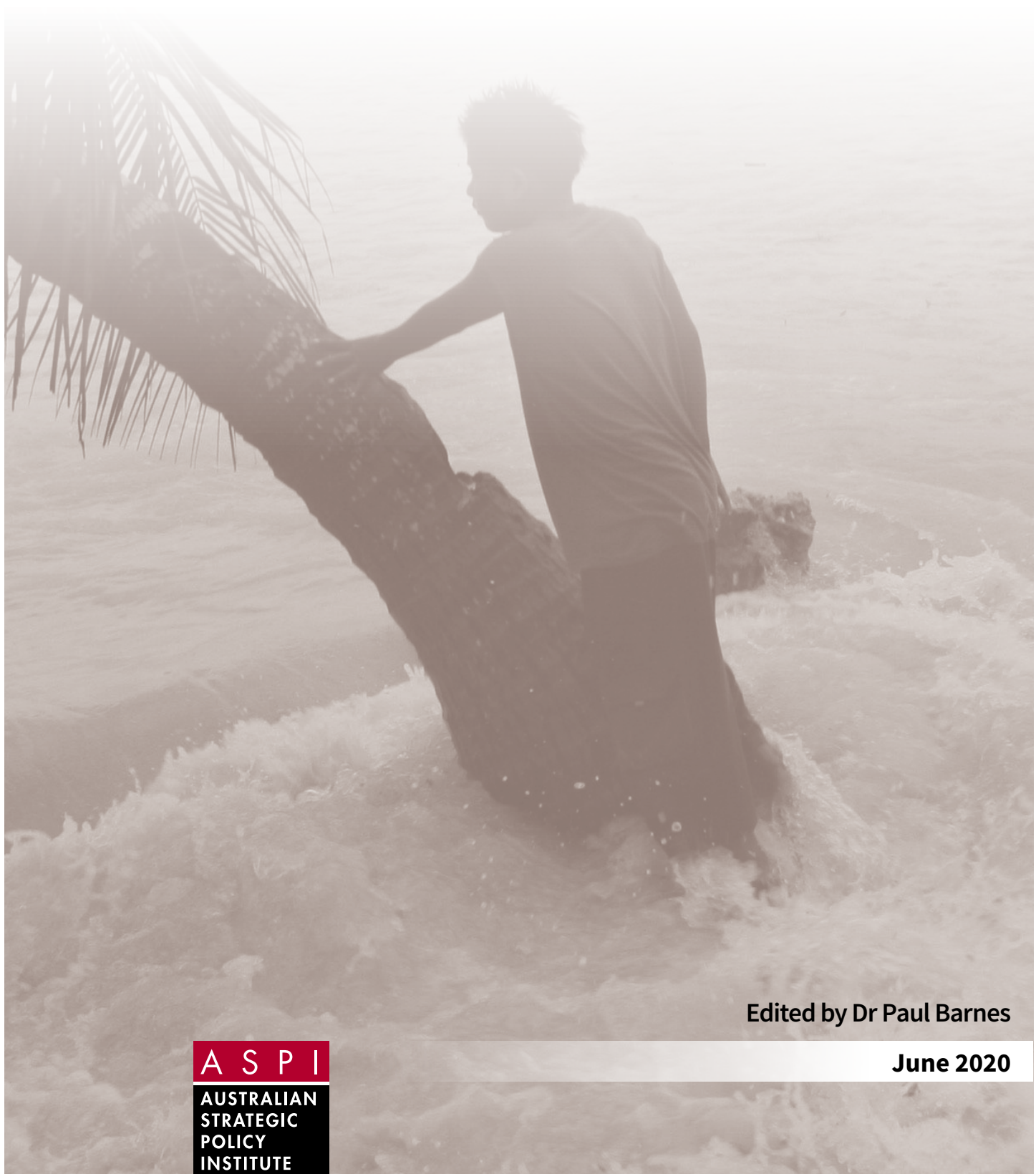
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Cover image: Pita Meanke of Betio village on the South Pacific island of Kiribati watches the king tide crash through his family's sea wall which then spills onto his families property.

Image: Jeremy Sutton-Hibbert/[Alamy](#).

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FOREWORD

Mami Mizutori

Special Representative of the Secretary-General for Disaster Risk Reduction in the UN Office for Disaster Risk Reduction and head of the UN Office for Disaster Risk Reduction

This new review is a welcome initiative, coming as it does in a time of increased pressure on Pacific Island nations from the combined threats of the global climate emergency and the COVID-19 pandemic.

It provides a platform for the small island developing states of the Pacific to share experiences learned from fighting this dual challenge and to explore how the new layer of complexity provided by COVID-19 has impacted on progress in the integration of disaster risk reduction and climate change adaptation as a core part of their national development.

Such integrated risk management has become embedded at the national level through the joint national action plan processes (JNAPs), which Tonga pioneered in 2010. It has also guided regional level policy, notably the landmark Framework for Resilient Development in the Pacific: An Integrated Approach to Address Climate Change and Disaster Risk Management 2017–2030.

This is an outstanding example of putting the Sendai Framework into action through strengthening disaster risk governance to better manage disaster risk in a part of the world where global warming has combined with other risk drivers to pose an existential threat to a centuries-old way of life.

This strategy has also helped to develop a better understanding of disaster risk among the public at large, increased investment in disaster risk reduction and paved the way for more effective preparedness and response.

The impressive recovery in Fiji after Tropical Cyclone Winston, the risk-informed recovery budget of the Government of Tonga after cyclone Gita and the prompt evacuations of Ambae Island in Vanuatu because of volcanic eruptions are just three of several examples of ‘Sendai in action’ across the region.

Regional recovery and resilience capacities are being further tested following Tropical Cyclone Harold which caused widespread destruction in the Solomon Islands, Vanuatu, Fiji, and Tonga during April this year just as lockdown measures had been introduced across the Pacific to keep the new coronavirus at bay.

The combined challenge of the cyclone season and COVID-19 has brought into stark relief the important role of public health services in a disaster-prone region where such services are not always of the standard required. The lack of laboratory testing for COVID-19 and the economic impact of the pandemic on tourism and business continuity makes the disaster response environment even more challenging.

Nonetheless, taking stock of regional achievements in disaster risk reduction policy and practice is important alongside identifying the areas where the region needs to focus most in the coming years.

This is why the Pacific Disaster Prevention Review is so critical. It's an important initiative to examine progress in implementing the Sendai Framework across the Pacific and to provide a range of independent views that will stimulate efforts to reduce disaster losses in the region.

It will also provide a vital boost to implementing target (e) of the Sendai Framework, which seeks a substantial increase in the number of national and local strategies for disaster risk reduction by the end of the year and the inclusion of pandemic preparedness which has not always been a priority.

Five years into the Sendai Framework era, the Pacific region has come a long way. At the same time, it still has some way to go to achieve its agreed vision of a resilient future for its people, societies, economies, cultures and the natural environment.

With sea-level rises in some countries four times greater than the global average, Pacific island countries and territories are on the front line of the escalating climate crisis. As coastal areas or degraded inland areas become uninhabitable, people will seek safety and better lives elsewhere. The very survival of communities and countries is at stake in the coming decades.

In such a challenging context, disaster risk reduction is truly a matter of survival. A resilient Pacific depends on achieving the targets for reducing disaster losses and building resilience set out in the Sendai Framework.

INTRODUCTION

Dr Paul Barnes

Disaster risk reduction (DRR) is a global policy issue. Reducing the likelihood and severity of damage and related cascading and cumulative impacts from natural hazards has become central to all nations and is equally important regionally. Historical instances of extreme weather combined with the impact of natural hazards have triggered the enhanced evolution of international cooperation, multilateral responses and humanitarian aid efforts over many years.

The nexus between natural hazards and vulnerability is central to appreciating the scale of the damage caused by large natural and sociotechnical disasters. The Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation¹ was a harbinger for the Hyogo Framework for Action (HFA), which emphasised building the resilience of communities and nations to the effects of disasters, and the Sendai Framework for Disaster Risk Reduction, which followed. The HFA defines vulnerability as ‘The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of communities to the impact of hazards.’²

Addressing the four stated priorities of the Sendai Framework is central to achieving the goals of minimising both the likelihood of impacts from disasters and their severity.³ By promoting a better understanding of disaster risk (Priority 1), consideration of the potential losses and contexts where damage and loss occur is more assured. Strengthened disaster risk governance (Priority 2) can be achieved through ensuring that more effective policies and practices are implemented. An emphasis on investment choices that promote resilient design (Priority 3) and increasing the effectiveness of preparedness planning (Priority 4) through building community lifelines and essential services to higher degrees of resilience all detail efforts that need to be in place before a disaster manifests.

In addition to more effectively reducing disruptions and preventing loss of life, economic impacts and damage to critical infrastructure and ecosystems, investment in those four priorities makes good sense. Sustaining that support, however, will require strengthened national coordination mechanisms that promote meaningful engagement among relevant institutions and stakeholders, as well as coherent support from the UN system. Such coordination and engagement will be essential if member states are to achieve one of the major targeted milestones of the Sendai Framework—to have national and local DRR strategies in place globally—by the end of 2020.⁴

Pacific island countries and territories (PICs) have been historically affected by weather-related disasters. Many PICs have been listed among the top 10 most disaster-prone countries in the World Risk Index over several years. The UN Office for the Coordination of Humanitarian Affairs (UNOCHA) reported that the Pacific region experienced nine major weather emergencies between November 2013 and June 2014.⁵ In addition to damaging winds, a convergence of flash flooding, king tides and high-intensity rainfall contributed to damage to essential services and food supplies and the displacement of people across island economies. The frequency of cyclonic activity has decreased from that peak period, but the PICs remain significantly vulnerable to severe weather.

While the international efforts in disaster mitigation mentioned here culminated in the commencement of the Sendai Framework in 2015, a coincident series of pan-Pacific dialogues and communiqués on climate change and disaster mitigation made the year a watershed of intent. Pacific Islands Forum leaders stated at the 46th Pacific Islands Forum Leaders' Summit in Port Moresby that year that Pacific states were among the most vulnerable and least able to adapt and respond to the damaging impacts of natural hazards and destructive weather events.⁶

Other natural-hazard-related communiqués released in 2015 included the Lifou Ministerial Declaration on Climate Change in April;⁷ the Nuku'alofa Ministerial Declaration on Sustainable Weather and Climate Services for a Resilient Pacific⁸ and the Polynesian Leaders' Taputapuātea Declaration on Climate Change in July;⁹ and the Smaller Island States Leaders' Port Moresby Declaration on Climate Change¹⁰ and the Suva Declaration on Climate Change in September.¹¹

Those concerns were justified during the 2015–2016 cyclone season, when eight fully developed cyclones wrought havoc across large parts of the eastern Pacific Ocean. One of the storms, Tropical Cyclone (TC) Winston, was the first category 5 system to impact Fiji,¹² the strongest storm event on record in the Southern Hemisphere and the most costly, causing damage and losses estimated at more than US\$1 billion.¹³

As a continuation of this long history of climate diplomacy in the Pacific, the 2018 Boe Declaration on Regional Security signed during the 48th Pacific Islands Forum set out several key principles important to equitable responses to DRR. One was:

the importance ... placed on an expanded concept of security inclusive of human security, humanitarian assistance, prioritising environmental security, and regional cooperation in building resilience to disasters and climate change, including through regional cooperation and support.¹⁴

Participants at the forum also agreed to strengthened information sharing and the further development of early-warning mechanisms, assessments and other advice, all of which remained central to Pacific Islands Forum discussions throughout 2019.

This year marks five years of applying the Sendai Framework to DRR efforts globally. It will also be nearly two years since reporting on progress towards implementation against a series of activity indicators was initiated. Completion of one-third of the Sendai Framework's operational life cycle creates an opportunity to examine challenges faced by selected PICs in its implementation.

With that goal in mind, this report explores independent views on challenges to implementing the Sendai Framework in eight Pacific island economies.¹⁵ It doesn't pursue an in-depth analysis of constraints or impediments to the implementation of the framework against the established indicators. The intent of the report is to present independent views—at a moment in time—about the 'fit' of the Sendai Framework, in the general context of its four priorities,¹⁶ to local needs and its flexibility for its adaptation to specific conditions 'on the ground.' It is recognised that in capturing independent voices, official developments not yet in the public domain might not be noted.

Following comments by Dr Robert Glasser, former Special Representative of the UN Secretary-General for Disaster Risk Reduction and Head of the UNDRR, on future contexts within which the Sendai Framework will be applied, section authors examine options for making the 'fit' better and give their thoughts on what would progress DRR into the future.

An additional consideration is the usability of the framework when incorporating local knowledge and skills and promoting collaboration and the inclusion of local capabilities and culture.

While there's considerable detail in each section, generic themes emerge about options to enhance the fit of the Sendai Framework to local needs. They include:

- recognising the importance of engaging effectively with local private sectors and wider civil society in supporting DRR efforts and risk communication outcomes, because community recovery rests on a viable economy

- acknowledging and documenting traditional knowledge supportive of self-protection and risk communication that can increase community and regional resilience
- using land-use planning as a key means for enhancing disaster mitigation
- recognising that capability and capacity to effectively implement the Sendai Framework will vary across PICs
- supporting pathways to strengthen linkages, coordination and communication between local communities and provincial-level and national initiatives to reduce vulnerability and build capacity to reduce disaster risk
- knowing the importance of targeting projects dedicated to strengthening coordination between government response agencies (disaster management authorities, police, militaries and fire and emergency services), rather than broad and unfocused programs of capacity building
- understanding the benefit of enhancing the influence and standing of national disaster management authorities within governments, especially where decision-making power resides within central ministries and disaster agencies have less agency to coordinate across government.

A recurrent theme in many of the economies examined in the report relates to the data collection and reporting arrangements central to the Sendai Framework. Specific themes of note include the need to recognise the following factors:

- With an increased expectation of extreme weather events and significant disaster impacts becoming a new norm across the Pacific, the rate of change of pressure on societal and natural systems is likely to outstrip the scope and design intent inherent in current national and international policy frameworks and evaluation targets. As a result, meeting key goals and performance targets included within frameworks such as the SFDRR and the Sustainable Development Goals (SDGs) and some extant national adaptation plan protocols might not realistically be achievable. This might mean that addressing the ‘principles’ in such frameworks is more useful than seeking to meet measures that may have evolved to include unrealistic targets.
- It may be more viable if performance is systematically monitored against a smaller subset of DRR indicators that reflect the size and risk profile of an island economy and are relatively easy to collect.

It’s critically important that the Sendai Framework isn’t viewed as an ongoing data heavy burden among regional economies but rather as a useful endeavour that contributes to enhancing disaster mitigation and local capability. A unique challenge for the UNDRR and donor agencies is in balancing the support needed in the Pacific to generate capability and capacity that enables the translation of the Sendai Framework’s intent and guidance into genuine betterment.

BEYOND SENDAI

Dr Robert Glasser

The Sendai Framework and its predecessor international frameworks have been instrumental in accelerating global awareness of disaster risk and mobilising action to reduce it.¹⁷ One important indicator of that success has been the significant reduction in loss of life from disasters globally and the increasing acceptance in many countries of the principle of ‘building back better’ following disasters.¹⁸

Despite this progress, the recent *Sendai Monitor* suggests that countries are falling short of achieving the ambitious global goals agreed in the Framework.¹⁹ Many governments are unaware of the risks they face because of significant gaps in information about the frequency and impacts of past disasters. Others focus on a narrow range of risks, usually related to their recent experience of major disasters, but not on the often significant risk of hazards that occur less frequently. For the most part, countries aren’t yet comprehensively and rigorously embedding multi-hazard risk assessments in core economic and social planning and investments.

Progress in reducing disaster risk has generally proceeded along three paths. The first is incremental improvements resulting from the persistent advocacy of leaders within (predominantly) the disaster management agencies, but also of other national disaster risk champions in the private sector, the science and technology community, academia and civil society. The Framework both reflects this progress and has helped accelerate it by creating an international reference point for domestic advocacy.

The second path is characterised by the political opportunity that can arise in the wake of a major disaster. Immediately afterward, governments often make significant strategic changes to disaster management policies and procedures that go well beyond the incremental approach. The Mexican Government, for example, put in place major reforms to DRM and strengthened building codes in the wake of the devastating 1985 earthquake that killed more than 9,000 people.²⁰ However, the political pressures for government to be seen to be acting rapidly after a major disaster can also result in changes that are poorly thought through and too narrowly focused on addressing the kind of disaster just experienced, rather than on multi-hazard risk.

The third path is most often taken in countries that regularly experience large-scale disasters and for which the impacts represent a significant drain on their economic and social development. In those places, DRR is core business. The Philippines, for example, is one of the most disaster-prone countries.²¹ More than 60% of its total land area is exposed to multiple hazards, and about three-fourths of the population is vulnerable to their impact. Over the past decade, the country has experienced on average 19 climate-related disasters each year, involving numerous fatalities and enormous economic costs.²² As a consequence, it’s embedding disaster risk in economic development planning at both the national and subnational levels of government.

PICs are similarly exposed. In 2016, for example, TC Pam inflicted damage on Vanuatu that equated to over 60% of the country’s GDP.²³ In the same year, TC Winston inflicted losses on Fiji estimated at US\$1.38 billion (31% of GDP).²⁴ With damage on this scale, it isn’t surprising that PICs have adopted the Framework for Resilient Development in the Pacific (FRDP), which places climate and disaster risk at the core of the region’s economic development efforts.²⁵

DRR risk-reduction efforts are proceeding slowly in countries that are less exposed and vulnerable to hazards. For many, the annual costs of disasters are too small to trigger the political transformation in risk management called for in the SFDRR. But climate change is already elevating the costs of disasters in many locations, and that trend is likely to accelerate in the years ahead.

Over 90% of disasters globally are linked to hydrometeorological hazards (storms, floods, drought), which are precisely the sort of hazards climate change is amplifying. “The number of floods and other hydrological events have quadrupled since 1980 and have doubled since 2004.²⁶ As climate change increases the frequency and severity of many hazards, we’re likely to see an increase in concurrent extreme events and in events that follow in closer succession. Communities may weather the first few but, in their weakened state, be overwhelmed by those following. Large areas of the planet that are currently marginally viable for agriculture will be in chronic crisis from the compounding impacts of the steady rise of temperature, drought and fires. The scale of those impacts will be unprecedented, and the patterns the hazards take will change in ways that are difficult to anticipate.

These developments will increasingly stretch emergency services, undermine community resilience and escalate economic costs and loss of life in many countries, including in countries that to date have been relatively disaster-free. The impact will be exacerbated by knock-on effects from disasters affecting regional neighbours and global systems, including global supply chains.²⁷ Of course, in the case of many PICs, those climate impacts are absolute; they represent an existential threat to national survival.

Our climate is warming amid the largest period of investment in infrastructure in human history. The investment required over the next 15 years in infrastructure for energy, transport, potable water supply, sanitation and telecommunications is estimated to be around US\$80–90 trillion, which exceeds the value of the entire existing stock.²⁸ It will be impossible to achieve the outcomes of the SFDRR (not to mention hugely wasteful economically) if climate risk and disaster risk more broadly aren’t incorporated in the design and implementation of those investments.

Institutional investors have enormous resources to invest in meeting those needs. The global re/insurance industry alone manages assets worth \$30 trillion, which is about three times the size of the Chinese economy.²⁹ But the public sector also plays a fundamentally important role.³⁰ On average, it finances 40% of infrastructure investments in developed countries and 60–65% in developing countries. It also leverages additional private-sector financing for disaster- and climate-resilient infrastructure through public–private partnerships, in which the public investment reduces the risk for private-sector investors. This is particularly important in developing countries, where those risks can discourage private-sector investment.

The public sector also plays an important role in promoting resilient investment in infrastructure by establishing the enabling environment and policy settings. This includes building codes and standards that incorporate climate and disaster risk and procurement policies. On average, government procurement accounts for 10–25% of countries’ GDP.³¹ Procurement policies that require contractors to address climate and disaster risk can therefore have a major impact on strengthening national resilience.

Influential institutions and actors across the global financial sector are increasingly moving from treating climate change as a public relations matter to seeing it as a core business risk (and opportunity). The work of the Task Force on Climate-related Financial Disclosures is rapidly gaining traction.³² The voluntary disclosure of material climate-related risks promoted by the taskforce is now supported by three-quarters of the world’s globally systemic banks, eight of the top 10 global asset managers, the world’s leading pension funds and insurers, major credit-rating agencies, and the big four accounting and consulting firms.³³ Together, those institutions manage almost US\$110 trillion in assets.

Voluntary reporting addresses two categories of climate risk: physical and transitional. The former concerns financial losses resulting from the sudden-onset hazards that climate change is amplifying (such as wildfires, drought, floods, storms and heatwaves) and from progressively intensifying hazards (such as sea-level rise, changes in rainfall patterns and increasing temperatures). The latter concerns the risks to the financial system, and to specific sectors and investments, associated with the transition to a low-carbon economy.

In time, voluntary reporting is likely to become mandatory, and the methodology underpinning it more rigorous. As it does, it will unlock enormous amounts of public and private capital that can be redirected from high-carbon to low-carbon assets and, consistent with the SFDRR, to investments in assets that are resilient to disasters. Sophisticated analysis by the world's largest asset manager, BlackRock Inc., is already detecting major climate-change impacts on the value of investments, including evidence that the most climate-resilient utilities trade at a premium.³⁴ The company is advising its investors that this premium will increase over time as climate-change risks and dangers compound.

As these events unfold, it will be extremely important for aid programs and regional development banks to minimise the impact that the changed directions of these financial flows may have on less developed countries, and particularly small island developing states, which are highly exposed to climate and disaster risk.

Ultimately, without significantly deeper global reductions in greenhouse gases, even very significant increased funding for DRR will be inadequate to protect communities from the hazards that climate change is amplifying. In this respect, the single most urgent disaster risk treatment—and the path to achieving the objectives in the SFDRR—is to reduce greenhouse gases as rapidly as possible.

PAPUA NEW GUINEA

Darian Clark

At the extreme: lessons from disaster management in Papua New Guinea

Papua New Guinea (PNG) is widely recognised as one of the most disaster-prone countries in the Pacific region. The 2017 World Risk Index ranked it as the world's 10th most at-risk country.

In part, this reflects its geological position in the Ring of Fire—the collision point of several tectonic plates that encircles the Pacific Ocean. Of the 452 active volcanoes along that ring, 67 are in PNG.³⁵

The topography of PNG is also highly diverse. The country spans some 462,840 km², which is the largest landmass of any country in the Pacific, and includes mountainous, rugged terrain, vast tropical inland forests (third in scale only to Brazil's and Indonesia's) and more than 600 atoll islands.

Given its unique geoclimate, it's perhaps unsurprising that the PNG archipelago is exposed to an array of natural hazards, from earthquakes, volcanic eruptions, tsunamis, cyclones, flooding, coastal erosion and landslides to droughts and frost. Indeed, PNG accounted for an estimated 25% of all the natural disasters that occurred in the Pacific between 1950 and 2008.³⁶

Furthermore, PNG has the highest population among PICs, at some 8 million people according to various estimates (the most recent national census was conducted in 2011). PNG hence has one of the highest proportions of national population exposed to earthquakes in the Asia-Pacific region. According to the UN Development Programme (UNDP), between 1997 and 2002, 63 major calamities were reported in PNG affecting more than 4.1 million people.³⁷ PNG also has one of the highest population growth rates in the Pacific, compounding future human insecurity in the face of disaster risks.

PNG's economic growth and fiscal position are also vulnerable to natural hazards. The PNG economy is dependent on the extractive sector, led by the oil and gas industry, as well as the agricultural sector. Damage and loss in those sectors can have a profound impact on both livelihoods and communities more generally. Public infrastructure such as roads, schools and health posts—although limited—is also highly exposed.

As the World Bank states, the cost to repair public infrastructure, not to mention the provision of relief, can readily outweigh the financial resources available to the PNG Government.³⁸ For example, the Rabaul volcanic eruption in 1994 resulted in damage and losses of 280 million kina (US\$100 million) and the displacement of some 150,000 people. In 2008, TC Guba resulted in 149 deaths and severe damage in the order of 200 million kina (US\$71.4 million).³⁹ More recently, the February 2018 earthquake in the Highlands left more than 270,000 people in immediate need of lifesaving assistance, led to a death toll of more than 150 people, and resulted in widespread damage to roads and houses at an estimated cost of 450 million kina (US\$133 million).⁴⁰

The 1997 and 2015 droughts are further notable examples of recent high-impact natural disasters. Those twin disasters highlighted how large parts of the country and population are susceptible to the extremes of climate related to the El Niño – Southern Oscillation. A severe El Niño event resulted in reduced rainfall in many parts of PNG from April 2015, and a major drought subsequently took hold. Reduced cloud cover in high-altitude locations in July and August also led to damaging frosts. According to Bernard Broughton, the impacts on the rural population included less access to clean drinking water and staple foods and resultant health problems, including greater vulnerability to morbidity and mortality.⁴¹

This situation highlights how climate change is also likely to exacerbate the risk of existing natural hazards in PNG through more frequent extreme weather. More than half a million people living in thousands of coastal villages across the country are vulnerable to coastal erosion, king tide cyclones and storm surges, all of which are likely to be exacerbated by climate change. The population and commercial centres of Port Moresby and Lae are also particularly vulnerable to rising sea levels.

The social and economic implications of the various hazards prevalent in PNG are arguably magnified in a context of weak institutional capacity. PNG's National Disaster Centre (NDC) was established under the Disaster Management Act 1984 (revised in 1987). The NDC acts as the executive arm of the National Disaster Committee and is responsible for carrying out its day-to-day responsibilities. NDC currently sits within the Department of Provincial and Local Government Affairs, and the relevant minister is the chair of the National Disaster Committee. Under the new government of James Marape, it's possible that responsibility for the NDC may shift across to the Ministry of Defence, recognising the unique capabilities of the PNG Defence Force to mobilise assistance across the country.⁴²

As a recent review led by Peter Chamberlain notes, the NDC's capacity is constrained by low levels of both resourcing and support.⁴³ Its annual budget appropriation is only some 8 million kina (US\$3 million), while well over half of its 15 positions remain vacant. Together, this adversely affects its profile and capability. This was illustrated in the aftermath of the Highlands earthquake when then Prime Minister Peter O'Neill appointed an Emergency Controller to run relief and recovery efforts, in apparent conflict with the NDC's mandate.⁴⁴ These issues extend to the subnational level, as provincial disaster committees equally suffer from shortages of trained staff and lack of budget.

Translating Sendai into the Papua New Guinea context

Despite this sobering picture, the PNG Government has made some headway in embracing a strategic approach to meaningful DRR. In 2019, the government launched the National Disaster Risk Reduction Framework 2017–2030 (NDRRF).⁴⁵ This framework builds on the achievements of PNG's previous framework (the National Disaster Risk Reduction and Disaster Risk Management Framework for Action, 2005–2015). The NDRRF enshrines PNG's commitment to the Sendai Framework and aims to prevent new and reduce existing disaster risks and losses. The development of the NDRRF represents an achievement of broad-based consultation. As highlighted by an interlocutor in Chamberlain's report: 'NDC were in the driving seat ... every single word went through six months of review with line ministries and NGOs.'⁴⁶

The NDRRF embraces—indeed, is a facsimile of—the four Sendai priorities for action: understanding disaster risk; strengthening disaster risk governance; investing in disaster reduction; and enhancing disaster preparedness for effective response and to 'build back better'. This is underpinned by seven aspirational targets (along with 40 associated indicators):

1. Reduce the average disaster mortality rate by 2030 compared to 2005–2015
2. Reduce the number of people affected by disasters by 2030 compared to 2005–2015
3. Reduce direct disaster economic loss in relation to national GDP by 2030
4. Reduce disaster damage to critical infrastructure and disruption of basic services
5. Increase the number of provinces with provincial and local DRR strategies

6. Enhance international cooperation through adequate, sustainable support
7. Increase the availability of and access to multi-hazard early-warning systems and disaster risk information and assessments.

The launch of the NDRRF is undoubtedly a positive development, but progress has since stalled on any action plan and associated monitoring and evaluation framework, as proposed in the NDRRF. Moreover, there are no baselines for targets 1 to 4, so this will require dedicated effort. All this raises questions about genuine political and bureaucratic commitment. It also remains unclear how the NDRRF will be socialised and actively promoted at the subnational level, where the disaster risk is most real. The NDC doesn't seem particularly well placed to do this, as illustrated during the fieldwork component of Chamberlain's review. As he notes, NDC staff felt unable to accompany the review team on several occasions, given outstanding local debts or unrealised support to disaster victims.⁴⁷

Key lessons from recent disaster experiences in Papua New Guinea

The NDRRF is notably weak on the role of subnational actors. There's reference to 'different levels of government',⁴⁸ but limited appreciation of the legal and institutional framework for disaster management in PNG. Provincial disaster committees (PDCs) were established in the same parliamentary Act as the NDC. Given the decentralised nature of administration in PNG, PDCs form the backbone of efforts to improve DRR at the local level. Despite this, the state of the committees remains highly problematic. The UNDP recently conducted provincial DRM capacity assessments in five of its target provinces. Despite various limitations with the data, those assessments provide valuable insights into the state of the PDC network, including the following:

- There's no common structure, and staffing levels vary between one and eight individuals.
- Scores for human capacity are generally very low and suggest the need for further training.
- Physical resources are lacking—and the committees are heavily reliant on the use of personal equipment.
- All PDCs are in debt to an alarming degree. Typically, the debts arise when provinces are encouraged to spend money on a response with an unrealised promise of public resources. The collective debts of the five provinces during the assessment were more than 8 million kina (around US\$3 million). This affects their credibility and ability to procure from the private sector.
- No province has completed a disaster management plan.

Lack of support for, and investment in, PDCs will continue to act as a handbrake on PNG's efforts to implement the four priorities in the Sendai Framework. A starting point to address this would be to legislate budget provision under the Disaster Management Act to enable proper planning.

The NDRRF also touches on the role of other stakeholders, including NGOs, UN agencies, donors, academia and the private sector. A key lesson from the 2018 Highlands earthquake was the capacity and potential of the private sector, in partnership with civil society and development partners, to mobilise major relief support operations. The earthquake hit in the heartland of the operations of both Oil Search and Exxon Mobil, and they responded to the immediate humanitarian needs of the local community through the deployment of assets and significant food and non-food items. In the absence of any UN presence in the affected region, and because of problems in accessing communities due to intertribal conflict, the private sector became the key enabler for the humanitarian response. As a recent Humanitarian Advisory Group report concludes, 'extractives contributed significantly to the earthquake response with greater speed and reach than traditional humanitarian actors could achieve.'⁴⁹ Development partners, including Australia and New Zealand, worked closely with private-sector actors to supplement assistance and help ensure a strategic approach to relief efforts.

From this experience, it's apparent that the reception of the Sendai Framework in PNG could be strengthened with a greater focus on engaging the private sector, as reflected in PNG's implementation of the NDRRF. This should carefully balance the opportunities with the risks. The Humanitarian Advisory Group report suggests that the extractive sector can support humanitarian response operations to achieve greater reach, scale and therefore increased impact through its alternative skills, resources and community connections. Yet those actors might not operate within the humanitarian frameworks that are traditionally used to guide response operations. The extractive sector has little formal training in humanitarian response, and its understanding of humanitarian principles and approaches may be limited. It falls to the humanitarian sector and key elements of the private sector to get better at working with the extractive sector in the Pacific region, particularly in PNG

Civil society and faith-based organisations equally receive limited attention in the NDRRF despite the major role that they play on the ground. In contexts where PDCs may lack the capacity to fulfil their mandate, this gap is filled by the active, extensive network of NGOs and faith-based organisations in PNG. The Australian Humanitarian Partnership, under the Disaster READY initiative, is the flagship group in this context. In PNG, it comprises Plan International in consortium with ChildFund, World Vision, CARE, and Caritas as lead of the CAN DO network (Church Action Network – Disaster Operations) involving Anglicare, the Adventist Development and Relief Agency, the Baptist Union, Caritas Australia, the Evangelical Lutheran Church, the Salvation Army and the United Church.⁵⁰

Together, the network has a footprint throughout PNG and seeks to promote inclusive community-based DRM. Activities include supporting schools to manage hazards by building awareness of DRR, mapping church assets as potential evacuation centres and helping community leaders to develop and test schools' disaster preparedness plans. Disaster READY also aims to strengthen subnational and national coordination and communication mechanisms in PNG. The reach and capacity of civil society were apparent in the Highlands earthquake response, in which CARE, Caritas (as part of the CAN DO network) and World Vision mobilised vital humanitarian assistance quickly on the back of their existing community connections. Civil society in PNG will continue to play an integral role through harnessing the resilience of the people of PNG, particularly in promoting gender equality and social inclusion, yet that is largely overlooked in the NDRRF.

Perhaps one of the greatest challenges in strengthening PNG's disaster preparedness and response capacity, along with some gaps in policy coordination is that of public communications. The means to gather, analyse and meaningfully convey meteorological and geohazards information is key to informing and mobilising communities before and during a natural disaster. Yet, as a recent USAID-sponsored report finds, there's a distinct lack of facilities at the provincial and district levels to provide warnings to communities in PNG, and that's especially true for remote areas. The procedures and protocols for early warning dissemination are unclear as well. As a result, vital warnings are generally not disseminated to those who need them most.⁵¹ Despite this reality, there's only superficial appreciation of these pressing issues in the NDRRF.

The views of a National Broadcasting Corporation official illustrate ambiguity in the protocols used to create and authorise warnings:

We have multiple layers of disaster response agencies: who says what and who has overall authority to issue directions/warnings? [It could be] NEC, the Minister or Secretary of the Department of Provincial Affairs, NDC, PDCs, the Police, the PNG Defence Force, the Geophysical Observatory, the National Weather Service, the PNG Fire Service ...⁵²

There's broad recognition of the problem, and in 2018 PNG established a new Multi-Hazard Early Warning Centre, but at this stage the centre's focus has been on the collection of complex technical data, and it doesn't yet appear to have the means to translate the data into simple warnings and advisories, which communities find so critical in times of crisis.

The transmission of warnings is also a major problem. In 2017, the National Broadcasting Corporation introduced an emergency broadcasting policy, but its coverage is far from universal. Mobile phone networks are increasingly used for disaster warnings, as usage and coverage continue to grow across PNG, but the largest telephone company in PNG, Digicel, has so far been reluctant to transmit warning messages without financial compensation.⁵³ Communication infrastructure is also highly vulnerable—almost every Digicel mobile phone tower collapsed during the Highlands earthquake, for example. Together with the damage to roads and airstrips, that curtailed efforts to access, understand and assess the impact in order to mobilise support. The importance of building public communications, possibly in partnerships with the private sector, could be far better recognised in the NDRRF.

Looking ahead

Natural disasters are a fact of life in PNG. The Sendai Framework, translated into the PNG context through the NDRRF, has served as a useful platform to prompt policy priorities. At the same time, the application of those global principles arguably warrants more reflection to ensure that they're genuinely fit for purpose, given the unique local challenges in the PNG landscape.

This paper has highlighted three areas for attention:

- the role and capacity of subnational government
- the scope to better harness the private sector and civil society
- a need to improve public communications.

The PDC structure clearly needs attention to ensure more effective real-time support on the ground. To that end, there should be a commitment to the public provision of multi-year funding to each PDC to enable proper planning processes and address long-term workforce skills development.

In parallel with meeting their resource needs, PDCs should further be urgently tasked to prepare disaster management plans in close consultation with the local private sector and civil society. The diversity and remoteness of PNG communities make provincial-level response plans the most meaningful, and they can be underpinned by national-level resourcing and personnel where appropriate.

Lastly, the PNG Government should seek an explicit commitment from private-sector companies about their community service obligations during emergencies and promote a clear line of sight on information-handling protocols.

Closer policy consideration in these three areas will make a significant contribution to PNG's ongoing disaster management efforts.

SOLOMON ISLANDS

Linda Flora Vaike and Diana Hinge Salili

Introduction

Solomon Islands is an archipelago comprising 992 islands located to the east of Papua New Guinea and northwest of Vanuatu. The most recent census completed in November 2019 listed the total population as 683,394.

Like other small PICs, Solomon Islands faces several socio-economic problems, including a weak economic base, a small public administration and rapid population growth. Those issues are further exacerbated by climate change and natural disasters, leading to increasing vulnerabilities. According to the 2019 World Risk Index, Solomon Islands was ranked the fourth most vulnerable country to disaster risk exposures.⁵⁴ Future projections for the country reveal an even more dangerous future; they show an average direct loss of US\$20.5 million annually from natural hazards for the next 50 years.⁵⁵

Solomon Islands has taken active steps to address risks posed by natural hazards and climate change. At the highest decision-making level, the country has a mix of national and sectoral policies that are aimed at reducing disaster risks and the impacts of climate change. Solomon Islands is also demonstrating great leadership in the international space through its ratification and adoption of sustainable development and environmental treaties, including the Sendai Framework,⁵⁶ the FRDP⁵⁷ and the Paris Agreement.

While the Sendai Framework and Paris Agreement provide useful guidance for addressing climate change and DRR at the international level, the FRDP integrates climate change and disaster risk considerations as immediate priorities for addressing regional concerns about the short-term impacts from natural hazards while also addressing longer term climate change issues and sustainable development. For Solomon Islands, the adoption of the FRDP is fundamental, as its implementation also contributes to the implementation of the Sendai Framework and other global frameworks.

The country is highly susceptible to hydrometeorological and geophysical hazards, including cyclones, floods, droughts, earthquakes, tsunamis, landslides and volcanic activity. Climate change also poses a serious threat to ecosystem health, the livelihoods of people and sustainable development.

Solomon Islands has experienced natural disasters that have affected livelihoods and cost the country millions in economic losses. In 2007 and 2013, earthquakes of up to magnitude 8 affected the western and eastern parts of the country, respectively, displacing thousands of people and claiming many lives. Another earthquake of a similar magnitude in 2016 affected three of the country's nine provinces. In 2014, the capital city and nearby communities were severely damaged by flash flooding in which 22 people died and thousands were displaced.

Emergent themes on disasters and challenges in enhancing disaster risk reduction and resilience that are unique to Solomon Islands

Solomon Islands, like neighbouring PICs, realises the strong link between climate change and natural disasters. This has greatly shifted discourse and previously siloed approaches to dealing with the two issues. The adoption of the Sendai Framework and FRDP in the region signifies the importance of integrating climate change and DRM and mitigating the impacts.

More conventional approaches to dealing with disasters have always been centred on response and recovery. However, Solomon Islands' National DRM Plan 2010 places disaster risk reduction at the centre.⁵⁸ Together with the Sendai Framework and FRDP, it's assumed that more emphasis will be placed on DRR—from both technical and sociocultural perspectives.

For example, traditional knowledge has assisted local communities in disaster preparedness and response. Some practices include traditional methods for predicting weather, seasonal changes and natural disasters as well as for food and water storage and preservation. In the eastern Solomons, for example, breadfruit is normally dried and stored for times of cyclones and droughts, and houses are built very low to withstand strong winds associated with cyclones. Certain communities store water in hollow bamboo during times of extreme events. The government is increasingly recognising the importance of traditional knowledge and is taking active steps to capture important traditional approaches for DRR and DRM.⁵⁹

Gender considerations, the inclusion of people with disabilities and the importance of civil society organisations and the private sector in DRM are becoming commonplace in dialogue, community outreach and engagement by the government and development partners. The Solomon Islands National Gender Equality and Women's Development Policy 2016–2020 acknowledges the importance of gender and other social groupings when addressing disaster risks and climate change.⁶⁰ Similarly, the country's climate change and disaster risk finance assessment report highlighted the importance of gender considerations and the important role of civil society organisations and businesses when addressing climate change and DRM and recommended that more resources be allocated to fully realise this goal.⁶¹

The National Development Strategy, which serves as an overarching policy document for the country, acknowledges DRR and DRM as a priority area and one that can be achieved through the combined efforts of the government and its development partners, including civil society organisations and the private sector.⁶²

Although Solomon Islands shows evidence of progress in dealing with DRM and climate change, challenges remain. They include the slow implementation of policies and plans, limited coordination, unclear and sometimes competing roles of government agencies, NGOs and other development partners, and financial constraints. The geographical distribution of islands is also a major challenge. Some parts of the country that have been affected by previous disasters are still struggling to recover, mainly because of the cost of transportation and other essential services needed for full recovery.

As noted in the climate change and disaster risk finance assessment report, an ongoing challenge for the country is having adequate funds that can be readily mobilised when a disaster strikes. As in most of the neighbouring PICs, the government has instigated massive budget reallocations and expenditures during times of disaster.

The Sendai Framework's applicability to local needs

The Sendai Framework covers a wide range of disasters, including small-scale and large-scale, frequent and infrequent, sudden and slow-onset, and natural and manmade, as well as related environmental, technological and biological hazards and risks.⁶³ It was developed with the intention of guiding the multi-hazard management of disaster risk in development at all levels and within and across all sectors.⁶⁴

The Solomon Islands Government has mapped much of the intent of the SFDRR through regional, national and local actions on the ground via different, but situation-specific, channels. That's embodied in the National Disaster Council Act (Act of 30 April 1990), which provides for the establishment, structure, organisation, powers, functioning and responsibilities of the National Disaster Council of Solomon Islands.⁶⁵

In support of this legislation, the government has also developed national frameworks and policies to create formal linkages between the SFDRR and local DRR actions and initiatives, including the Solomon Islands National Development Strategy 2016–2035 (NDS), the Solomon Islands National Climate Change Policy 2012–2017 and the Solomon Islands National Disaster Risk Management Plan 2010.⁶⁶ These national documents have sought to operationalise the SFDRR at the outset and create a platform for action to reduce disaster risks in Solomon Islands.

Table 1 details the alignment of these national frameworks and policies against the Sendai Framework priority areas and notes progress towards their implementation.

Table 1: Alignment of Solomon Islands national policies with the Sendai Framework

Sendai Framework priorities	Solomon Islands national policy priorities and objectives Key: Solomon Islands National Development Strategy 2016–2035 Solomon Islands National Climate Change Policy 2012–2017 Solomon Islands National Disaster Risk Management Plan 2010	
	Solomon Islands frameworks	Stage of implementation / challenges
Priority 1 Understanding disaster risk	<p>Principle C: DRM is supporting communities to understand and manage hazards and disasters—safeguarding lives, property and livelihood.</p> <p>Principle E: To identify and understand hazards, including climate change, is the basis for DRM.</p>	<p>The government, in collaboration with stakeholders, has implemented nationwide awareness campaigns to raise community understanding on managing and responding to disasters. For this to become a continuous and ongoing activity, the challenges that must be overcome include high costs of travel and media promotions, especially those reaching out to the more remote communities.</p>
Priority 2 Strengthening disaster risk governance to manage disaster risk	<p>NDS Objective 2: Poverty alleviated across the whole of the Solomon Islands, basic needs addressed and food security improved; benefits of development more equitably distributed to Solomon Islanders.</p> <p>NDS Objective 4: Resilient and environmentally sustainable development with effective DRM, response and recovery.</p> <p>Guiding Principle 1.8: Integration of climate change adaptation and DRR. Climate change adaptation and DRR are closely interrelated and shall be aligned.</p> <p>Guiding Principle 1.9: Science and evidence-based adaptation, DRR and mitigation. Climate change policy and adaptation, DRR and mitigation measures will be based upon, as far as practicable, both international climate change research and evidence-based local scientific measurements and observations.</p> <p>Principle F: National and provincial government commitment and engagement with partners is vital for effective DRM.</p> <p>Principle G: DRM is everyone's business and a whole of country approach with all agencies, communities and individuals taking ownership and everyone knowing their roles and being responsible and accountable for them.</p> <p>Principle H: Good governance is building on existing processes across all levels—national, provincial and community—with transparency, accountability, efficiency, best practice, strong relationships and clear arrangements within and across sectors.</p>	<p>In 2013, 12.7% of the population were living below the national poverty line. Solomon Islands' national poverty profile, released in 2015, confirms that of that percentage more than 50% are in rural areas. While this has been mostly attributed to remoteness and infrastructure, implications for food security are evident and confirmed by this national document.^a</p> <p>The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) plays a key role in addressing development challenges posed by climate change and disasters. That role has historically been hampered by the limited operational capacity of this recently established ministry (This gap is expected to be addressed by an ongoing recruitment process within the NDMO). Partners such as the UNDP have provided technical support, resulting in the development of MECDM corporate plans (2015–2017 and 2018–2020). The UNDP and Global Environment Facility also support institutional capacity-strengthening initiatives to improve coordination and the management of resources.</p> <p>DRR and preparedness have been mainstreamed into the national governance system, with maximum results thus far for Makira and South Malaita provinces through the development of specific earthquake recovery plans. This is a positive step forward as, in the event of disasters, the plans will guide the allocation and distribution of resources from both internal and international sources.</p> <p>Water resource planning has improved significantly through integration with climate change adaptation, resulting in improved water quality in six targeted areas, including Temotu Province (after the 2017 volcanic eruption).^b</p>

<p>Priority 3</p> <p>Investing in disaster risk reduction for resilience</p>	<p>NDS Objective 2: Poverty alleviated across the whole of Solomon Islands; basic needs addressed and food security improved; benefits of development more equitably distributed to Solomon Islanders.</p> <p>NDS Objective 3: All Solomon Islanders have access to quality health and education.</p> <p>NDS Objective 4: Resilient and environmentally sustainable development with effective DRM, response and recovery.</p> <p>NDS Objective 5: Unified nation with stable and effective governance and public order.</p> <p>Guiding Principle 1.5: Respect for culture and rights of indigenous people. Climate change will impact on natural resource utilisation and people's livelihoods. The culture and rights of indigenous communities shall be respected throughout the planning and implementation of climate change mitigation, adaptation and DRR programs and activities.</p> <p>Guiding Principle 1.9: Science and evidence-based adaptation, DRR and mitigation. Climate change policy and adaptation, DRR and mitigation measures will be based upon, as far as practicable, both international climate change research and evidence-based local scientific measurements and observations.</p> <p>Principle D: Risk reduction management is a development issue and an investment for community resilience and sustainability.</p>	<p>In terms of health, major challenges remain in service capacity, access, and infectious disease and non-communicable disease prevention and control. Solomon Islands has among the highest rates of malaria incidence, mortality attributed to exposure to unsafe water, sanitation and hygiene services, and mortality attributed to unintentional poisoning compared to other countries in the region. The availability of data could be contributing factor to the dire outlook in these findings.^c</p> <p>Education in the Solomon Islands is governed by an Education Act and is patterned after the British system. The law, however, doesn't make education compulsory at the primary level, which is the main reason why only 60% of school-age children have access to six-year elementary or primary education. Even so, recent reports indicate increased investments in the education sector by the government and development partners, which will potentially result in increased human resource capacity at the national level.^d</p>
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<p>Priority 4</p> <p>Enhancing disaster preparedness for effective response and to build back better in recovery</p>	<p>NDS Objective 1: Sustained and inclusive economic growth.</p> <p>NDS Objective 2: Poverty alleviated across the whole of the Solomon Islands; basic needs addressed and food security improved; benefits of development more equitably distributed to Solomon Islanders.</p> <p>NDS Objective 5: Unified nation with stable and effective governance and public order.</p> <p>Guiding Principle 1.2: Stakeholder participation and collaboration. Solomon Islanders across all levels cannot be spectators in the ongoing efforts to address climate change. National, provincial and community mitigation, adaptation and DRR programs and activities shall promote and ensure the active participation of all.</p> <p>Guiding Principle 1.9: Science and evidence-based adaptation, DRR and mitigation. Climate change policy and adaptation, DRR and mitigation measures will be based upon, as far as practicable, both international climate change research and evidence-based local scientific measurements and observations.</p> <p>Principle I: DRM is empowering community action for rural advancement.</p> <p>Principle J: DRM is setting arrangements for all hazards, including climate change.</p> <p>PART ONE</p> <p>Principle K: Committed resourcing and cost-effective action is essential for effective DRM.</p> <p>Principle L: Provincial government is an essential and critical partner in DRM.</p> <p>Principle M: The involvement of women in DRM arrangements at all levels is essential for effective DRM.</p> <p>Principle N: DRM will recognise community and individual rights and be based on a concern for equity, fairness, gender and minority group issues.</p>	<p>Increased coordination and liaison with partners and other stakeholders, including line ministries and agencies, provincial administrations and development partners, has greatly enhanced progress towards DRR and more resilient communities.</p> <p>With regard to financing, the Solomon Islands climate change and disaster risk finance assessment report for 2017 has made strong recommendations for institutional capacity building, urging the government to identify its institutional capacity needs, beginning with capacity needs in areas directly related to the effective management of aid, before capacity-building programs are formulated in order to be supported by donors.^e</p>
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- a Solomon Islands National Statistics Office, *Solomon Islands poverty profile based on 2012–13 household income and expenditure*, Ministry of Finance and Treasury, Solomon Islands Government, Honiara, December 2015, [online](#).
- b UNDP Pacific Office in Fiji, *Resilience and sustainable development*, 2020, [online](#).
- c World Health Organization, *UHC and SDG country profile 2018: Solomon Islands*, [online](#).
- d Graham Dawson, *Solomon Islands Education Sector Support Program independent assessment report*, June 2017, [online](#).
- e Pacific Community, Pacific Islands Forum Secretariat, Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, UN Development Programme, *Solomon Islands climate change and disaster risk finance assessment: final report*, September 2017, [online](#).

Source: Ministry of Development Planning and Aid Coordination, *Solomon Islands National Development Strategy 2016–2035*, Solomon Islands Government, 2016.

Of the three instruments detailed in Table 1, the National Disaster Risk Management Plan and the National Climate Change Policy predated the commencement of the Sendai Framework. The third body of work, the NDS was initiated in 2016 and will be implemented out to 2035.

In one sense, a challenge to effectively applying the Sendai Framework in Solomon Islands relates to finding compatibility with policies and practices that were begun before the international guidance was adopted.

As detailed in Table 1, a limited number of the guiding principles and objectives of the three instruments map naturally to the core priorities of the Sendai Framework.

Central to addressing both the Sendai Framework priorities and relevant aspects of the three national policy and legislative instruments are active steps to strengthen collaboration among the national government, development partners, local civil society organisations and NGOs in ways that progress DRM agendas. Progress can be best made by aligning regional and national activities with local community-based initiatives.

Recommendations and ways forward

National-level initiatives should include the following:

- Develop an updated national DRR policy (or equivalent) with an accompanying implementation strategy and monitoring and evaluation strategy to ensure coordinated national efforts that help to meet SFDRR data-reporting requirements.
- Ensure that the updated climate change policy includes stronger links aligned to DRR activities and the wider SFDRR priorities.
- Review initiatives and strengthen national institutions to ‘mainstream’ DRR goals as part of development planning processes. Enhance existing national capacity for the implementation of DRR initiatives at the community, provincial and national levels.
- Amend the current Disaster Risk Reduction Act to include financing national DRR initiatives in a more holistic manner (moving away from the focus on response capability and capacity to a more coordinated effort, highlighting initiatives to enhance preparedness and the resilience of essential services by building back better).

The major challenges to achieving these recommendations include the availability of funding to develop and implement new policies and review current national documents and the lengthy process of amending national legislation. They could also be hampered by other complex national circumstances.

In addition to national policy and legislative efficiencies, local and community-based efforts remain extremely important. Local and community-based enhancements might include the following:

- Identify and understand risk exposures at the local level and strengthen initiatives that enhance community resilience and options to build back better after disasters.
- Build capacity at the community level to implement and own initiatives.
- Document and enhance the use of traditional knowledge for DRR and increased resilience.
- Strengthen linkages between local communities and provincial-level and national initiatives.

Additionally, at the regional level, it’s recommended that collaboration with the FRDP taskforce be strengthened for the purposes of sharing experiences and maintaining close networks with regional partners and governments. Improving the monitoring and evaluation of collaboration efforts at the regional level, including technical assistance and funding support to strengthen national initiatives, is also strongly recommended. The major challenge that would potentially be encountered is the difficulty of establishing coordinated reporting efforts between government and development partners (specifically, those originating from development partners that could contribute to national action).

Requirements for implementing these recommendations would mostly be the effective and efficient collaboration and coordination of stakeholders working in local communities and ensuring that there are no overlaps in local initiatives that could result in communities not having ‘ownership’ of the initiatives.

Considering these recommendations for action will contribute to progressing the implementation of national DRR initiatives in Solomon Islands.

TONGA

Anna Schimel and Elisabeth Holland

Historical context

The Kingdom of Tonga is a Polynesian country that's a collection of 170 islands (volcanic and coral) with a land area totalling 650 km², a maximum elevation of 1,030 metres and an exclusive economic zone (EEZ) of approximately 700,000 km².⁶⁷ Tonga is the last constitutional monarchy in the Pacific but joined the Commonwealth in 1970 as a British protectorate. Its current population is 100,651,⁶⁸ spread across 36 inhabited islands with a population density of 138/km² and near zero population growth. It had a per capita GDP of US\$4,024⁶⁹ for a total GDP of US\$426.06 million in 2017.⁷⁰

Tonga is located within the Pacific Ring of Fire, where tectonic plate boundaries meet, accounting for 90% of the world's seismic activity. Its sensitive geographical location and its high exposure to extreme natural events resulted in its listing in the World Risk Index as the world's third most disaster-prone country.⁷¹

The human and economic cost of natural disasters in Tonga is increasingly high. Estimates suggest that it will experience US\$15.5 million per year in losses. Estimates that consider vulnerability and adaptive capacity predict increasing chances of devastating casualties. According to the TC Gita post-disaster rapid assessment report, there's a 50% chance of casualties of up to 440 and a 10% chance of casualties amounting to 1,700.⁷² Annual losses, on average, account for 4% of GDP.

Under current climate change scenarios, Tonga is expected to experience droughts, El Niño and La Niña events, rising sea levels, storm surge, saltwater intrusion, inundation, coral bleaching, more extreme rain events, and higher intensity tropical cyclones and winds.⁷³ Tonga has experienced three devastating tropical cyclones in the past eight years, and the loss of functionality from their impacts is accumulating:

- TC Ian, a record-breaking category 4 tropical cyclone, struck the Ha'apai Islands between Tongatapu and Vava'u in January 2014, resulting in one death and \$US48 million in losses, which amounted to 11% of Tonga's GDP.⁷⁴
- In 2016, before gaining strength and hitting Fiji, TC Winston caused an estimated \$US12 million in agricultural losses in Vava'u but no loss of life in Tonga.⁷⁵
- TC Gita in 2018 was a significant event. It passed over the Tongatapu and 'Eua Island groups around 11 pm on 12 February and was the strongest cyclone to affect Tongatapu and 'Eua since TC Isaac in March 1982, with average wind speeds of 130 kph and gusts of up to 195 kph. An accompanying storm surge reached 1 metre above normal high-tide levels, and 200 mm of rain fell over a 24-hour period, resulting in localised flooding. The storm affected approximately 80,000 people—about 80% of Tonga's population. Gita passed directly over Tonga's capital, Nuku'alofa, and resulted in losses of US\$164.1 million, or 37.8% of Tonga's GDP. It brought down power lines and damaged or destroyed schools and other public buildings. The storm lifted off the roof of the Tonga Meteorological Service building at the airport and the parliament building in the centre of Nuku'alofa.

It destroyed 800 houses and damaged 4,000 others. Losses in the housing sector alone accounted for 53% of the total damage. Agricultural losses were estimated at 63% of total losses, highlighting the importance of agriculture in the economy.

To guide disaster recovery, in the wake of TCs Ian, Winston and Gita, the Tongan Government's Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications undertook its first post-disaster needs assessment training in August 2017.

According to Deputy Prime Minister Siaosi Sovaleni, Tonga reported 34 natural disasters over the 30-year period from 1983 to 2012.⁷⁶ Cost estimates for more than half of the disasters in that period weren't available, but US\$104 million in losses was a substantial underestimate of the economic impacts of natural disasters, given that TCs Ian, Winston and Gita weren't included.⁷⁷

Current Sendai application in Tonga

The Sendai Framework is a global development agenda with four priorities for action and seven targets.⁷⁸ The framework aims to better DRR over the 15 years from 2015 to 2030, reducing losses of livelihoods, lives, health and economic, physical, social, cultural and environmental assets. The four priorities for action are:

- Understanding disaster risk
- Strengthening disaster risk governance to manage disaster risk
- Investing in DRR for resilience
- Enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction.

While Tonga remains the third most at-risk country, according to the 2019 World Risk Index, it doesn't currently include references to the Sendai Framework in its DRR framework. However, the guiding priorities of the Sendai Framework are evident in the Tongan Government's post-disaster rapid assessment and updated Joint National Action Plan on Climate Change and Disaster Risk Management (JNAP 2).⁷⁹

JNAP 2 is a 10-year (2018–2028) strategic DRR plan, as is called for in the Sendai Framework targets. The original JNAP ran from 2010 to 2015. The plan has 10 guiding principles, which either directly relate to the Sendai Framework targets and goals or support them indirectly.

Principles 1, 2, 3 and 5 of JNAP 2 work towards SFDRR Priority 2, emphasising Tonga's dedication to good governance, leadership and a multifaceted policy approach. Principle 10 of the JNAP works towards supporting SFDRR Priority 1: understanding disaster risk. Increased scientific evidence and an evidence-based policy response better support an understanding of Tonga's potential for loss. Principles 5, 6 and 7 refer to community ownership; equity and fairness; and gender inclusivity. Those principles work directly to meet Priority 4 of the Sendai Framework.

The implementation of the Sendai Framework depends on strong institutional commitment and governance. The creation of JNAP 2 as an institutional framework for climate change adaptation and DRR efforts is crucial. Tonga took the next step in supporting strong governance by creating the JNAP secretariat and JNAP taskforce, to be housed under the Department of Climate Change. The secretariat will manage the iterative process of implementation and modify actions based on annual reviews. While this work directly supports Sendai Priority 2, it provides foundation support for Tongan efforts on most of the Sendai priorities and targets.

Emerging themes and challenges

The three tropical cyclones (Ian, which made landfall in Hapai'a, Winston in Vava'u and Gita in Nuku'alofa and 'Eua) highlighted many of the strengths and challenges within the Tongan DRM system. The Tongan Government secured \$US25 million from the World Bank to improve disaster management systems over three years beginning in mid-2017, before TC Gita.⁸⁰

Tonga has been a Pacific leader in implementing sustainable economic development (as outlined by the Global Green Growth Institute⁸¹) and has incorporated those economic factors into its priorities and DRR projects. Throughout Tonga's DRR discussions and post-disaster needs assessments, a major theme is the idea of 'building back better'. Following TC Ian, the focus was on green growth, emphasising building resilience through an innovative housing recovery and reconstruction program funded by the World Bank.⁸²

This program has created several opportunities to unite communities, civil society organisations and the government through joint efforts on betterment.

Communication among Tonga's many islands is an ongoing critical challenge following disasters. Following TC Ian, a state of emergency was declared on 10 January 2014, and telephonic communication to the 23 islands of Ha'apai wasn't restored until 13 January. Luckily, a phone call to Ha'apai just before the storm hit announced the arrival of the storm.

Ofa Fa'anunu, the Director of the Tonga Meteorological Service and President of World Meteorological Organization Region V, is leading a restructuring of the meteorological service. The goal is to support aviation and marine forecasting and the delivery of a multi-hazard early warning system, including tropical cyclone forecasts. Tonga's early-warning systems in TCs Gita and Winston didn't include storm surge predictions.

Both Winston and Gita highlighted the need to disseminate warnings early and to a wider audience, with a stronger emphasis on vulnerable groups. The absence of a detailed storm surge forecast may leave communities vulnerable.⁸³ A further complexity during TC Gita was the loss of the roof of the Tonga Meteorological Service building, which resulted in meteorological support being transferred to the Regional Specialised Meteorological Centre in Nadi at the height of the storm.

A multiagency effort is underway to address that shortcoming by designing and implementing an early-warning capability for tidal inundation.⁸⁴ It's supported by the World Bank Pacific Resilience Program, the Global Facility for Disaster Risk Reduction,⁸⁵ the Australian Bureau of Meteorology's Climate and Oceans Support Program in the Pacific,⁸⁶ the Secretariat of the Pacific Community, the World Meteorological Organization's Climate Risk and Early Warning System project and the University of the South Pacific.

Further reforms are underway to encourage the development of research capacity, establish meteorology regulations for quality management, cost recovery and qualifications of personnel, and improve and enhance severe weather and tropical cyclone warnings and related training. Support from Japan of up to 1.24 million pa'anga (US\$535,000) has provided equipment for the Tongan National Emergency Management Office, enabling the development of improved standard operating procedures for responses to earthquakes and tsunamis and enhanced coordination on hydrological services.⁸⁷

Recent communication capacity upgrades include Tonga's installation in 2013 of an 830-kilometre fibre-optic cable connecting Tonga to Fiji via the Southern Cross Cable, which links Australia, New Zealand, Fiji, Hawaii and the continental US. In 2018, fibre-optic cable connectivity was extended from Tongatapu to the islands of Eua, Ha'apai and Vava'u. However, the cable was accidentally severed in early 2019, underscoring the vulnerability of the communication system.⁸⁸ The much slower internet connectivity of the existing University of the South Pacific and Ezinet satellite networks couldn't provide enough backup to keep up with growing demand.

The Government of Tonga uses a cluster system as a means of coordinating disaster response. The appropriate government ministry is supported by interagency cooperation, including bilateral support from Australia and New Zealand. Following TC Gita, all coordination activities were led by a government ministry and co-led by a humanitarian agency and supported by daily coordination meetings to share information on needs and gaps and agree on common approaches and tools, including protecting gender diversity and equality in the response. Several joint sectoral meetings were held, bringing together key stakeholders in health; water, sanitation and hygiene; shelter; food security; essential services; protection; gender and inclusion; and response and recovery.

Community empowerment in disaster resilience is a priority endorsed by a growing number of organisations, including the Anglican Church, the Mainstreaming of Rural Development Innovations (MORDI) Program, Live and Learn and the University of the South Pacific's Pacific Centre for Environment and Sustainable Development (PaCE-SD).

In its report on TC Gita, the Red Cross highlighted the work of Caritas, Save the Children, Oxfam, Act for Peace, the MORDI Program (with support from CARE International and CARE Australia), the World Health Organization, UNICEF, the Food and Agriculture Organization of the UN, the UNDP, Habitat for Humanity, the International Organization for Migration, UN Women, and the UN Population Fund.⁸⁹

The youth of the All Saints Anglican Church in Fasi, building on diocese-wide youth training, received additional training and then conducted a parish-wide youth participatory self-assessment using the PaCE-SD Community Integrated Vulnerability Assessment (CIVA) tool,⁹⁰ the QGIS community disaster risk mapping tool⁹¹ and a disaster preparedness approach to map the parish's vulnerability and exposure.⁹²

Tongan youth then led the way in preparing the parish for the arrival of TC Gita. Disaster relief supplies were prepositioned, vulnerable houses were made secure, and disabled people were taken to a disaster relief centre and looked after during the cyclone. Despite extensive damage to infrastructure, no one was hurt and damaged infrastructure was made secure. Youth groups led the clean-up and mapping of damage to lay the foundation for rebuilding. MORDI leads training in food security at the community level and recently rolled out a three-phase training program for farmers in Tonga. Live and Learn provides extensive training and support to communities, building on the CIVA and QGIS toolkits and focusing on water, sanitation, hygiene, resilience and recovery.⁹³

Actionable opportunities for disaster risk reduction in Tonga

Tonga's lack of direct reference to or inclusion of the Sendai Framework makes progress towards meeting its goals and targets more difficult. However, Tonga's ongoing commitment to work on DRR and its notable compatibility with SDRRF priorities indicate its clear intention to progress towards meeting the Sendai Framework priorities. DRR and climate change are clear priorities for financial investment and capacity building and a focus of national policy.

In reviewing Tonga's existing DRR infrastructure against the Sendai Framework goals, three actionable opportunities have been identified:

1. Community preparedness training using mock drills, toolkits and the inclusion of vulnerable populations
2. An early warning system targeted at communities, particularly by expanding predictive capabilities for storm surges
3. A disaster preparedness and early-warning system back-up plan to ensure enhanced coordination of international and domestic support efforts.

Action item 1 stems from a lack of community preparedness in Tonga's villages in the wake of catastrophic tropical cyclones. While projects are underway, including the one with the youth groups from the All Saints Anglican Church, continued emphasis on gender and including vulnerable people is crucial to building back more resilient communities.

Action items 2 and 3 are the results of overlapping situations. As in much of the Pacific, Tonga's early warnings aren't designed for community use and understanding. Early-warning systems, especially in tsunami-prone areas, must include storm surge predictions. Storm surge often causes the most catastrophic damage in villages, especially if they're left unprepared without targeted information.

Item 3 has an important stand-alone focus stemming from damage to the Tonga Meteorology Service during TC Gita, which left the service unable to provide the necessary nationwide information. Tonga was dependent on neighbouring countries for early warning, updated cyclone tracking and other pertinent information for disaster planning. In order to better fortify both the meteorological system and supporting physical infrastructure, backup plans should be created and implemented in support of DRR outcomes. Support for the establishment and coordination of this continuity-planning capacity should be generated domestically, across the Pacific region and among the international community.

These actions would support Tonga's continued DRR planning, lower its vulnerability and go further towards meeting its Sendai Framework commitments. While Tonga has worked to build strong governance infrastructure, continued support and investment from external sources will be needed.

VANUATU

Dr Johanna Nalau, Rebecca McNaught and Malcolm Dalesa

Disaster context

Vanuatu was ranked at the highest risk level in the 2019 World Risk Index.⁹⁴ It's prone to various disasters, ranging from tropical cyclones to earthquakes, coupled with underlying social and economic vulnerabilities.⁹⁵ In small island developing states where people rely very much on subsistence farming, and where expected climate impacts are going to be felt first,⁹⁶ powerful cyclones damage entire socio-ecological systems, causing biodiversity loss and ecosystem degradation and simultaneously damaging people's livelihoods in the short and long terms.⁹⁷

Indeed, faced with a potential increase in the intensity of extreme events, exposure to significant disaster impacts has the potential to become the new normal. This puts at risk a number of key goals and targets such as those of the Sendai Framework⁹⁸ and the newly agreed SDGs, and the extent to which national adaptation plans can realistically progress climate adaptation and work towards the global adaptation goal.

This section focuses on the current use of the Sendai Framework in the Republic of Vanuatu in guiding DRR processes and efforts, and the extent to which the framework is able to respond to local needs. It first looks briefly at the history of DRR in Vanuatu and major programs and disasters, and then at the different scales involved in DRR and how they reconcile global frameworks with local needs. In conclusion, we explore the potential for integrating the Sendai Framework, the Paris Agreement and the SDGs as a way forward to support DRR at all scales in national and local contexts.

Vanuatu has a long history of DRR, including both formal programs and practices stemming from indigenous and traditional knowledge. Despite that history, TC Pam in 2015 was the country's first Category 5 cyclone and resulted in unprecedented damage.⁹⁹ It drastically reduced food security in communities mostly dependent on farming and livestock.

For example, on Emau Island, communities had to switch from land-based livelihoods to fishing because of extensive damage to livestock and farms.¹⁰⁰ On Tanna Island, communities faced the reduced availability of traditional medicinal plants, good-quality produce and traditional building materials.

In extreme weather events, Vanuatu's economic dependence on overseas tourism causes great losses at the national level. For example, the economic impact of TC Pam was equivalent to 64.1% of GDP.¹⁰¹ Non-economic losses are still poorly understood but critical, given that 60% of the population lives in rural areas in a non-cash economy.

National, provincial and local policies, needs and responses

In Vanuatu, the Sendai Framework is being implemented by the establishment of national systems and supporting structures that consider disaster risks from multi-hazards at all governance levels. In 2016, Vanuatu launched its National Climate Change and Disaster Risk Reduction Policy, which was designed to align with the Sendai Framework. The lessons from TC Pam highlighted the need to revamp institutional arrangements, processes and mechanisms to mitigate the substantial wide-ranging impacts of another severe cyclone or other disaster in the future.

Vanuatu is starting to use the online reporting tool, the *Sendai Monitor*, to track progress on achieving indicators set by the framework.¹⁰² This also tracks disaster losses and links with the new FRDP. One result should be more evidence-based, risk-informed decisions on DRR strategies while linking with the SDGs. The Sendai Framework refers to the importance of traditional, indigenous and local knowledge, which is particularly important in Vanuatu.

Priority 1: Disaster risk management should be based on an understanding of disaster risk

Caritas Australia works with the Diocese of Port Vila, where children are learning about DRR and emergency management through songs and nursery rhymes.¹⁰³ This partnership also works to secure at least two water resources that can be accessed during natural disasters in each community. Projects by CARE on gender equity in DRR, trialling new disease-resistant crops and conducting disaster training for communities and local government staff strengthen the options available for risk understanding, prevention and mitigation.

Additionally, the Climate Services Division (under the Meteorology and Geo-hazards Department) in collaboration with the Pacific Climate Change Science Program, funded by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), and the Red Cross developed the Cloud Nasara animation-based toolkit.¹⁰⁴ This innovative approach has helped to educate a broad range of audiences on the complexities of risks posed by the El Niño – Southern Oscillation phenomenon. In 2016, the Pacific Risk Tool for Resilience (PARTneR) project,¹⁰⁵ with technical assistance from the National Institute of Water and Atmospheric Research (New Zealand), piloted the RiskScape tool.

This initiative, with the National Disaster Management Office (NDMO) as the lead implementing agency, worked with several government and civil society agencies to tailor the application of RiskScape in three case studies involving ash fall, tropical cyclones and drought. The pending second phase of PARTneR will combine hazard and asset data to inform risk reduction decision-making.

Priority 2: Strengthening disaster risk governance to manage disaster risk

Vanuatu developed its National Vulnerability Assessment Framework in 2017. The framework is intended to facilitate a more systematic and robust analysis of climate and disaster vulnerability data using multiple sources and methods for more effective resilience decision-making, planning, project prioritisation and financial allocation at the national and subnational levels.

Strengthening disaster risk governance is of ongoing importance, as demonstrated through TC Pam. Many NGOs work closely with communities and can articulate local needs to improve DRR.

Vanuatu's Risk Governance Assessment¹⁰⁶ and 2019 budget policy recognise the critical role of disaster risk governance in government planning and budgeting. Additionally, the Department of Local Authorities has put together subnational risk-informed development planning guidelines, which were endorsed in 2017. New local council administrators must be trained on the guidelines, which cover the core elements of risk-screening community development priorities and the subsequent implementation of risk-informed development projects.

Legislative changes to institutionalise disaster and climate change committees, and clusters at the municipal, provincial and community levels, are being undertaken through the Disaster Risk Management Bill, which is currently before parliament. The government, through the NDMO, has for many years collaborated with donors, civil society organisations and private-sector partners to establish disaster governance structures. The Bill will give further legality to on-the-ground DRR-related practices and structures.

Partners have collaborated with the Vanuatu Government to support the development of a climate change and DRR vocational course. Delivered by the Vanuatu Institute of Technology, this program aims to produce a pool of trained personnel with the capacity to undertake DRR measures at the community level. The training program is now into its third cycle.

Priority 3: Investing in disaster risk reduction for resilience

Many elements mentioned under other priorities are also key to disaster resilience. Financial protection mechanisms are presently operational at the national level. Vanuatu has been part of the Pacific Catastrophe Risk Insurance Pilot since 2013.¹⁰⁷ The pilot aims to aid access to immediate relief funding after disasters. The program works as part of an integrated strategy for national disaster risk financing and lowers the costs of catastrophe coverage for participating countries. It has helped the government to meet financial costs arising from TC Pam, especially where public infrastructure is concerned.

The 2017–18 Ambae volcanic eruption involved the rollout of a cash transfer program, led by Oxfam Vanuatu, to help displaced people buy local goods from local markets to meet their priority needs. This approach is now being piloted to cover financing for longer term recovery at the individual household or community level. While the people of Vanuatu are yet to fully embrace insurance, the government is examining the application of a market-based micro-insurance system. In 2015, Vanuatu, supported by the Global Facility for Disaster Risk Reduction and Recovery, conducted a post-disaster needs assessment following TC Pam that mobilised much-needed recovery funding.

The private sector has been engaged only in an *ad hoc* fashion. This gap was more pronounced during TC Pam, when the private sector struggled to cooperate in response efforts. Accordingly, in 2017, with the support of partners such as GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit) and the UNDP, the Vanuatu Chamber of Commerce and Industry established the Vanuatu Business Resilience Council.¹⁰⁸ The council aims to strengthen the capacity and coordination of private-sector efforts in disaster preparedness, response and recovery, and there's now enhanced engagement in DRR-related policy discussion.

Priority 4: Enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction

In Vanuatu, emerging research points to a disconnect between more remote island communities and provincial and national governments in cases where, for example, local evacuation centres weren't available in local communities.¹⁰⁹ While decision-making at the local level on disaster planning and risk continues to rely heavily on village chiefs and the Council of Chiefs, much more needs to be done to enable women's participation. Equal participation is key in enhancing effective responses and enabling greater resilience in the recovery, rehabilitation and reconstruction of damaged assets.

For preparedness, service clusters usually undertake simulations and disaster planning, with oversight from the NDMO. This has usually taken place prior to the cyclone season. More recently, with leadership and support from the Red Cross, multi-hazard planning has been undertaken. This is on the back of multiple events during 2017–18, such as TC Hola, TC Donna and the Ambae volcano eruption. Additionally, a number of partners (NGOs or donors) have been active in developing provincial and community disaster action plans. Domestic resourcing for risk prevention and reduction is negligible at the subnational level.

Nationally, the government is developing the National Disaster Recovery Framework to better integrate recovery into development to support building back better. There's a National Recovery Committee, established in 2015 and chaired by the Department of Strategic Policy Planning and Aid Coordination. However, some human and technical capacity issues need to be addressed in order to advance the goals of the National Disaster Recovery Framework. Such deficiencies might be usefully supported by capacity gap analyses and longer term targeted donor support.

The road forward: integration with climate change adaptation and the Sustainable Development Goals

There's now common agreement that DRR needs to be integrated with other policy agendas, such as those of climate adaptation and the UN SDGs.¹¹⁰ Hence, the implementation of the Sendai Framework needs to be situated in the everyday realities of small island nations, where policy agendas demand closer integration to deliver multiple benefits.

In Vanuatu, this has led to joint approaches and closer inter-ministerial collaboration to enhance the implementation of the Sendai Framework by linking it to climate adaptation and the SDGs. Failure to integrate 'day-to-day' development decisions (for example, on the construction of infrastructure, agricultural production and private-sector tourism investments) puts them at greater risk of being undermined by climate and disaster threats.

In parallel to the specific policy considerations contrasted against the four priorities of the Sendai Framework above, Vanuatu has recognised the inefficiencies of separating these key areas and has worked towards integrating climate change adaptation and DRM in the context of development under the FRDP. For example, Vanuatu brought together the NDMO and the departments of Energy; Environment; Meteorological and Geohazards; and Climate Change in the Climate Change Ministry.

Concurrently, the National Advisory Board (which includes private-sector and civil-society representatives) was established to review climate change and DRM project proposals, as well as to bring together government ministries affected by climate change and disasters.¹¹¹ The national Climate Change and Disaster Risk Reduction Policy was endorsed in 2016, and the National Policy on Climate Change and Disaster-Induced Displacement in 2018. These moves have brought a focus on integration, but they still fall outside the core budget functions of central government agencies such as the Department of Strategic Policy Planning and Aid Coordination, and the Ministry of Finance and Treasury, perhaps perpetuating the segregation of development from climate change and disaster policies. Including the funding needs of those policies as part of centralised budget planning would be a useful and timely step.

In alignment with the SDGs, the creation of Vanuatu's sustainable development plan (the Vanuatu People's Plan 2016–2030) in 2016 provided a specific pillar for the environment, with the goal of 'A strong and resilient nation in the face of climate change and disaster risks posed by natural and man-made hazards'.¹¹²

The Monitoring and Evaluation Framework published in 2017 also sets out how central government ministries require government ministries to report on the outcomes of the People's Plan, including indicators related to 'Proportion of government ministries with policies, budgets, and legislation for [climate change and] DRM', and on a range of climate change and DRM actions. These requirements from central government, and ultimately the Treasury, for the inclusion of climate and disaster considerations throughout line ministries promote a new level of integration in Vanuatu.

Given significant agricultural losses associated with recent disasters such as TC Pam, the dry conditions brought about by the 2016 El Niño event, and the Ambae eruption, the agriculture sector has made significant inroads in integrating climate and disaster considerations and in increasing food security.

At the institutional level, a Risk and Resilience Unit was established within the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity. Posts in the unit are dedicated to running the ‘food security cluster’, which is a coordination mechanism under the Vanuatu cluster system. This cluster has brought about increased coordination between governments and supporting agencies such as donors, UN agencies, NGOs and the private sector in times of disaster, but also in peacetime. Evaluations have shown that food security efforts buffered some communities in the wake of TC Pam.

Conclusions

While significant progress has been made in implementing Sendai Framework commitments, there’s still much to be done. Work already undertaken to improve understanding of disaster risk through extensive hazard maps and enhanced weather and climate information needs to link more substantially with development investments and decision-making processes. Examples include improved linkages with urban planning and approvals processes and the institutional adoption of risk management beyond donor-required risk management (which not all donors require). Such an approach leverages existing international and domestic funding for the purposes of risk reduction, which is much more likely to be palatable in constrained domestic budgets.

Acknowledgement

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SAMOA

Filomena Nelson

Background

Samoa, like many other PICs, has a long history of being subject to natural disasters. Those disruptions and the effects of climate change have taken a toll on its regional development agenda. Its geographical location and physical environment make the country susceptible to a range of natural and human-induced hazards. Its proximity to the Tongan Kermadec Trench and its position in the middle of the world's most active seismic zone (the Ring of Fire) increase its vulnerability and exposure to the ever-present threat of earthquakes, tsunamis and volcanic eruptions.

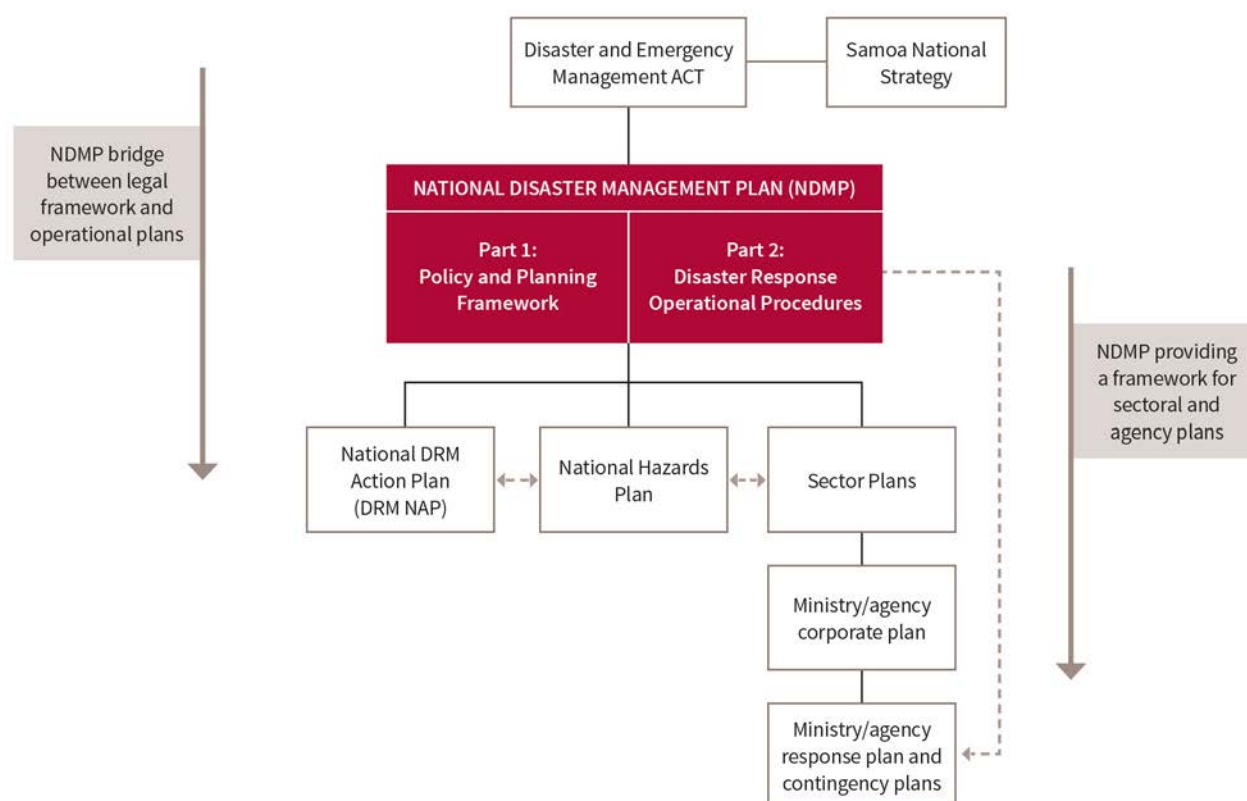
Samoa is experiencing more frequent and severe weather and climate events, such as floods, cyclones and prolonged periods of reduced rainfall and a subsequent increase in fuel loads, leading to more frequent forest fires.¹¹³ Other ever-present threats are from biological hazards and environmental crises due to invasive plant or animal species and disruptions to major essential services over a long period. Additionally, its economy remains vulnerable to external economic shocks.

In 2009, Samoa was severely affected by a tsunami generated by a magnitude 8 earthquake at the Tonga Trench.¹¹⁴ Total direct damage and economic loss amounted to approximately US\$124 million and a death toll of 149.¹¹⁵ Three years later, category 4 TC Evan struck Samoa while the country was still recovering from the effects of the tsunami.¹¹⁶ More recently, TC Gita struck in early 2018, and there have been floods during every wet season.¹¹⁷

The Samoan Government has been quite responsive to these events. It has progressed through three iterations of its National Disaster Management Plan (NDMP). The current plan (2017–2020) is aligned to the SFDRR¹¹⁸ and the FRDP.¹¹⁹ The Disaster Management Act 2007 and the National Disaster Risk Management Action Plan¹²⁰ (currently in its second iteration) provide actionable and implementable guidance for implementing the NDMP as well as a results-based monitoring and evaluation framework.

The focus of the current NDMP is on mainstreaming and enhancing the coordination of government agencies, communities, civil society organisations, NGOs, the private sector, development partners and donors. It employs a whole-of-country and multisectoral approach to implementation, seeking to normalise DRM across all sectors and communities. Figure 1 shows the linkages of the NDMP to the National Sustainable Development Framework, as well as to plans by sectors and line agencies.

Figure 1: National Sustainable Development Framework



Source: Samoan Government, National Disaster Management Plan (2017–2020).

Under the leadership of the Disaster Management Office (DMO), Samoa is working in close collaboration with sectors, response agencies, civil society organisations, NGOs, the private sector, communities and development partners and is progressing well with the implementation of its DRM National Action Plan.

The focus of implementation is on mainstreaming DRM across all 14 development sectors (health; education; tourism; agriculture; energy; finance; transport; communication; water; community; environment; commerce and industry; law and justice; and public administration¹²¹), building their capacity to support the implementation of risk-informed sector strategies, and getting communities ready to self-mobilise and respond to disasters through the development of village disaster preparedness and response plans.

Further emphasis is on practising drills and training in basic skills to support village-wide warning and evacuation protocols, search and rescue, damage assessment and emergency sheltering of displaced villagers. In addition, Samoa is improving its multi-hazard early-warning systems through the installation of more seismic and weather observation systems, resilient communication systems and warning-dissemination pathways using smart technology and public outreach.

Emerging trends in Samoan disaster management include the following:

- **Enhancing the capacity of village communities to self-mobilise and respond to disasters** through a dedicated program called Community Disaster and Climate Risk Management.¹²² Past disasters have shown that well-informed and prepared communities with strong community leadership and effective internal collaboration contribute to a disaster readiness and resilience.

The program, which was developed in 2010 with funding from UNESCO, is now delivered in more than 50 village communities, and more donors and development partners are taking an interest and offering financial resources

to support nationwide delivery. The implementation of the program uses a multiagency approach to facilitate its introduction and focuses on a range of village-based practices, such as risk identification and mapping and the identification of roles and responsibilities under the four phases of DRM (the development of village disaster plans; the establishment of village committees; the training of village response teams; and the testing of their plans, skills and knowledge through drills). The program can be easily adapted and replicated across the Pacific (Tokelau is the first PIC to implement it on all its atolls).

- ***Building risk knowledge through focused hazard, vulnerability and risk assessments and mapping*** at sectoral and location-specific levels. Because of the importance of risk information for decision-making and planning, this type of work is gaining momentum in Samoa. The DMO has taken the lead with support from sectors to conduct sector- and location-specific assessments to inform sector strategies and interventions for implementation in the immediate and long terms. The information is also used to inform communities of localised impacts related to those risk exposures through the Community Disaster and Climate Risk Management Program.

The work also includes building risk information databases and training users of risk data and information on the use and application of the information through their day-to-day work. The involvement of sectors and government line agencies is also helping break down barriers to access to sector-specific data and information, which have always been a problem in Samoa and other parts the Pacific region.

Developing maps and identifying critical infrastructure and services that are exposed have helped sectors and line ministries, communities and the private sector to plan and make decisions on investments and risk mitigation. Collaborating with the Bureau of Statistics and using household codes and coordinates to pinpoint vulnerable household locations is another method that's frequently used in mapping hazards and risks. The National Risk Assessment Standard was developed and endorsed in 2017 to guide the implementation of risk assessments to ensure that a standard method is applied and to guarantee the consistency of risk data and information.¹²³

- ***The use of smart technology for warning and information dissemination integrating traditional social networks*** is another area that's getting traction in Samoa. The Samoa Meteorology Office has recently developed a mobile application for Android smartphones, which are widely used in Samoa (and intended for use by other Pacific meteorology offices) to access daily public weather reports as well as near real-time warnings and advisories of severe weather, earthquakes and tsunamis.¹²⁴ Social media are also being used regularly to push out warnings and information and are monitored by dedicated staff in both the Meteorology Office and the DMO.

More observation equipment for weather, sea and river levels and seismic activity has continued to be installed in high-risk areas of the country. A digital end-to-end emergency communication system was commissioned following TC Evan in 2012 and is currently being used on daily basis by all emergency services in Samoa, enabling cost and resource sharing among those agencies in using and maintaining the system and strengthening the emergency management alliance in the country.

- ***Post-disaster displacement and resettlement*** is another area that's becoming a frequent topic in the DRM space. The tsunami in 2009 and TC Evan in 2012 triggered a rethinking of approaches to accommodating and catering for the needs of displaced people and resettlement afterwards.

At-risk households were asked to move to homes of relatives and friends in safe areas before considering being accommodated in public evacuation centres. In the rural coastal areas, families opt to move and resettle inland using land previously used for agriculture, while in the Apia urban area some leave their normal residences while others with adequate resources have bought land further inland as the fear of similar events occurring in the future lingers in their minds.

The government has started a consultative process to address how loss of land due to coastal erosion and inundation will affect where people will live and how this will be implemented. This issue needs to be continually deliberated and addressed in the context of Samoan culture and sovereignty in anticipation of more severe impacts of climate change projected in the future. Land is sacred and symbolic of the Samoan people's identity and culture and is critical to Samoa's existence as a sovereign nation.

- **Mainstreaming DRM** so it becomes part of normal business planning along with the allocation of resources to support implementation through national and local budgets is also another area that's gaining wider support within government. A *Mainstreaming DRM guide* was developed and endorsed by the central government in 2017, and work is underway to enhance its use through sector-wide strategies, programming and budget allocations.¹²⁵

This normalisation practice also requires periodic monitoring and evaluation, and a simple system has been developed and tested to do that. The results will help in identifying gaps, strengths and areas that need more attention. DMO staff are dedicated to look after one or two sectors and work closely with sector coordinators to do this work.

The challenges of limited technical and financial capacity continue to hinder the implementation of DRM in Samoa. Efforts to enhance collaboration and forge new partnerships to address some of the capacity gaps are ongoing. Increasing private-sector engagement and encouraging investment in resilient business infrastructure to ensure continuity of services will require innovative approaches.

- **Samoa's small land mass** requires detailed land-use and infrastructure planning that considers exposure to hazards and vulnerabilities as well as traditional affiliations. Traditional land ownership and custodial arrangements dictate how land is used, whether it be for settlement, agriculture, commercial use, conservation or infrastructure for lifeline services such as roads, communication, power, water and warning systems.

The high cost of compensation to landowners and uncertainty about whether landowners would relinquish part of their land to allow for risk-informed land-use planning and infrastructure construction may result in costly solutions and will require stronger collaboration with landowners.

Sustained funding for the maintenance of supportive technology and equipment remains an ongoing issue, as does ensuring that spare parts and technical expertise are readily available. Staff turnover and the allocation of dedicated staff for sustaining the momentum of best practice and post-disaster work is also a continuing challenge. The completion of targeted needs assessments followed by a commitment to address any identified capability and capacity gaps should assist in this challenging situation.

The fit of the Sendai Framework in the context of Samoa

The Sendai Framework is very comprehensive and entails several practical actions and measurable targets at national, regional and global levels. National-level actions can be adapted to suit national situations and needs, but applying them further at provincial and local levels will require further finetuning to suit culture, traditions, capacities, capabilities, laws, policies and institutions.

The main concern for Samoa (and probably for other PICs) is the burden of implementation, monitoring, evaluation and reporting without enough people, capacities and resources.

What Samoa has done is to develop its own framework that fits its context and needs but is aligned to the spirit, objectives and principles of the SFDRR as well as the SDGs, the SAMOA Pathway, the FRDP and other relevant global and regional frameworks.

One gap of note is that the SFDRR 'Words into action' guideline, although comprehensive and simple to follow, doesn't have a practical guide on the 'displacement, relocation and resettlement' of people; nor does it provide a relevant case study on this area.¹²⁶ This aspect of the guideline is too focused on cities and big countries and lacks detailed guidance for small island states such as Samoa and other PICs.

Full use of the *Sendai Monitor* will require significant capacity building for Samoa and other PICs.¹²⁷ Training is needed to support countries on what data to collect, its cleansing and disaggregation, and the use of methodologies for data analysis. Collecting data to suit the indicators might be a challenge, as definitions of 'damaged dwellings',

for example, aren't the same, and therefore might lead to confusion and under- or overestimation of damage and the costs of losses. Trialling the monitoring process with full engagement of the PICs in planning an application is imperative.

Use of the Sendai Framework and doable actions into the future

The Samoan NDMP is 'aligned' to the SFDRR objectives, outcomes, principles and actions. It's also referenced in many research papers, reports, frameworks and funding proposals to reflect the alignment of those documents to the SFDRR goals and objectives.

The SFDRR objectives are being used to guide reviews of legislation, policies and institutional frameworks, such as the recent functional and institutional review of DRM and climate change in Samoa to inform a realignment of government functions to improve efficiency and effectiveness and to identify services that could be privatised. It has also been used to inform the development of the Samoa Meteorological Services Bill that's currently under development.¹²⁸

Three suggested options for enhancing DRR in Samoa are as follows:

- **Refocus global implementation guidelines** to regional, national and local contexts to enable small island developing states¹²⁹ and least developed countries,¹³⁰ particularly PICs, to implement the SFDRR. Their capacity limitations and need to have the right technical people to do the work will also require trialling the application of downscaled guidelines to help them incorporate, align with and adapt the SFDRR and its actions, goals and targets.
- **The UNDRR should strengthen partnerships** with Pacific intergovernmental organisations mandated to work with PICs in DRM and climate change, such as the Secretariat of the Pacific Community and the Secretariat of the Pacific Regional Environment Program, to jointly implement synergies between the SFDRR and the FRDP in a way that works well with PICs' resources and needs to support the enhanced national implementation of both.
- **Develop and trial an SFDRR- and SDG-aligned monitoring, evaluation and reporting system** for small island developing states and least developed countries to reduce the burden of reporting and the cost of conducting reviews of global and regional frameworks and multilateral agreements on DRM, climate change and sustainable development. The Secretariat of the Pacific Community, the Secretariat of the Pacific Regional Environment Program, the Pacific Islands Forum Secretariat, the Pacific Resilience Partnership and PICs are working together to develop the FRDP monitor. The monitor will be aligned to the *Sendai Monitor* and the SDGs. Trialling the regional monitor to ensure that DRM and climate change focal points and stakeholders can use it to inform further improvements is critical.
- **Promote the SFDRR and the Sendai Monitor** through regional and national DRM and resilience platforms and other relevant regional events, such as through the biennial Pacific Resilience Meeting, as important opportunities for enhanced awareness of the SFDRR.

A final issue to be noted is that Samoa has its own DRM programs and frameworks for which it's obligated to promote and develop capabilities and capacities. While the Sendai Framework is a very useful guide to actioning DRR, its full adoption isn't yet a norm, although some countries have signed off on the framework.

FIJI

Anna Schimel

Historical context

Fiji, an archipelagic nation of 322 inhabited and uninhabited islands, is 3,150 kilometres northeast of Australia. The country is a volcanic island chain with elevations up to 1,324 metres. However, most of the country's population of 884,887 (2017 Census) live in coastal areas under 5 metres above sea level. Fiji's largest urban centres—Suva and Nadi—are on the coast and house 55.9% of the population.¹³¹

The geography and population distribution of Fiji leave it prone to natural disasters and their catastrophic impacts. Fiji faces many climatic changes and natural disasters, the main three of which are rising sea levels, ocean acidification and tropical cyclones. The tropical cyclone season usually runs from mid-November to April, averaging two major cyclones per year. However, tropical cyclones have occurred in every month of the year. Rising sea levels will further increase the catastrophic impacts of cyclones as a result of storm surge and flooding. By 2050, it's predicted that extreme weather events may cause up to a 6.5% loss of Fiji's GDP annually, but recent tropical cyclones have already exceeded that loss projection.¹³²

While predictions suggest that the frequency of storms might not increase as a result of climate change, tropical cyclones are predicted to increase in severity. Maximum wind speeds and rainfall are expected to increase under climate change. Damages will be exacerbated by a reduction in the translational¹³³ speed of tropical cyclones, resulting in greater destruction as they pass through more slowly.

Sea-level rise is a defining issue for PICs. As sea levels rise, storm surges intensify to inundate areas further inland, expanding the scope of damage. The Fijian Government considers the relocation of houses and villages following disasters to be a viable option to support resilience.¹³⁴ To date, three full village relocations and two partial relocations have taken place. More relocations are underway, and 42 villages are marked for future relocation. The government has published *Planned relocation guidelines: a framework to undertake climate change related relocation* to guide national and local planning.¹³⁵

Fiji has experienced two record-breaking tropical cyclones in the past eight years. TC Evan, a category 4 storm in 2012, is considered one of the worst in Fijian history. Economic losses were estimated at F\$194.9 million (US\$88.8 million), or approximately 2.6% of Fijian GDP. While TC Evan was very destructive, February 2016 brought TC Winston, which shattered previous records. It peaked as a category 5 storm, with a direct hit on Fiji. Wind speeds reached 233 kmh, and gusts reached 306 kmh. TC Winston was the strongest recorded storm in the Southern Hemisphere.¹³⁶

TC Winston tested and changed disaster policies that Fiji had in place. Sixty-two per cent of the Fijian population (540,400 people) were affected by the cyclone and subsequent cascading effects. Eighty per cent of the population lost power, even in areas not directly hit by the storm.¹³⁷ Approximately 30,000 houses, 500 schools and 90 health

centres were severely damaged or destroyed. The power grid for Viti Levu, Fiji's largest and most populous island, is dependent on remote inland transmission lines extending from the World Bank funded Monasavu hydroelectric dam. Damage to the transmission lines compromised the Viti Levu power grid following flood damage in March 2012 and damage from TC Winston in February 2016.¹³⁸

The final death toll for TC Winston was 44 people, not including mortalities related to exposure because of infrastructure loss and post-cyclone diseases (such as leptospirosis, dengue fever and Zika virus).

The economic impacts of TC Winston were vast and estimated to be F\$1.99 billion (US\$865.7 million), of which F\$1.9 billion was in damage and the rest from losses. The economic damage amounted to approximately 20% of Fiji's GDP.

While TCs Evan and Winston were the most damaging, Fiji experienced more than 100 natural disasters between 2009 and 2016. In 2018, TCs Josi and Keni struck Kadavu, resulting in nine deaths and the displacement of more than 8,000 people.¹³⁹

In the wake of TCs Evan and Winston, the Fijian Government undertook post-disaster needs assessments (PDNAs) to better guide disaster recovery.

Emerging themes and challenges

In the wake of recent tropical cyclones and other storms across the Pacific, consistent themes and challenges have become apparent. TC Winston highlighted many of the strengths and challenges within the Fijian DRM system.

The global climate change leadership of Fiji and the other PICs is incorporated into the priorities of their DRR projects. Throughout Fiji's DRR discussion and PDNAs, a major theme is the idea of 'build back better': rebuilding resilience against future storm events, and rebuilding communities and infrastructure to reduce future storm vulnerability and improve living conditions while honouring Fiji's green growth framework.

Rebuilding is required at the community level and the institutional level. Creating resilient institutional infrastructure and processes for future storms is highlighted in Fiji's DRR goals.

A critical challenge faced by Fiji and other PICs at the community and institutional levels is communicating disaster risk information to the population. While storm categorisation is understood by the Fiji Meteorological Service and DRR professionals, it holds little meaning to those most affected by storms. TC Winston was the first category 5 storm many Fijian communities had ever experienced. Hurricane Bebe in 1972 was a category 3 tropical cyclone that made landfall in Tuvalu and the Gilbert Islands as well as Fiji.¹⁴⁰ Many previous catastrophic storms have begun to fade from generational memory. Those who received early warnings of a category 5 storm approaching had little understanding of the implications of a tropical cyclone of that magnitude.

The Fiji Meteorological Service forecast emphasised wind strength but gave no accompanying information on storm surge and tides. Community feedback indicated that, while people were prepared for potential destructive wind forces, they were unprepared for the storm surge. Without consideration or understanding of the impact of a significant storm surge, coastal community evacuation centres and supplemental housing were compromised.

Currently, the Fiji Meteorological Service's early warnings don't include storm surge predictions. The absence of this detail may leave communities vulnerable. Forecasts of storm timing and tropical cyclone track are provided, but the process for releasing the forecast can be slow, resulting in delays to preparations. TC Winston highlighted the need to disseminate warnings early and to a wider audience, with a stronger emphasis on vulnerable groups.

Fiji has placed a strong emphasis on outreach to vulnerable population groups for both preparation and rebuilding, as is highlighted in section 4 of the TC Winston PDNA and work conducted by the Pacific Council of Churches, Fiji Red Cross and the Pacific Disability Forum, among others.

While DRR in Fiji has continued to be a government priority, certain vulnerabilities continue to be hurdles. A major factor is that 80% of citizens on small islands live within coastal erosion and flood zones and have significant exposures to inclement weather.

Many of Fiji's DRR activities rely on flows of external investment, which may come with sets of expectations and be linked to priorities defined by donor investors. There's a potential that, in negotiating the means for a 'best fit' between local needs and federal government including other competing priorities, implementation may be slowed without full community buy-in.¹⁴¹

The Sendai Framework centred on the global development agenda with four priorities for action and seven targets. The four priorities for action are:

1. Understanding disaster risk
2. Strengthening disaster risk governance to manage disaster risk
3. Investing in DRR for resilience
4. Enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction.

The framework aims to enhance DRR globally over the 15 years from 2015 to 2030 by promoting the reduction of losses of livelihoods and lives and impacts on health and economic, physical, social, cultural and environmental assets.¹⁴² The framework's priorities and targets are useful guides for DRR projects, nationally and locally. The four priorities remain broad enough to allow for local application and adaptation, with certain country-specific challenges.

For Fiji, the Sendai Framework guidance is consistent with national priorities because of the increasing severity of tropical storms and growing climate change impacts in local communities. Unlike in some regions, most Fijians live in areas that are vulnerable to disasters, whether they be floods or tropical cyclones.

The high exposure of the Fijian population makes the Sendai targets more difficult to achieve. Many PICs have limited usable land to use for infrastructure development or the relocation of populations. Fiji is no exception in that regard.

However, the priorities are applicable as guidelines for DRR community projects. As noted in the previous section, risk communication has been a barrier to building strong DRR pathways for local communities. Priority 1 is especially applicable and aligned with local needs for Fiji: understanding vulnerability, capacity, exposure, hazard characteristics and the environmental context are crucial for planning, preparation and post-disaster response.

For Fijian communities, a more detailed understanding of vulnerabilities and potential disaster impacts can lead to better placement of evacuation centres and temporary shelters, further outside of wind and storm-surge damage zones. Understanding potential losses and their locations can inform communication strategies and strengthen resilience planning for the provision of crucial community health and educational infrastructure. This is a key challenge highlighted in both the TC Winston PDNA and Priority 4 of the Sendai Framework. The post-Winston rebuilding of schools and health centres is being supported by a long-term recovery investment of \$20 million from the Australian Government.¹⁴³

Language differences are also a barrier to successfully implementing Sendai priorities 1 and 4. The country has three predominant languages: iTaukei, Hindi and English. This 'nuance' is a crucial factor for planning and delivering risk communication and local disaster preparedness and should be addressed in implementation efforts.

The full intent of Sendai priorities 2 and 3 isn't as easily applied in the Fijian context. Fiji's last National Disaster Management Plan was created in 1995. Despite increased DRR projects and investment within the country, no updates to national frameworks or legislation were carried out in the following 20-year period.¹⁴⁴ A review of the

1995 plan, funded by the European Union, was commenced after TC Winston in coordination with the International Federation of Red Cross and Red Crescent Societies and the Building Safety and Resilience in the Pacific project.

While national policies are aimed at investing in DRR, as described in Priority 3, Fiji's resources for internal investment are limited. Its reliance on external and international investment for infrastructure and resilience projects has grown, given the limitations of the local public and private investment resource base.

Current predictions of Fiji's expected average losses due to earthquakes and tropical cyclones run to F\$158 million (US\$72 million).¹⁴⁵ By comparison, in 2017–18, Fiji's largest foreign aid investor (Australia) provided investment support of approximately F\$92.5 million (A\$63 million).¹⁴⁶

Priority 4 guidance is timely and appropriately aligned with local needs. However, vulnerable populations, such as people with disability, youth, women and the poor haven't been adequately incorporated into previous response and reconstruction plans. Fijian village structures continue to be primarily patriarchal, but women's leadership in DRR and climate change projects is increasing and they're emerging as a crucial component of a more comprehensive approach to building back better.

As a developing country, Fiji relies on coordination with foreign aid organisations, the International Federation of Red Cross and Red Crescent Societies, the Pacific Council of Churches, associated churches, the Pacific Disability Forum and local university support through the University of the South Pacific, which offers postgraduate courses in climate change and disaster risk resilience.

Current Sendai Framework application

In the wake of TC Winston, Fiji was recognised as Sendai Target Champion in DRR by the UNDRR for its reduction of the mortality rate in the wake the cyclone and for working to meet the Sendai target to globally reduce disaster mortality by 2030.

The TC Winston PDNA was executed by the Fijian Government in coordination with the Asian Development Bank, the Australian Government, the EU, the UN and the World Bank, among others. The Sendai Framework was only briefly mentioned in the report, as the framework had been adopted only 10 months earlier.

Despite the lack of direct reference to the Sendai Framework, the PDNA targets and priorities, such as 'build back better', were reflected in the content and structure of the report. The notion of building back better promotes the reduction of pre-existing vulnerability, improved sustainability and improved living conditions.

The PDNA focused on a long-term vision to rebuild, keeping in mind future disaster resilience. Building back better was highlighted 45 times throughout the report. The emphasis on this strategy further highlights Fiji's commitment to aligning with major Sendai Framework themes. The PDNA provided the opportunity to better assess national strengths and weaknesses in disaster risk understanding (vulnerability, capacity, exposure), current DRR governance structures and required future investment areas.

Many of the Sendai targets were directly addressed in the review, including:

- Reduce disaster damage to critical infrastructure and disruption of basic services, especially health and educational facilities (Sendai priorities 2 and 4; TC Winston PDNA, section 3.2)
- Leadership and outreach from women and persons with disabilities, to enhance inclusion and gender equity of DRR (Sendai Priority 4; TC Winston PDNA, section 3.4.2)
- Increase the availability of and access to multi-hazard early-warning systems and disaster risk information and assessments (Sendai Priority 2; TC Winston PDNA, sections 4.4–4.7).

While the PDNAs made after TCs Winston and Evan are detailed and honest, they don't provide a long-term national framework for DRR. To ensure continuity of the plans detailed in the TC Winston PDNA, developing and implementing a long-term framework is critical, supporting global efforts to meet Sendai's Priority 2. The TC Winston PDNA has created a strong foundation to build on.

The Sendai Framework aligns well with Fiji's needs and priorities, leaving enough flexibility to allow for local adaptation and implementation. Local nuance and context are crucial considerations for sustainable local planning, and the framework provides 'big picture' guidance.

While Fiji has made DRR a priority out of necessity, it's addressing other issues and supportive practices ranging from the management of foreign investment to risk communication, early warning and local-level vulnerability assessments.

The approval of a new national disaster plan will allow for foreign investment opportunities and smoother implementation of DRR projects. One barrier to this has been turmoil in government and power shifts (Fiji has had two coups since 1995). Furthermore, the amount of information, international guidelines (including the Sendai Framework) and technical support for DRR has increased significantly in the past five years. The Sendai Framework priorities and targets can serve as an outline, but the emphasis will be on the action points identified in the TC Winston PDNA.

Communicating and understanding risk and uncertainty, especially at the local level, was a major challenge highlighted in Fiji's disaster assessments. Risk communication is a global barrier to community resilience. In Fiji, streamlined communication dissemination is lacking, in part due to lack of infrastructure and investment. Mock-disaster drills are an effective tool to help local understanding of disaster impacts and required levels and types of risk communication. The drills encourage the community-based customisation of disaster planning tools, taking into consideration the community's unique geographical and social context. The drills also provide an opportunity for community feedback on existing disaster policies and planning.

The disaster drills, completed in coordination with the NDMO and partner organisations, such as the Red Cross and the Pacific Disability Forum, provide mutual benefits for organisers and communities, including increased dialogue and effective engagement at the local level on DRR needs. Resulting improvements in risk understanding and planning are a crucial step in defining needs for communication infrastructure and early-warning content.

There are gaps in Fiji's current early-warning system, which isn't currently fully effective in reaching all necessary people. The process of executing warnings is slowed by the number of parties involved in creating and delivering the crucial information. Beyond just local players, much of the data used for Fiji's warnings is from international bodies or neighbouring countries. The system lacks a streamlined compilation of information and dissemination. The information that's communicated isn't always applicable or useful to those that it does reach. As Action item 4 suggests, warnings need to include tide information and storm surge predictions. The current forecast format provides landfall timings in relation to international time zones (UTC), which aren't used by local Fijians. A full independent assessment of the current communication infrastructure and the early warnings would better inform future planning and disaster preparedness at the national and local levels.

Work to better empower vulnerable populations in disaster preparedness and rebuilding is already occurring in Fiji, but traditional village and community structures across the islands have often failed to create a space for the voices of the vulnerable. Many organisations and government entities have begun to empower those voices in DRR projects. The TC Winston PDNA emphasised the need for continued work on the subject. The continuation and expansion of the inclusion of youth, women, the disabled and the poor is needed to best meet the Sendai Framework targets and strengthen current DRR projects.

Actionable opportunities for disaster risk reduction

Immense improvements have been made to Fiji DRR planning in the wake of TCs Winston and Evan. Five actionable items have emerged in this assessment:

1. The creation of a framework to update the 1995 NDMP
2. The carrying out of regular mock-disaster drills in local communities, with support from external organisations
3. Assessment of capability and capacity for communications infrastructure applied in early warning
4. Improvement of community-focused early warnings, including:
 - tide information
 - storm-surge predictions
 - the use of the local time zone in forecasts
 - local geographical context
5. A continued emphasis on the inclusion and leadership of vulnerable groups in DRR, including the disabled, women, youth and the poor.

Acting on these five priorities would address weaknesses in Fiji's current DRR planning and work towards further meeting global Sendai Framework targets by providing opportunities for both internal development and foreign aid investment. Future tropical storms and cyclones are inevitable in Fiji, so, while many improvements have occurred in the wake of TC Winston, more work is needed.

NAURU

Mavis Depaune and Monte Depaune

Country profile and disaster impacts

The Republic of Nauru is a single isolated raised phosphoric atoll located south of the equator at latitude 0°32' South and longitude 166°55' East. The country has a population of 11,288, a terrestrial area of 21 km² divided into 14 districts and an EEZ of 310 km². Other areas of jurisdiction include maritime and aeronautical search and rescue regions that are notably larger than the EEZ.

The island is surrounded by a fringing intertidal reef ranging from 120 to 300 metres wide. The land area consists of a narrow coastal plain from 100 to 300 metres wide that encircles a limestone escarpment. Around 85% of the population occupy the coastal plain, as does established commercial, recreational and government infrastructure, including schools and hospitals.

It's important to note that Nauru's soil, which is very porous, limits agricultural practices. Most crops are highly labour intensive and require the use of limited potable water.

All PICs experience the effects of climate change, including rises in temperature and sea level, ocean acidity and coral bleaching. However, unlike other PICs, Nauru doesn't experience tropical cyclones (due its proximity to the equator) but endures natural disasters such as long droughts and tidal storm surges.

Droughts usually occur during La Niña events and have been known to last as long as three years.¹⁴⁷ Prolonged droughts reduce the limited underground freshwater supply and increase salinity in non-potable underground water, inducing related health hazards. They affect around 61% of the population due to the limited potable water supply and increased water demands during drought.

During the wet season (normally from November to April), natural hazards manifest in the form of fierce, damaging winds, heavy rainfall that causes flooding and tidal storm surges that accelerate coastal erosion. At least 74% of Nauruan households have experienced one or more of those impacts. Climate Change (CC) is predicted to lengthen droughts and increase flooding, coastal erosion and sea inundation, all of which will exacerbate existing socio-economic problems. The geographical isolation of the island also increases its vulnerability to the impacts of natural hazards.

Implementing the Sendai Framework: national planning

Nauru takes a countrywide development approach under its National Sustainable Development Strategy (NSDS),¹⁴⁸ which was first developed in 2005 (NSDS 2005–2025) to address the country's economic crisis and is expected to be reflected in all national documents, such as laws, policies and plans within the various sectors. It has undergone two reviews, first in 2009 (NSDS 2009–2025)¹⁴⁹ and the most recent in 2019 (NSDS 2019–2030).¹⁵⁰ The current version takes into consideration the United Nations (UN) Sustainable Development Goals (SDGs), the Paris Agreement and the SAMOA Pathway.

The Sendai Framework and the SDGs cover overlapping and interconnected social and economic issues. The Government of Nauru recognises those synergies and has incorporated elements of each into the NSDS.

CC is identified as the single greatest threat to Nauru. The Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction (RONAdapt)¹⁵¹ and the Nauru Energy Road Map (NERM)¹⁵² are ambitious but necessary planning schemes that Nauru is using to mitigate and adapt to forecast negative impacts.

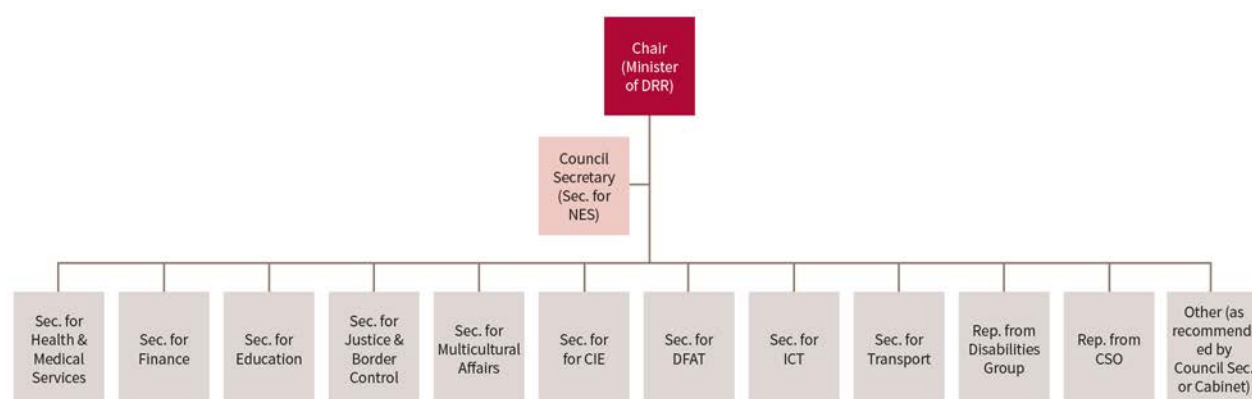
RONAdapt is considered an important contribution to the mainstreaming of CC and DRM in all sectors in Nauru. Its development took five years (from 2010 to 2014) and involved extensive consultation and review by all government sectors, civil society group representatives and the public. Its emphasis is on the relationship between Climate Change Adaptation (CCA) and DRR. Nauru considers climate change to be a key hazard driver that can influence the onset of a disaster where vulnerability and exposure exist, and that adaptation to climate change is a subcategory of DRR that emphasises reducing both the vulnerability of and risk to local populations and livelihoods.

The framework was born from Nauru's endorsement of the Hyogo Framework for Action 2005–2015 and the Pacific Regional Disaster Risk Management Framework, integrated the SDGs and led to the enactment of the National Disaster Risk Management (NDRM) Act 2008. RONAdapt is due for revision in 2020.

In 2016, the Government of Nauru updated the NDRM Act, which is the principal legislative base for addressing disaster-related issues in Nauru. Even with the Act's central place in and directive influence on disaster readiness, there are still gaps in its implementation. For example, while it details a requirement for annual updates of the NDRM Plan, the 2008 version of the plan remains in use. A more regular cycle of updates would provide assurance of readiness to the government.

The Act also establishes, when needed, the NDRM Council, consisting of a majority of heads of government departments and agencies, which essentially coordinates all sectors in case of a national disaster (Figure 2).

Figure 2: Nauru Disaster Risk Management Council

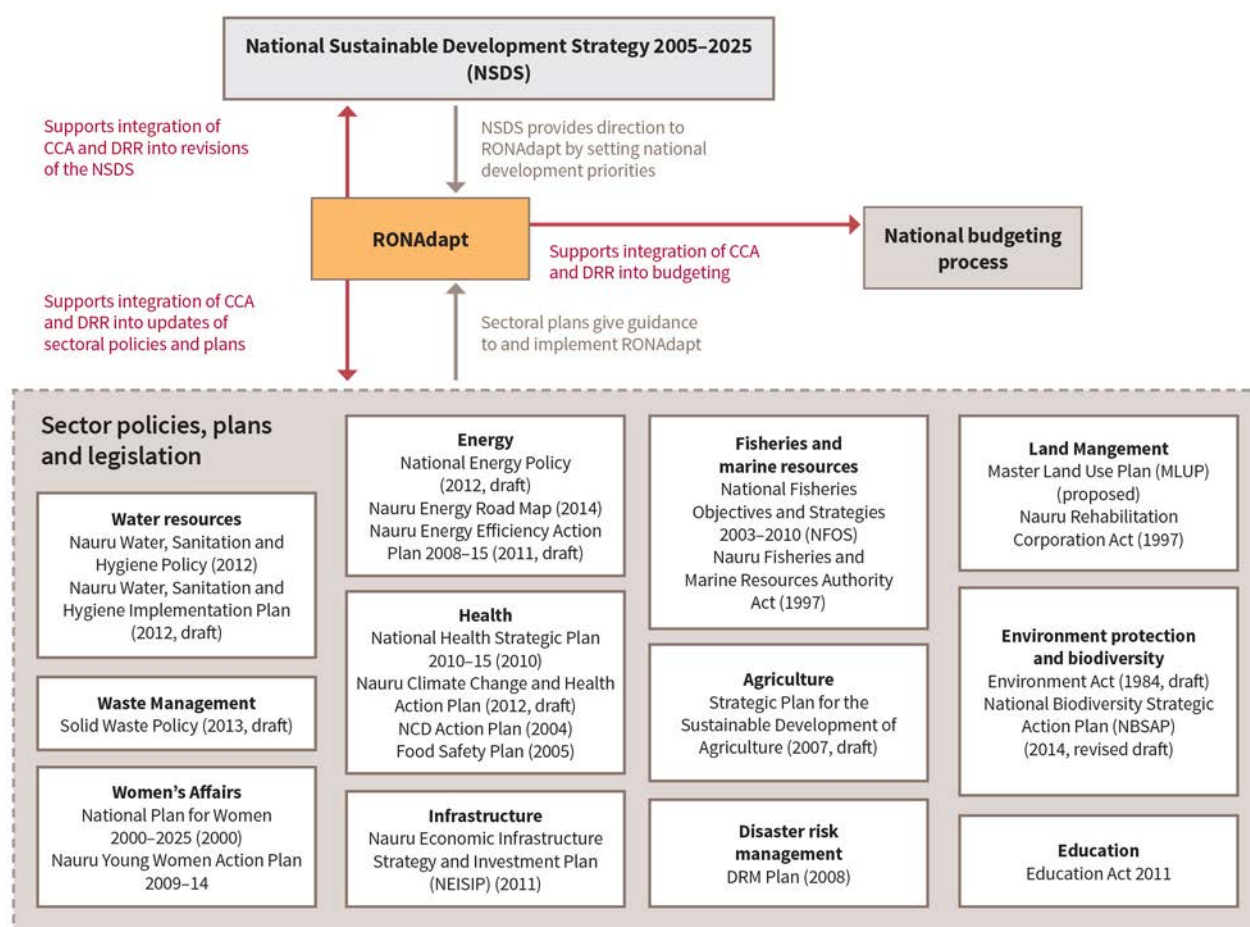


CSO = civil society organisation; CIE = Commerce, Industry and Environment; DFAT = Department of Foreign Affairs and Trade; ICT = Information, Communications and Technology; NES = National Emergency Services.

The NDRM Council has a mandate to establish a DRR Committee chaired by the Secretary for Finance. While there's an option to establish a Recovery Advisory Committee under the Act, the council must establish community disaster management councils, with suitable terms of reference for the committees, and identify suitable locations for the National Emergency Operations Centre when a disaster has significant national impacts.

The relationship between the NSDS and RONAdapt (Figure 3) contextualises the incorporation of CC issues and DRR outcomes explicitly into sector policies and plans.

Figure 3: RONAdapt



DRR = disaster risk reduction; CCA = climate change adaptation; RONAdapt = Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction.

Source: Government of Nauru, *Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction (RONAdapt)*, 2015, [online](#).

RONAdapt is intended to support progress towards the country's national development priorities and the goal of environmental sustainability by ensuring that a focus on reducing vulnerabilities and risk is incorporated into planning and activities across all sectors of the economy and society.

It's important to note that neither the NSDS nor RONAdapt maps directly to the Sendai Framework. A relationship does exist via the SDGs, as they're integrated into the NSDS. From this linkage, there's a possibility that selected indicators could constitute surrogate measures comparable to some of the Sendai Framework targets. The viability of this option would need to be examined and evaluated.

Such steps might support the reporting process linked to the Sendai Framework but they would have to be realigned to be a 'best fit', as data is limited and might not be able to be integrated in a manner that can be used to report fully against the defined reporting targets. An additional constraint is that to enable such a reporting regime would require investing in developing the human resource and capacity to implement it.

Division 2 of the NDRM Act outlines the purpose of the legislation and how to achieve its purpose with guiding principles, along with the requirement to have annual updates of the NDRM Plan, which is yet to be updated from the 2008 version.

Emerging themes in national disaster risk management

One of Nauru's main challenges is its need for administrative and personnel capacity to implement and monitor DRM activities nationally. This requires a clear management commitment and capacity to mainstream risk reduction efforts across government sectors and for local communities. How disaster risk is managed could thus be monitored and evaluated against the four Sendai Framework priorities for action through the sectoral components of government institutions.

The NDRM Act and RONAdapt are currently applied jointly, but there's a need to strengthen national disaster risk policies and plans. Missing components named in the Act include an updated NDRM Plan, current disaster management guidelines and, where needed, implementation procedures.

Communicating the implications of a changing climate and disaster risk has continually been a challenge, whether it be to institutions or the public. The mobile communication infrastructure in Nauru is a decade old and has been used previously for early tsunami warnings. Unlike in conventional practice, this service hasn't been extended to include the more frequent instances of natural disasters such as early onsets of droughts, fire hazards or coming storms. For the development and implementation of a national communication strategy, it's feasible to filter national disaster risk information more consistently across the public and private sectors as well to local populations.

The last national review in 2019 of SDG milestones found that only 26% of the NSDS goals had been achieved.¹⁵³ Contributing factors include inadequate funding, staff capacity, weak coordination, land issues and the unclear specification of goals. Environmental stresses, climate change and external economic impacts continue to affect and amplify these pre-existing challenges. Climate change has the potential to affect current and future revenues received from fisheries, further exacerbating Nauru's economic vulnerability.

A key finding of the review was the necessity to relocate coastal communities and key infrastructure from low-lying coastal areas. However, effective relocation might not be possible without the remediation of higher ground, much of which has been previously used for phosphate mining. The restoration and remediation of higher ground and subsequent relocations would be a long-term initiative and would require significant international donor support to succeed.

The need to enhance CCA and DRR capabilities has of course been recognised in recent years. The government established the National Emergency Services in 2015 as the responsible department covering meteorological services, emergency response services such as firefighting, ambulance and lifeguard services and the Office of DRM. In May 2019, the established meteorological services assisted in building resilience by supplying hourly projections based on satellite imagery and atmospheric readings and contributing to better community communication on weather.

Support for meteorological services is provided through the Secretariat of the Pacific Community's Building Safety and Resilience in the Pacific project and has included new meteorology and hydrology equipment.¹⁵⁴ Training and capacity building for weather forecasting and the use of the equipment has been provided by the Australian Bureau of Meteorology.

This is the first time Nauru has had a weather service operational 24 hours a day. The service extends to other jurisdictions, such as the Department of Transport, providing critical weather information for international and domestic aviation services. The establishment of the service will enable Nauru to capture long-term climatic data, which will be used to measure the impact of CC in the country. Plans are underway for the National Emergency Services to develop and launch a website to provide public access to Nauru's meteorological information. These wider enhancements support hazard communication components in several of the Sendai Framework priorities. More active attention to addressing resilience goals as priorities under RONAdapt would also support other emerging themes that are reflective of all the Sendai Framework priorities for action.

As highlighted in the NSDS, Nauru faces many challenges in its pursuit of sustainable socio-economic development. Those challenges are exacerbated by the country's geographical isolation, small land area, poor potable water resources, environmental degradation, dependence on imports and chronic health problems.

As mentioned above, the NDRM Act 2016 and RONAdapt are currently used in defining the national approach to DRR. There's a need, however, to strengthen related policy and planning capabilities. This includes updating the NDRM Plan along with disaster management guidelines and related procedures. In addition, greater effectiveness in monitoring the impact of RONAdapt can be reflected through annual departmental reporting on the status of progress against the pre-set NSDS milestones.

Government departments have incorporated committees to build close collaboration and partnership on national project developments. The groups include representatives from NGOs, wider civil society and the private sector and actively seek input from diverse groups based on youth and gender.

The capacity to enhance DRR varies within different sectors and is heavily dependent on funding availability, resource requirements, available infrastructure and, especially, skilled personnel. Most of those factors differ across the public and private sectors, which makes the coordination of efforts between departments and communities challenging.

An application of the Sendai Framework: water scarcity

Water scarcity is a prime example of a challenge in Nauru's DRR and sustainability efforts. The Sendai Framework, generically, seeks to work along three synergic tracks: preventing the creation of new risk exposures, reducing existing related vulnerability, and strengthening resilience.¹⁵⁵ Access to potable water is a definite risk under those goals.

The Department of Commerce, Industry and Environment (DCIE) and the Nauru Utilities Authority (NUA) are responsible for the policy, planning and provision of water. Oversight of the water sector also involves a diverse group of representatives from the government sectors and non-government representatives.

Water quality and scarcity are key factors that require careful attention. Most households rely on a combination of brackish groundwater, delivered potable water and harvested rainwater.¹⁵⁶ This multisource solution has been established to minimise the use of potable water for purposes other than drinking. Many households can harvest and store rainwater, but others lack the necessary guttering, downpipes and tanks.

There are also many instances of contaminated groundwater due to overflowing underground sanitation systems, many of which lack adequate drainage and maintenance. Groundwater has also been found in some areas of the island to be higher in salinity due to droughts and increased unregulated removal of groundwater.

Understanding these issues has allowed the DCIE to establish awareness workshops on the maintenance of rainwater harvesting systems and the limited use of underground water to avoid health problems.

With the recurrence of drought, the government had to invest highly in the production of potable water from seawater to reduce water-related disasters. Potable water is supplied by the NUA and is produced by five

diesel-powered reverse osmosis machines with a combined capacity of 2.4 megalitres per day. Processed water is stored in national storage tanks, one of which holds 4 megalitres and has a further five years of operational lifespan, and six of which are concrete tanks with a combined capacity of 1.74 megalitres.¹⁵⁷ The system can store enough water to supply demand for just over a week when the reverse osmosis equipment isn't operating.

Current water demand has been reported to be 130,000 litres per week by schools and hospitals and 110,000 litres per week by industrial, commercial and tourist institutions. Each day, 0.5 megalitres is delivered to the Nauru Regional Processing Centre, while household community tanks take around 300,000 kilolitres.

Understanding the limitations of water storage, the government has also invested in household-level storage tanks through various funded projects as well as from public funds, taking into consideration the recommended tank capacity and tank material to ensure longer use of the procured tanks.

The governing documents developed to address national water and sanitation issues include:

- the Water Sanitation and Hygiene Policy 2013¹⁵⁸
- the Water Sanitation and Hygiene Implementation Plan 2013¹⁵⁹
- the Nauru Water and Sanitation 20-year Master Plan 2015–2025¹⁶⁰
- the Drought Management Strategy 2016.

The water-specific policy and planning documents incorporate future climate projections as well as population growth.

Progress has been made since the development of these documents, including:

- water production monitoring and asset maintenance in the form of annual reporting from Nauru Utilities Corporation
- increased training in specialised positions, including engineering and managerial skills development
- increased investment from government along with international partners, which is still being implemented, in community rainwater harvesting systems
- the continued use of composting toilets and the generation of public interest to increase the number of such toilets for interested households.¹⁶¹

In addition to progress, documents such as the Water Sanitation and Hygiene Implementation Plan and Nauru Water and Sanitation 20-year Master Plan were developed to address existing water and sanitary issues and to provide a road map towards more coordinated and sustainable use in national water production and management as well as addressing future sanitary issues. More immediate developments should include continued water monitoring through Nauru Utilities Corporation's established electricity and water safety standards, which adopted standards from the *Australian drinking water guidelines* developed in 2004.

Managing public information for communication purposes to enhance preparedness across the water and sanitation sector is a key element that needs to be strengthened. Water monitoring results can be communicated to the general public to enhance water-saving efforts, especially during drought periods or when little fuel is available for potable water production.

Information can also include the level of contaminants in groundwater to prevent public health issues. Continued training and capacity building are needed, especially in the areas of the regulatory measures to ensure safe drinking water and the operational maintenance of reverse osmosis devices. Currently, this training is mostly dependent on the availability of consultants, financial assistance from international partners, or both. Future infrastructure and capacity enhancements must take into consideration predicted climate events and population growth to ensure the sustainability of potable water supplies, including storage capacity, especially during drought periods, and mechanisms to continually reduce the cost of potable water production.

Increased understanding of DRM and vulnerability reduction needs in the water sector is important, as is the need to communicate current information, knowledge and capacity building requirements for enhanced preparedness across the potable water and sanitation sector. They are key elements that need to be strengthened.

Future infrastructure and capacity enhancements must continue with ‘climate-proofing’ initiatives to ensure the sustainability of potable water resources and mechanisms to continually reduce the cost of potable water production as part of ‘building back better’.

The fit of the Sendai Framework in the context of Nauru

The Sendai Framework is very comprehensive and can be integrated with or adapted to many levels of an economy’s institutions. The constraints for Nauru in data alignment and reporting on Sendai measures mentioned above will remain an issue in the future. As a small island developing state, with limited landmass, agriculture and population, Nauru is aligned with and required to report against several internationally agreed frameworks, including the Sendai Framework.

Several issues could enhance the ‘goodness of fit’ for Nauru:

- **Data availability:** Capacity to account progress against targets indicated under the framework is either limited or hampered by gaps in available data or by the absence of relevant data categories. Nationally, to enable data collection against the Sendai targets would require capacity building supported by external financial resources and strengthened communication between the departments responsible for encapsulating the required data for reporting.
- **Sustained access to funding:** The availability of and access to new sources of funding assistance is an important contribution for national development in this area, given the limited resources and level of human resources and capacity nationally.
- **Monitoring frameworks:** Nauruan line agencies responsible for DRR need to select appropriate measures and realistic monitoring and evaluation systems to allow the measurement of progress on DRR efforts (with support for monitoring included in the national budget). Effective implementation of the reporting requirements of the SFDRR will entail the development of nationally relevant indicators that reflect the socio-economic situation of a developing country. Ensuring efficiency in reporting against those targets would require a very comprehensive and effective reporting mechanism cast across relevant sectors—a mapping that’s currently lacking. In addition, there’s a need to promote consistency in monitoring data quality and determine whether it has cross-sectoral compatibility and whether it will suit reporting requirements under the targets.
- **Protection of infrastructure systems:** In relation to SFDRR Priority 1, there are several current and recently developed projects being implemented as contributions to DRR, and more are planned. An additional factor needed is comprehensive risk management necessary for proper preparation to protect these investments against future threats.

National projects are currently addressing immediately required infrastructure and capacity building and, it’s to be hoped, will in future reduce the need for *ad hoc* reactions to disasters and promote the development of more long-term, cost-effective, sustainable solutions, although that can be made possible only with investments from donors.

Steps towards supporting vulnerable infrastructure by enhancing national planning efforts are also needed. Currently, agreed sets of building codes are non-existent. These projects also strengthen Sendai Priority 2 by enhancing collaboration with regional and international donors and agencies, as well as allowing cross-sectoral development and cooperation.

KIRIBATI

Dr Colleen Butcher-Gollach

Introduction and overview of historical and recent disaster impacts

The Republic of Kiribati, with a population of approximately 116,000 people in 2018,¹⁶² is one of the world's smallest and most remote, geographically dispersed and climate-change-vulnerable countries. Its total land area of some 810 km²—comprising 32 low-lying atoll islands and one raised limestone island, is scattered over 3.5 million km² of the central and western Pacific Ocean.

Most of the 21 inhabited atolls have elevations of no more than 2 to 6 metres above sea level and are only a few hundred metres wide. Dispersion raises the costs of providing, operating and maintaining infrastructure and services. The resultant disaster-resilient infrastructure gap and distance to larger markets constrain economic diversification, private-sector investment and GDP growth. The country's principal exports are limited to coconut and marine products (seaweed and aquarium fish); income from foreign fishing vessel licences is the major source of government revenue (81% in 2017); and there's a high reliance on official development assistance grants and external loans. As a result, Kiribati has one of the lowest per capita gross national incomes in the Pacific island region (US\$3,140 in 2018¹⁶³), one of the highest rates of basic needs poverty at about 22% of the population,¹⁶⁴ and an estimated two-thirds of the population in or at risk of falling into poverty.¹⁶⁵

Ironically, although lying within the world's largest ocean, Kiribati is subject to periodic drought. Because of the atolls' very narrow landmasses, the naturally occurring underlying freshwater lenses, which are crucial for sustaining human settlement, are constrained, and freshwater supplies are frugally rationed. Rainfall that's critical for replenishment of the lenses and for filling rainwater harvesting tanks is correlated with El Niño – La Niña events. The long-term climate outlook for Kiribati is for drought to decrease, but changes in rainfall might not be apparent in the short to medium terms due to natural variability,¹⁶⁶ and the limited storage on the small islands places great stress on drinking-water supplies for the foreseeable future.

For example, in South Tarawa, Kiribati's capital and main urban area (estimated population 60,200 in 2018), severe droughts occur approximately every four to five years with recorded durations of five to six months.¹⁶⁷ The severe drought of 1998–99 affected the entire country and population (84,000 people at that time). In March 1999, when the President declared a state of natural disaster and requested international assistance, the drought was entering its 12th month.¹⁶⁸ Below-average rainfall in La Niña years was recorded in 1971, 1985, 1988–89, 1998–1999, 2007–2009¹⁶⁹, February–April 2011¹⁷⁰ and 2016–2017.

The geography of the narrow and low-lying atolls means that almost all land is part of the coastal system,¹⁷¹ directly exposing human settlements and infrastructure to coastal erosion and inundation. Coastal zones, which in the case of Kiribati include almost all land, groundwater and vegetation, are complex and highly dynamic environments. The natural dynamic equilibrium of the reef-fringed atolls' shorelines is easily upset by human activities such as beach mining and reef extraction for building materials, channel dredging for fishing boats, excessive sediment and nutrient run-off, building seawalls and informal land reclamation for defending settlements, and similar activities. Specific features along the dynamic and changing shorelines (such as spits, channels and ends of islands) are particularly subject to episodic flooding and inundation caused by high spring and king tides (more than 20 extreme spring tides can occur each year), by wave overtopping when moderate or large waves coincide with high tide levels, or by large swell-wave conditions caused by distant storms and tropical cyclones.¹⁷²

These phenomena not only routinely damage physical assets, destroy food crops and trees¹⁷³ and endanger communities, but also exacerbate ever-immediate water shortages by contaminating the groundwater lenses with saline seawater. When the three flood hazards—unusually high water level, high spring tide and storm-generated swell—coincided on 10 January 2016 in the vicinity of Kiritimati Island (population 5,500), they caused the loss of four lives and extensive damage to physical assets.¹⁷⁴ Mean sea-level rise (projected to be between 8 and 12 centimetres by 2036) is expected to increase the frequency and magnitude of such flood events. For example, modelling calculates that for every 10-centimetre rise in mean sea level the number of high tides above the destructive king-tide level will increase by roughly 10% in the capital, Tarawa.¹⁷⁵

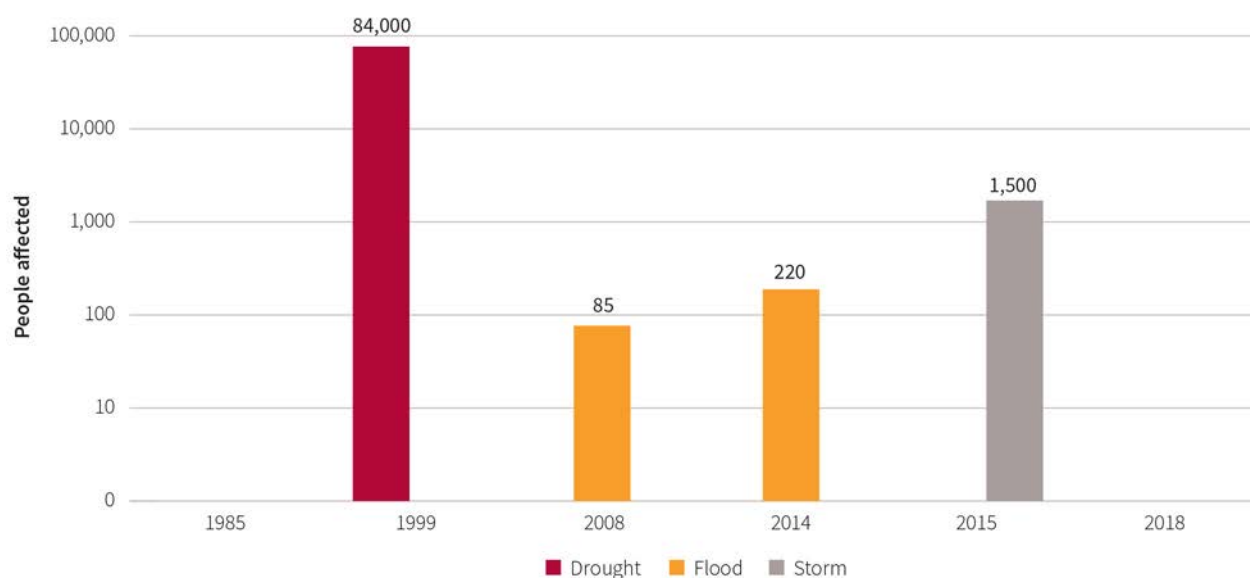
Kiribati lies in the relatively calm latitudes that straddle the equator, making tropical cyclones rare occurrences for the country. Between 1969 and 2018, only four were recorded as passing within 400 kilometres of the main islands.

Risk modelling by the Australian Bureau of Meteorology points out that the widespread distribution of Kiribati's islands and the nature of its seabed means that exposure to tsunami risk will vary from island to island,¹⁷⁶ and modelling and historical records suggest that the country has a low tsunami risk relative to other PICs that lie closer to subduction trenches. From 1994 to 2018, there were seven small tsunami-related events. In October 1994, February 1996, November 2005 and November 2006, small (less than 10 centimetres high) tsunami waves (triggered from the Kuril Trench) were detected by the Tarawa sea-level gauge. Kiribati was placed under a 'tsunami warning' by the Pacific Tsunami Warning Center for the 2 April 2007 Solomon Islands earthquake, but the Tarawa sea-level gauge didn't record any visible sign of the tsunami. Tsunami watch notices went into effect for Kiribati following the Japan earthquake on 11 March 2011 (the Tarawa gauge recorded a 27-centimetre height), on 6 February 2013 (recorded height of 12 centimetres¹⁷⁷) and on 17 September 2015 following the Chile earthquake.

The impacts of climate change will add to the human stressors already affecting the country's natural ecosystems and shorelines. Estimates of the range in sea-level rise for a 30-year outlook (to the 2050s) and increasing sea surface temperature¹⁷⁸ are well documented.¹⁷⁹ Those factors are expected to lead to loss of biodiversity, ecosystem degradation and loss of fisheries—all compounding the vulnerability of the country's population.

Figure 4 provides a snapshot of significant natural hazard events from 1985 to 2018.¹⁸⁰

Figure 4: Kiribati significant natural hazard events, 1985 to 2018



Sources: *Climate Change Knowledge Portal for Development Practitioners and Policy Makers*, Kiribati, World Bank Group, 2020, [online](#); *DesInventar Sendai*, 2020, [online](#).

According to one of only a few available country estimates, Kiribati faces economic losses of around US\$0.3 million per year ‘due to earthquakes and tropical cyclones’ and in the next 50 years has a 50% chance of losses from those events exceeding US\$1 million and of casualties exceeding 10 people.¹⁸¹ That 2011 estimate was based on building exposure replacement costs and land cover (major crops) using satellite imagery and limited ground-truthing and a simulation of potential future events. A more recent (2018) assessment of the economic impact of a broader range of more immediate natural hazard risks (storms, floods, earthquakes and droughts) together with less frequent ‘other’ disasters (earthquakes and tropical cyclones) made use of EM-DAT natural disaster observations between 1980 and 2016.¹⁸² The 2018 assessment calculated a 10.8% probability of at least one disaster occurring in Kiribati in a given year and an average 0.8% of the total population being affected. While the study provided no information behind the damage calculations, using historical observations it recommended an adjustment for GDP per capita growth per year of –0.04% as result of natural disaster impact.

Emergent themes and challenges in enhancing disaster risk reduction and resilience

Global good practice embodied in the Sendai Framework for Disaster Risk Reduction emphasises the need for early and targeted actions at the local, national and international levels to reduce the drivers of existing and potential new risks; that is, to better manage risks before they become disasters. Specifically, countries are called on to implement measures to reduce exposure to hazard risks, to reduce the vulnerability of their populations, assets and institutions, and to increase preparedness for immediate disaster response and short- and long-term recovery.

The comparatively small number of extreme events in Kiribati from 1985 to 2018 masks the underlying vulnerability of its small, isolated and relatively poor communities to their ever-present exposure to slow-onset droughts, relentless coastal erosion and periodic inundation and flooding. Four key areas stand out regarding Kiribati’s efforts to reduce risk and strengthen resilience.

First, there's a severe lack of data to model probabilistic risk estimates and to better inform policies and local actions. For example, the 2014 *New science and updated country report* for Kiribati produced by the Australian Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation¹⁸³ noted that available data on wind and waves in Kiribati isn't suitable for assessing long-term trends. Similarly, in its 2016 report to the World Meteorological Organization RAV Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean, Kiribati Meteorological Service (KMS)¹⁸⁴ stressed its need for support to improve wave height, storm surge and inundation forecasting data and capabilities.

In the main, coastal and groundwater modelling have been prepared only for known coastal 'hotspots' on South Tarawa and groundwater lenses on North Tarawa. Elsewhere, local island vulnerability assessments and hazard risk maps rely on oral histories and local knowledge. While of value, such localised assessments capture subjective perceptions of past events and are less reliable for predictive analyses. The assessments are typically aimed at confirming that a problem exists (for example, coastal erosion or salinity of groundwater) and to justify short-term solutions (for example, constructing a seawall), and tend to overlook critical assessments of underlying root causes (including the location and thus exposure of community assets) and don't attempt to assess different scenarios that make trade-offs between probability and acceptable risk.

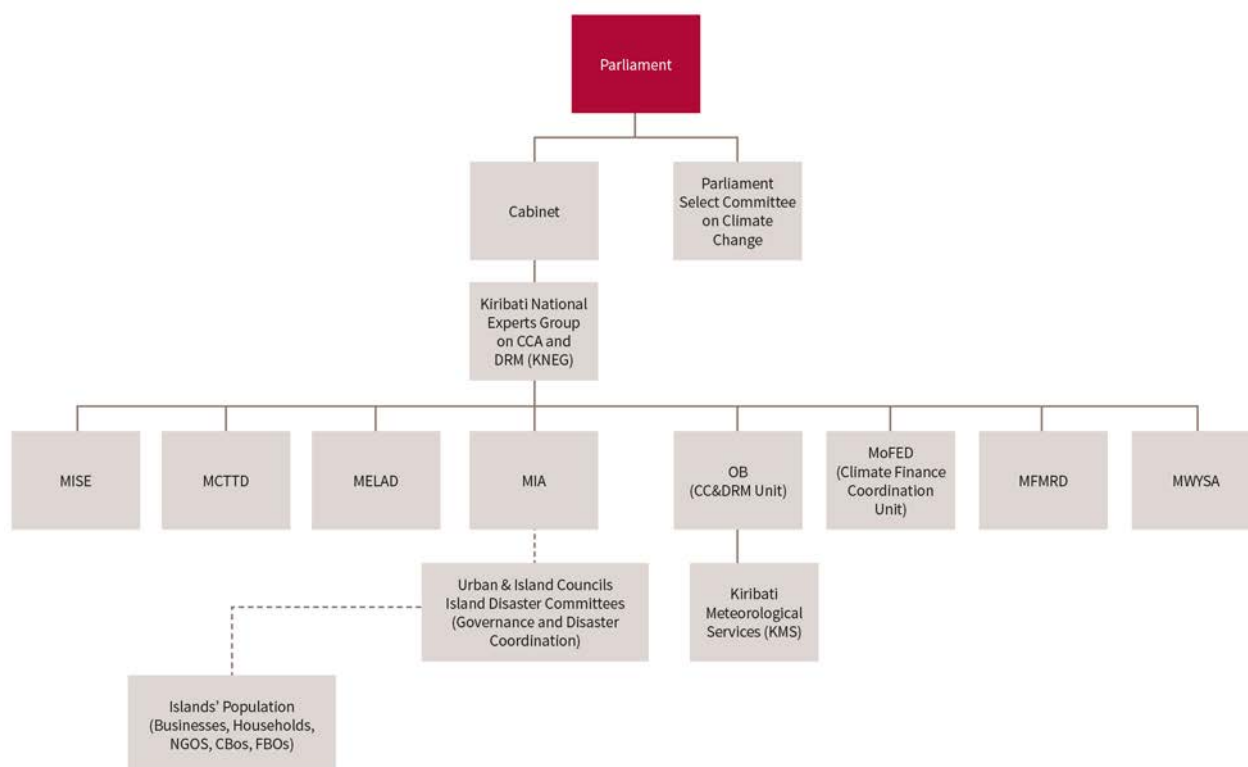
The Sendai Framework calls on countries to provide strong political leadership, commitment and involvement of all stakeholders at all levels to effectively address disaster risk. The second standout is that, notwithstanding data vulnerability, the Government of Kiribati has prepared and adopted well-considered disaster risk and climate change policies, including the Kiribati Joint Implementation Plan for Climate Change and Disaster Risk Management 2015–2025 and the Kiribati Climate Change Policy (2016). Both policy documents link climate change and DRM through the central theme of risk reduction. The recently enacted *Disaster Risk Management and Climate Change Act (2020)* will enable updates to national planning and bring additional emphasis on climate change and governance arrangements, with the supporting of new regulations and joint policy development.

Institutionally, DRM and climate change adaptation are also given prominence in government structures. The parliament has established the Select Committee on Climate Change; the Ministry of Finance and Economic Development has a Climate Finance Coordination Unit; the Office of the President (Office *Te Beretitenti*) has a dedicated Climate Change and DRM Unit responsible for preparing policy; the Ministry of Environment, Lands and Agricultural Development is responsible for technical leadership on the environmental and social impacts of natural hazard risks and climate change, including whole-of-island assessments; and the KMS—a division under the Office of the President—is responsible for regional and national drought monitoring, seasonal climate outlooks, meteorological observations, marine weather bulletins, tide predictions, satellite imagery and national forecasts. Overlapping mandates among the plethora of different ministries can present challenges, and DRR and climate adaptation priorities aren't yet mainstreamed in sector development plans or screened as part of annual budget approvals for ministries.

At the local government level, since 2015, island disaster committees have been established under seven remote island councils to coordinate DRM initiatives. The government plans to extend the committees to the remaining 12 outer islands but, as yet, not to the three urban councils, which account for just over half of the national population.

Figure 5 shows the institutional arrangements for DRM and climate change adaptation and the prominent leadership and coordinating roles of the Parliamentary Select Committee on Climate Change and the Kiribati National Experts Group.

Figure 5: Kiribati institutional arrangements for climate change adaptation and DRM



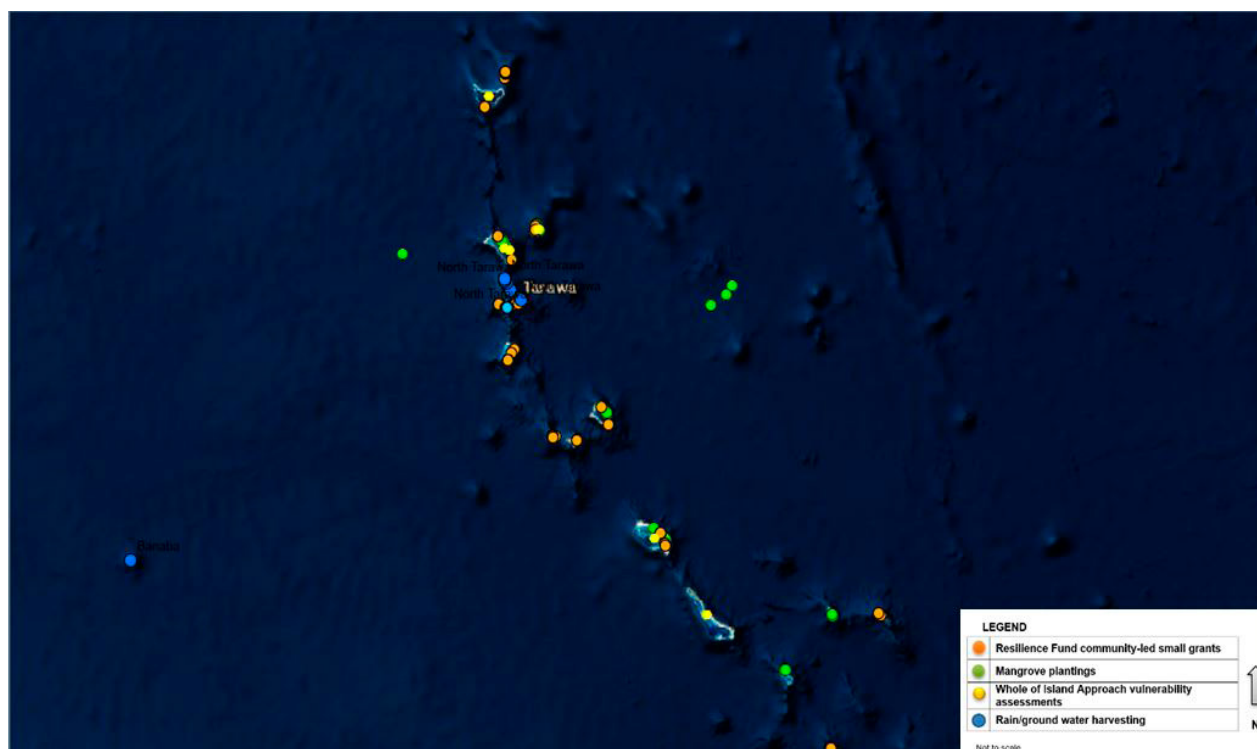
The third standout for Kiribati is that of dispersion. Notwithstanding its approved policies and public-sector institutional arrangements, Kiribati's remoteness and the vast expanse of ocean separating its small populated atolls from each other and from other countries speak to the vulnerability of its population, raise the costs of service delivery and cause significant logistical challenges to government administration systems and communications channels for DRM. Over the past decade, although not directly articulating it in official policies, the government and external support partners have *de facto* been promoting a decentralised and incremental approach to reducing risk and building resilience (at household and community levels and in NGOs and businesses across the dispersed islands) that cumulatively leads to strengthened resilience.

Short-term incrementalism is a rational approach in the face of the constraints and costs imposed by dispersion and an unknown climate future. Recent initiatives being implemented include island vulnerability assessments and a whole-of-island approach to climate adaptation led by multisector ministry staff and coordinated by the Office of the President. By early 2019, island vulnerability assessments had been prepared with the island communities for eight of the 21 inhabited islands and whole-of-island island development plans had been prepared for five islands. Small grants for community-led emergency recovery efforts and for climate adaptation and DRR activities (particularly for the security of potable water supplies, such as rainwater harvesting tanks) are promoted through the Disaster Fund administered by the Office of the President (around A\$2 million per year in 2018) and the Resilience Fund (US\$700,000 over the 2016–2018 period).¹⁸⁵ The Ministry of Environment, Lands and Agricultural Development has an ongoing program of shoreline mangrove plantings with communities in outer islands. Where human settlement pressures haven't yet disrupted natural sediment supply processes, the mangroves play an

important role in trapping and stabilising deposited sediments in their root systems, which mitigate the impacts of coastal flooding and act as natural filters that maintain water quality.

Figure 6 (showing the Gilbert group only) highlights the extreme dispersion of the islands and illustrates several recent promising successes of the incremental approach to risk reduction through the Resilience Fund small grants, mangrove plantings and whole-of-island vulnerability assessments and plans.

Figure 6: Gilbert group, Kiribati, showing dispersion and small-scale incremental risk reduction measures, 2012 to 2018



Source: Author generated (23 May 2019) from World Bank, *Implementation completion and results report on grants in a total amount of US\$11.57 million to the Republic of Kiribati for the Kiribati Adaptation Program—Phase III Project*, report no. ICR00004711, 17 June 2019, [online](#).

Finally, a standout from efforts to date has been the limited program and activities to increase the resilience of the *urban* populations living in South Tarawa and Betio, which together account for 56% of Kiribati's total population and at current growth rates will be home to 60% of the population by 2025. The whole-of-island vulnerability assessments and plans target outer islands and not the more heavily populated urban areas. The South Tarawa & Betio General Land Use Plan (2017) approved by the Central Land Planning Board doesn't consider available coastline assessments or wave inundation modelling and doesn't include practical provisions for risk reduction by households and businesses when developing land. The 2017 plan places a restrictive 'protection' zone on a large (300-hectare) block of state land at Temaiku that had been zoned under an earlier approved General Land Use Plan (2010/2011) for future urban expansion and that several recent studies have flagged as suitable for safer settlements for future decades if appropriately infilled and provided with infrastructure services.¹⁸⁶

The fit of the Sendai Framework and its four priorities to local needs

The Sendai Framework sets out four clear priority areas for action. While the focus of the action areas is sound, implementing the actions in a small island developing state comprising low-lying and remote atolls isn't always straightforward.

Understanding disaster risk in all dimensions: While Kiribati's natural hazard risk exposure relative to other PICs appears relatively low, the level of risk varies from island to island, and the government agencies and regional organisations lack the resources to produce 'hard science' assessments for all the islands. Slow but steady progress is being made by government-led efforts to engage remote outer island communities in self-assessments of major risks and whole-of-island levels of vulnerability.

However, more accurate predictive assessments for the very low-lying atolls would require accurate digital elevation models (for example, generated by LiDAR); hydrogeological investigations of the depths, extents and water quality of underlying water lenses; complex surge-wave modelling; and similar work. That work is not all within the capabilities of the small country's local experts and would involve huge per capita costs for equipment and the upgrading of observation networks. Kiribati's current efforts tend to focus on outer islands rather than on the increasing proportion of the population living at risk on the densely settled atoll of South Tarawa. More could be offered by the Sendai Framework to provide guidance to small, dispersed countries such as Kiribati on where, geographically and risk-wise, to focus their efforts and provide more practical guidance for developing scenarios that make trade-offs between probability and acceptable risk.

Strengthening disaster risk governance: Kiribati's government policymakers and technical staff are keenly aware of natural hazard risks and the potential impacts on vulnerable communities. The public-sector agencies provide strong leadership and commitment in proactively engaging at all levels, from remote communities to regional and international forums on disaster risk awareness and have established formal committees from the parliament to island councils to prepare for and respond to disasters. However, more could be done by the public-sector agencies to engage with and motivate the private sector to manage risk at local levels. Whereas the Sendai Framework has an indicator to monitor 'local governments that adopt and implement local DRR strategies in line with national strategies', it could also include indicators on, for example, 'the number of local businesses that have developed business continuity plans' or 'the number of building plan approvals with raised floor levels/bracing for high wind speeds'.

Investing in disaster risk reduction for resilience—public and private investment through structural and non-structural measures to enhance the economic, social, health and cultural resilience of persons, communities, the country and its assets and environment: The action is extremely broad, and the immediate response from a small, low-resource country such as Kiribati was articulated by the government as:

Like many other SIDS, Kiribati is constantly challenged by: (i) The complications relating to financing preparation and responses to disaster events ... (iii) The inability of our communities to meet costs associated with disaster events causing wider impact on our national budget to fill the gaps ... (emphasis added)¹⁸⁷

The action would be more easily implemented if more guidance and encouragement were provided under Sendai for three important considerations that are lost within this broad action item:

- Every \$1 invested in reducing risk typically results in post-disaster savings of \$4.¹⁸⁸
- Specified actions might be envisaged as 'non-structural measures'.
- Private investments are critically important.

With regard to private investments, the daily location and personal investment decisions of private households and small and large businesses dictate where human settlements occur and the design and quality of built development. In small developing countries such as Kiribati, those decisions typically take place outside of government development consent and building permit approval processes. Therefore, much could be done to raise the understanding of risk factors and incentives for mitigating risk by small private investors' actions. Understanding the nature of socio-economic constraints on local-level decision-making might assist here.

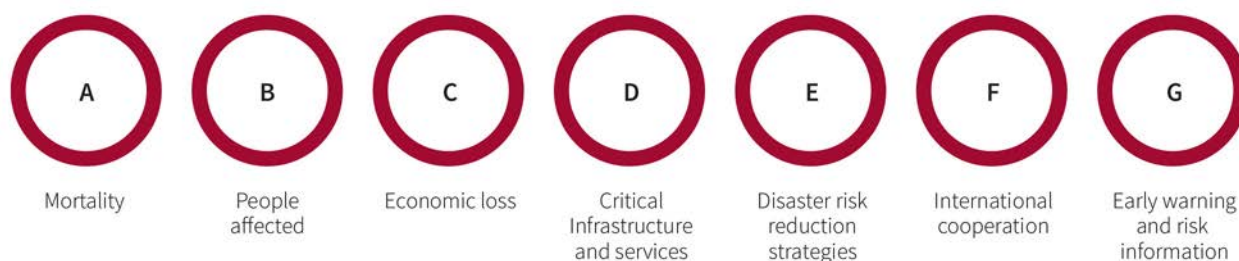
Enhancing disaster preparedness for effective response and to build back better in recovery, rehabilitation and reconstruction—prepare for disasters, act in anticipation of events and ensure capabilities are in place for effective response and recovery: An area requiring future focus is the potential for improved management of communications that underwrite early-warning systems in the remote islands. For example, KMS advises local government officials by email of extreme spring tide events (2.8 metres) and issues radio broadcasts three days before the events occur. As the AM radio service in Kiribati is unreliable, KMS now also makes use of a Facebook page to communicate spring tide advisories, which include tips to users on ways to prepare and relocate inland. However, KMS has noted that, as with all social media, the advisories are then shared, are commented on and can be changed by users, producing a risk of eventual miscommunication.

The director of the KMS has pointed out that, prior to the severe coastal inundation of Kiritimati Island in 2016 (which resulted in the loss of four lives), 'Though the warning was issued, it did not reach the majority of the communities, those who received the warning didn't fully understand the possible risks, and lastly the impacts were worse than expected.' Collaboration with other PICs (for example, Vanuatu) with experience in strong last-mile communications systems could be encouraged.

Appraisal of current use of the framework and recommendations for change or continuity of effort

At the national level, not only is there a lack of data to model and estimate probabilistic risk, but evidence-informed and systematic monitoring of the extent and impacts of past disasters and whether the seven Sendai targets are likely to be met by 2030 is limited. Current monitoring by Kiribati for all seven global targets (Figure 7) for the baseline (2005–2014), past decade and current year record information as 'not available' or 'no data', indicating that the country hasn't yet started systematic reporting.

Figure 7: Sendai Monitor global targets—zero reporting



The Sendai Framework's seven global targets are further broken down into 38 indicators for achieving the framework by 2030 and the associated SDGs (1: No poverty, 11: Sustainable cities and communities and 13: Climate action)—an ambitious monitoring task for a small country. It might be useful for the Kiribati Parliamentary Select Committee and the Kiribati National Experts Group to annually, systematically monitor progress against a smaller subset of indicators that reflect Kiribati's small size and particular risk profile. For example, Kiribati might focus its monitoring on the achievement of a subset of the main compound indicators and only for targets for which data would be relatively easy to collect from remote island councils; for example, Target B: Affected people, Target C:

Direct economic losses, Target D: Damage and disruption of basic services, and Target G: Availability of and access to multi-hazard early-warning systems. Monitoring of those targets could also be limited to impacts of high-probability events, which are notably coastal inundation (flood) and drought under existing climate conditions. An illustrative summary impact-monitoring is shown in Figure 8.

Figure 8: Illustrative impact-monitoring framework for Kiribati

Sendai target	Indicators (compound)	Coastal flood		Drought	
		Baseline	Target	Baseline	Target
Reduce the number of affected people	Number of people directly affected by disasters, per 100,000 population (disaggregated by women, men; annual actual).				
Reduce economic loss	Direct economic loss attributed to disasters in relation to global GDP (annual actual).				
	Direct economic loss resulting from damaged or destroyed critical infrastructure attributed to disasters (annual actual).				
Reduce damage to critical infrastructure and disruption of basic services	Damage to critical infrastructure attributed to disasters (no. destroyed or damaged health facilities and/or educational facilities; no. disrupted land/air/maritime transport facilities, telecoms network, drinking water supplies; annual actual).				
Increase the availability and access to multi-hazard early-warning systems and disaster risk information and assessments	Accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels (% of island and urban councils with an adopted plan to act on early warnings; no. of people per 100,000 covered by early-warning information through national dissemination system, disaggregated by women and men).				

Future actionable opportunities for disaster risk reduction in Kiribati

Kiribati's short-term, incremental approach to the Sendai Framework goal of preventing new and reducing existing disaster risk is a rational approach in the light of the small island country's constraints of data gaps, geographical dispersion and limited resources for implementation. In 2016, the new administration announced that it was replacing the policy of 'migration with dignity' with a 'long term coastal security' strategy that recognises security of place.

A draft strategy recently prepared by the Office of the President notes that current approaches are too reactive and *ad hoc* to be effective against long-term sea-level rise.¹⁸⁹ It recognises that the root causes of existing high levels of exposure are many years of poor land-use planning and development practice (for example, constructing seawalls produces misplaced feelings of security).

Among the key and potentially transformational actions recommended by the long-term coastal security strategy are as follows:

- When replacing government-owned houses that are reaching the ends of their lives on South Tarawa (government houses make up around 50% of all urban houses), the new houses should be located on government-leased land in safer areas, including infilled or reclaimed land, and they should be built set back from vulnerable coastlines and on raised platforms to reduce the risks of flooding.
- Strategic infrastructure investments funded by either the government or external partners on outer islands (such as roads and aerodromes) should be realigned inland to encourage voluntary incremental relocation by island communities. This would require carefully managed consultations with and possible compensation for affected landowners, but Kiribati has well-established administrative procedures and traditional protocols in place for resolving such issues, particularly if the need for realignment is flagged through earlier consultations during the whole-of-island island vulnerability assessments.
- Coastal ecosystems (coral reefs, mangrove forests, seagrass meadows) are highly interdependent, so communities should be encouraged to maintain large areas of intact coastal ecosystems, which have greater capacity to buffer the impacts of extreme weather.

Overall, Kiribati is well positioned, and its leadership has the commitment, to start implementing more ambitious and transformational DRR actions than in the past, and there are opportunities to do so.

DISASTER PREPAREDNESS AND RESPONSE IN THE PACIFIC: STRENGTHS, CHALLENGES, LIMITATIONS AND SUCCESSES

Patrick Haines

The Pacific region's vulnerability to climate change and natural hazards means that Pacific governments are well versed in managing the myriad complex tasks associated with preparing for, responding to and recovering from crises. Despite being so well rehearsed, capacity constraints, perverse incentives and competing priorities have rendered the region ill able to autonomously identify and manage the PICs' vulnerabilities.

The Pacific is arguably one of the world's most logistically challenging regions. The small populations of most PICs are spread across a vast ocean. Access is expensive and time consuming. Where remote communities were once self-sustaining and masters of subsistence living, traditional coping strategies have been eroded through increasing levels of urban drift and the greater accessibility of processed and imported foods.

The frequency and intensity of disasters have also increased. The changing climate in the Pacific has affected all facets of life. The migration patterns of pelagic fish have changed, increasing droughts are straining livelihoods and affecting crop production, and storm surges and king tides are more frequent and devastating. Where the Pacific has made economic development gains, the cumulative impact of climate change and natural hazards has stolen our wins.

Aid donors have for decades made investments that have been applied to public service reform in the Pacific. As a percentage of the overall population, PIC governments and their bureaucracies are too large, too expensive and too inefficient. Despite those criticisms, the sovereignty of each country demands a public service that can govern across all sectors.

With the list of priorities long, the disaster management sector is unsurprisingly not at the top of the government 'food chain'. Undertaking studies for a formal qualification in the disaster management sector isn't easy in the region, making it difficult to choose the sector as a career specialisation. National disaster management offices are under-resourced in both available budgets and staffing levels.

A now retired director of a national disaster management authority in the Pacific once referred to his office as 'like a hospital'. He explained that people were sent to him 'sick'. Once he made them 'well' again, they left. This analogy plays out across the Pacific, where high-performing staff are quickly rotated to more central ministries.

The absence of capacity isn't acutely felt while disaster management authorities lie dormant in peacetime. However, that sense of security is short-sighted. When disasters do occur, the lack of capacity in disaster authorities becomes both life-threatening to affected populations and politically damaging to governments of the day.

Where systems and processes in the disaster management sector in the Pacific exist, they're mostly archaic, or aren't fit for purpose and have been imposed through external 'support'. Coordination across government is key. While it's inevitable that catastrophic disasters will require the support of traditional partners such as Australia and New Zealand, the Pacific should have the capacity to self-manage localised disasters.

Category 1 and 2 cyclones are devastating to the communities in which they strike, but, given the relatively low impact of such disasters, should be manageable through whole-of-government coordination.

The Pacific Islands Emergency Management Alliance (PIEMA)¹⁸⁸ project, which is co-funded by Australia and New Zealand and implemented by the Pacific Community, is focused on this niche area of collaboration.

The project is dedicated to strengthening the coordination between government response agencies (disaster management authorities, police, militaries and fire and emergency services). Targeted investments such as the PIEMA project are proving more effective than broad and unfocused programs of capacity building.

The role of the military in humanitarian responses is new to the Pacific. Where the use of the Australian or New Zealand defence forces to respond to a disaster in the Pacific was once an anomaly, it's now the norm. The Pacific has only three official military forces – the Republic of Fiji Military Force, His Majesty's Armed Forces (Tonga) and the PNG Defence Force. The benefits of harnessing the resources and capacity of these military forces to respond to disasters are obvious.

The challenge currently facing the Pacific is to foster communication between the civilian and military arms of humanitarian assistance. Australia and New Zealand should be recognised for their work in this area. There's increased interoperability between the Australian Defence Force, the New Zealand Defence Force and the military forces of the Pacific. The deployment of civilian–military coordination cells to sit inside disaster management authorities during response operations has fostered a higher level of trust and greater understanding.

Coordination is difficult when leadership is absent. The national disaster management authorities in the Pacific often have limited agency and influence within their systems. Decision-making power resides with central ministries, and too often decisions are made without the disaster management agency present. The political economy of the sector further undermines the ability of senior staff in disaster agencies to coordinate across government.

There's been vast investment in civil society in the Pacific through both development and humanitarian programs. NGOs and national Red Cross societies are politically savvy and are often able to navigate complex decision-making structures. However, that level of nous is more difficult in the machinery of the public sector, and Pacific governments haven't yet demonstrated the capacity to harness the energy of civil society.

The mandate of national disaster management agencies in the Pacific is often unclear and largely undocumented. Disaster management legislation in many PICs is outdated; in some instances, it doesn't reference the disaster management agency as the primary point for coordination. Through the support of partners such as the International Federation of Red Cross and Red Crescent Societies, legislation is gradually being refreshed where needed. Most PICs have adopted versions of the UN's cluster system, appointing sectorial co-leads to government ministries and either UN agencies or international NGOs. However, the imposed nature of the cluster system and insufficient investment in embedding it within a national context mean that its effectiveness can be inconsistent.

National disaster management authorities, which are under-resourced, are too often focused on the wrong tasks. Unclear on where their mandate begins and ends, disaster management staff confuse their role with that of an implementing partner. Disaster management authorities should implement nothing, but rather they should lead, coordinate and support others in the provision of assistance. This mandate creep often leaves a disaster response operation without strong leadership.

Despite these challenges, progress is being made and the Pacific is learning from the mistakes of the past. TC Pam, which struck Vanuatu as a category 5 storm in 2015, provided a benchmark from which the region has since improved. The magnitude of that disaster brought an influx of international assistance into Vanuatu on a scale that had never been experienced in the Pacific. The international community sidelined the Vanuatu Government. It was denied decision-making rights and its sovereignty was disregarded, but it also beneficially provided an example for the rest of the Pacific to never allow that to occur again.

Only 12 months later, TC Winston struck Fiji. The Fijian Government was quick to articulate its leadership. Drawing heavily on the Republic of Fiji Military Force, the government effectively directed the international community to support the response in ways that it determined to support its highest priority. Using the defence force, the government was the public face of the response, showing strength and composure.

The obvious benefit of having a military force wasn't the only reason Fiji was able to avoid the reality that Vanuatu lived through. With no less international support offered, the Fijian Government exercised its right to refuse assistance. The message to the international community was clear: things had changed, local leadership was the way forward and its primacy would no longer be disregarded.

In 2018, Tonga was devastated by TC Gita. Tonga, while possessing a national military force that's smaller and has arguably less capacity than Fiji's, activated that capability. The Tongan Government was fast to speak to the international community, stating that the first tranche of assistance was to be received only from Australia and New Zealand. This approach allowed time to take stock and determine how best to coordinate assistance from the broader international community.

As capacity grows, interest in regional support has increased. The governments of Fiji and Tonga provided modest assistance to Vanuatu following TC Pam; Tongan soldiers deployed to Vanuatu to support the relocation of the community from Ambae following volcanic eruptions, and the Fiji and Solomon Islands governments provided support to Tonga after TC Gita. The momentum of 'Pacific supporting the Pacific' is growing and isn't only a clear demonstration of Pacific values but one of regional cohesiveness.

The recent accreditation of the Fiji Emergency Medical Assistance Team as a Type 1 World Health Organization verified capability is a game-changer. For the first time, a Pacific nation stands equal in a key capability with partners such as Australia and New Zealand. The integration of these health capabilities to best meet the needs of the region will be critical. The need to continually practise together to enable smooth joint deployments will take resources, but the pay-off will far outweigh the investment.

As the larger Pacific nations increase their footprint as humanitarian donors, there's a need for a dedicated investment in regional simulations and training to increase interoperability. At the policy level, Pacific leaders are recognising the centrality of humanitarian action, alongside the threat of impacts from climate change. The recent adoption by Pacific leaders of the Boe Declaration on Regional Security for the first time acknowledges the severity of the threat that natural hazards and climate change pose to the prosperity of the region.¹⁸⁹ While the threat of climate change impacts has been referenced in earlier Pacific Island Fora the Boe Declaration distilled regional concerns into a definitive consensus.

A challenge, as well as an opportunity, lies in the implementation of such declarations. Championed by the Pacific Islands Forum Secretariat and the Pacific Community, the FRDP is a sophisticated attempt to support coordination and action on issues related to climate change and DRM.¹⁹⁰ The principles articulated in the FRDP are consistent with those agreed to in the Sendai Framework.

By localising commitments made at the global level, Pacific counterparts are better able to contextualise complex global declarations and turn them into action. The FRDP promotes an integrated list of priorities that have been identified by the region. Through an inclusive and all-stakeholders approach, it aims to increase dialogue and articulate how fragmented action across the region is adding up to more than the sum of its parts.

The work of agencies such as the Pacific Islands Forum Secretariat and the Pacific Community is critical to regionalism. Those agencies are owned by the Pacific and, unlike external donors and multilateral partners, they can speak on behalf of the region. As regional organisations mature in technical capacity, the ability of the Pacific to lead humanitarian action will also increase.

Through the support provided by regional organisations and the increasing capacity of Pacific governments, localisation of disaster preparedness and response is occurring. Localisation in the Pacific context is unlikely to ever mean that the provision of external assistance isn't needed, but it does mean that local voices are able to direct where, when and how assistance is delivered. Through the institutional strengthening and lived experience of Pacific nations, the local voice is louder than it has previously been.

From here, coordination and consolidation of assistance is needed. The PICs will continue to move in the right direction, demonstrating increasing levels of leadership and regional approaches to preparing for and responding to crises. The use of internal surge capacities from across the Pacific, including through mechanisms such as the Fiji Emergency Medical Assistance Team, will empower the region, demonstrating a new era in humanitarian action.

The Sendai Framework, with its 15-year lifespan, remains a viable policy guide to DRR over a pivotal time in the Pacific. The capacity within the region to self-invest in reducing disaster risk is increasing, and the expectation placed on Pacific leaders to prioritise disaster preparedness and resilience is growing more urgent.

The role of UNDRR in supporting the Pacific to translate commitments made under the Sendai Framework into genuine action is critical. Addressing the reporting requirements of the framework can be difficult. The risk is that Sendai is viewed as a reporting burden for the region, rather than a useful commitment that saves lives. We must work together to ensure that it isn't a burden.

ADDENDUM: COVID-19

Dr Paul Barnes

Crises don't wait in line.

The occurrence of Cyclone Harold in the middle of the Covid-19 crisis creates the potential for a range of cascading and cumulative impacts and significant dilemmas across the Pacific. While public health protocols may advise closing borders and physical distancing as part of coping with the virus, disaster relief normally entails the rapid transfer of emergency supplies and the movement of support personnel across borders and regions into devastated areas.

The Pacific island countries and territories (PICs) aren't alone in having to respond to the convergent challenges of climate/weather hazards and emergent diseases: these are currently global issues. A critical difference between the Pacific and many other regions is the significant vulnerability of the region to natural hazards before the pandemic.

The Covid-19 pandemic is an ongoing global health and socio-economic crisis with a long tail of effects that will remain concerning into the future. Distance from major continental landmasses and being at the periphery of major supply chains and transportation routes doesn't confer protection on PICs.

As Dame Meg Taylor, Secretary General of the Pacific Islands Forum, said recently,¹⁹³ 'We must rise to both crises ... Our world is interconnected, and the impacts of transboundary issues are unavoidable.'

The Sendai Framework embodies goals of reducing the risk of damage and human distress from natural hazards and will remain central to risk reduction options for PICs.

The Framework was initiated in 2015. It was the culmination of work following UN Disaster Relief Organization group meetings in the late 1970s, the Yokohama Strategy, the International Strategy for Disaster Risk Reduction, and the Hyogo Framework. Along with other efforts, including the Agenda for Sustainable Development, it's part of broader practical policy terrain described as risk-informed sustainable development.¹⁹⁴

The harsh reality of vulnerabilities faced by the oceanic economies was central to a series of diplomatic engagements that also culminated in 2015. In July that year, Pacific Forum foreign ministers discussed a range of issues and options in Sydney¹⁹⁵ and then subsequently endorsed practical steps and options at the 46th Pacific Islands Forum held in Port Moresby in September 2015, with notable emphases on:

- pre-positioning emergency supplies in the Pacific to enable their timely dispatch to affected communities
- increasing access to multihazard early warning systems
- enhancing legal and policy frameworks to better manage disaster response and recovery
- strengthening intra-regional capacity to support national response efforts, including sharing of information between national emergency response agencies and the Council of Regional Organisations in the Pacific (CROP) agencies¹⁹⁶ about existing disaster management personnel and resources and operating procedures

- running Pacific-focused disaster management leadership training programs
- exploring opportunities to enhance civil–military cooperation to support efficiency in the deployment and distribution of supplies.

The disaster mitigation issues extant in 2015 and the statements made in Sydney and Port Moresby that year remain as important today as then and may be even more so as both climate disasters and pandemic disease outbreaks push society into crisis.

A relevant point noted recently by Mami Mizutori, Special Representative of the Secretary-General for Disaster Risk Reduction, is that when the UN member states adopted the Sendai Framework in 2015 the definition of ‘risk exposure’ was extended to include biological hazards. That expansion resulted from joint policy advice from a number of economies that had historically experienced Ebola, MERS and SARS outbreaks.¹⁹⁷

With the emergence of the Covid-19 pandemic, in tandem with the reality of natural hazards, all global economies affected have applied common interventions such as physical distancing and hygiene interventions in order to curb the spread of the virus. In addition to expected public health responses aligned to international practice, a number of PICs are adjusting to the immediate social and economic fallout from the pandemic.

It would seem an opportune time for the PICs to continue to emphasise and expand preparedness planning and policy development to ensure that additional capability and capacity are put in place, including an efficient and effective rapid public health response as the Covid-19 crisis continues.

The Pacific Community Director-General Dr Stuart Minchen noted in April this year a number of factors that are likely to exacerbate local impacts from the pandemic:¹⁹⁸

- In many of the PICs, access to good-quality health services is limited due to a lack of infrastructure, equipment and qualified personnel. In the current situation, this will pose a problem of access to care, depending on infection rates, as the number of infected people increases.
- Most PICs don’t have the needed laboratory equipment to analyse infection tests on site, creating difficulties in the rapid identification and confirmation of cases. The test samples have had to be sent to other regional economies for analysis.
- PICs normally have high numbers of visiting tourists. If uncontrolled, those movements, while critical to local economies, represent a preventable vulnerability, especially when many people may have been asymptomatic at the time of entry.

These factors are likely to be important in shaping the nature and type of aid that will be needed across the Pacific in the short term as strict social distancing and hygiene practices are applied. Equally, pressure to open borders to tourism will be a key issue even though international travel has been significantly reduced.

It’s been noted that even the two largest economies in the region, Fiji and Papua New Guinea, haven’t had the fiscal capacity to provide immediate recovery packages to sustain businesses and provide income support to those facing unemployment as a result of private- and public-sector shutdowns.¹⁹⁹

Steps for the future

Climate change (and related weather uncertainty) has become a major existential threat and an ongoing global security issue. It represents a constellation of risk exposures that threaten human and environmental security as well as socio-economic stability on multiple levels: it’s a significant threat multiplier.

While the occurrence of climate/weather disasters can’t be prevented, we can limit the severity of the destruction that they bring: this is a central tenet of the Sendai Framework and a central issue examined in this report. Similarly, the emergence or re-emergence of infectious disease, while less difficult to prevent, is obviously as devastating, as we’ve seen globally over the past six months.

In the case of PICs, reducing their vulnerability to climate-driven disasters and the effects of pandemic disease is critically important. Sustained and coordinated effort is needed. Two obvious areas are as follows.

1. Sustain the implementation of agreed risk reduction frameworks and linked courses of action

Ongoing support for implementing the Sendai Framework should be encouraged across the region. There's an expectation that a substantial number of member states will have a national strategy for disaster risk reduction implemented by the end of this year. However, to date, only 81 countries report having strategies in place.

It's timely to reinforce the benefits of expanding the Sendai Framework application across the Pacific and ensuring that such implementation addresses the threat of contagious disease and biosecurity factors, as originally intended in 2015 when it was activated.

The importance of this inclusion was reinforced by the Global Preparedness Monitoring Board, which is affiliated with the World Health Organization (WHO). In its first annual report in 2019, the board advised of the critical need for global capabilities and capacities for preparedness for health emergencies and of the need to proactively establish systems and frameworks needed to detect and control potential disease outbreaks.²⁰⁰

Such efforts, however, need to meaningfully engage communities, institutions and governments globally to invest in health emergency preparedness, response and recovery—all of which can improve health outcomes, build community trust, reduce poverty, and as a result contribute to achieving the UN Sustainable Development Goals.

The WHO's report emphasised the importance of strong and robust national systems that include the involvement of multiple stakeholders, ranging from elected governments, human and animal health specialists and security and foreign affairs practitioners to the private sector, communities, women and youth. These inclusion factors are critically important.

2. Plan to the scale needed for effective and sustained DRR efforts (regionally)

The 2017 *State of Pacific regionalism report* noted that uncertainties arising from growing political, economic and environmental trends were likely to further exacerbate the vulnerabilities and dependencies that the region experienced at that time.²⁰¹ The report suggested that the development efforts of Pacific regionalism will need to be focused on collective needs and target opportunities to apply resources to deliver planned outcomes.

Arguably, such a collective approach requires a deep understanding of regional and local vulnerabilities and capacities to anticipate emergent threats and activate institutional responses to events ahead of significant impacts. Effective planning is critically important, but a capability for anticipation and agility at institutional and whole-of-economy levels may be more important.

Three years ago, the Commission on a Global Health Risk Framework for the Future proposed measures to stave off health disasters, including an annual investment of \$3.4 billion to upgrade national health systems, a further \$1 billion investment in research and development and up to \$155 million for the WHO to establish a dedicated Centre for Health Emergency Preparedness and Response.²⁰²

Also in 2017, the World Bank emphasised the importance of investing in capability and capacity for pandemic preparedness, especially given the significant impact categories, ranging from morbidity and mortality to wider socio-economic impacts.²⁰³ Such investments might also be guided by a deep understanding of current and future vulnerabilities from an all-hazards perspective.

In retrospect, much of that reporting seems prescient. Last year, the Global Preparedness Monitoring Board also emphasised that economies, donors and multilateral institutions must be prepared for significant and even pandemic-level disease outbreaks by ensuring adequate investment in developing innovative vaccines and

therapeutics, surge manufacturing capacity, broad-spectrum antivirals and appropriate nonpharmaceutical interventions.²⁰⁴ There may also be a role for Australian assistance in this area via the ongoing efforts of the Indo-Pacific Centre for Health Security.²⁰⁵

As Secretary General Taylor has said, the Covid-19 pandemic and climate change crises are cross-cutting—both require a holistic and whole-of-government approach.²⁰⁶ They are crises that also require governments to reach out to civil society and the private sector, as integrated, innovative solutions are needed.

Future crises will not wait in line. Multi-sourced cascading impacts on communities and regions across the Pacific economies should be planned for and mitigation strategies invested in. This will need to be a collaborative effort among regional neighbours.

ABOUT THE AUTHORS

Beyond Sendai

Dr Robert Glasser served as Special Representative of the UN Secretary-General for Disaster Risk Reduction and Head of the UN Office for Disaster Risk Reduction from January 2016 to March 2018. Prior to his UN service, from 2008, Dr Glasser was the Secretary General of CARE International—a major non-government humanitarian organisation active in more than 80 countries. From 2003 to 2007, he was the Chief Executive of CARE Australia. Before joining CARE, he was Assistant Director General at the Australian Agency for International Development.

Dr Glasser is currently a Visiting Fellow at ASPI and an honorary associate professor at the Crawford School of Public Policy at the Australian National University.

Papua New Guinea

Darian Clark has broad experience from a diverse career in international development, with a particular focus on governance, gender and humanitarian affairs.

As the director of the PNG Partnership Fund, he currently manages a \$120 million portfolio of grants to six NGO consortiums working in the health and education sectors across PNG, including a new multidonor-funded immunisation grants program. He is responsible for all aspects of grant management, including reporting, monitoring, financial management, risk compliance and pipeline planning.

Mr Clark has worked in three countries with the Department of Foreign Affairs and Trade and AusAID: Timor-Leste (2009–11), Afghanistan (2012–13) and PNG (2016–19). He has managed programs across various sectors in those countries: governance, law and justice, and humanitarian assistance in Timor-Leste; economic development (mining, agriculture, infrastructure and public financial management) in Afghanistan; and climate change, humanitarian aid, aid coordination and public sector reform in PNG.

He has also served in strategic executive roles in Canberra, working with central federal agencies to advance foreign policy priorities with the multilateral development banks. He was previously a departmental liaison officer in the office of the Family and Community Services Minister in the Australian Parliament.

Mr Clark completed a Master of Globalisation (with Merit) at the ANU in 2015, which included an internship in the Office of Gai Brodtmann MP (former Member for Canberra) in the Australian Parliament. This built on his BA (First Class Honours) at the ANU in 2001, specialising in international relations.

Solomon Islands

Linda Flora Vaie is a PhD candidate at the University of the South Pacific's Pacific Centre for Environment and Sustainable Development (PaCE-SD). She also assists in teaching postgraduate diploma courses at the university. Her research interests lie in the areas of climate finance and its contribution towards resilient and sustainable development in Pacific small island developing states.

Diana Hinge Salili is a PhD candidate at PaCE-SD. She also teaches climate change and disaster risk management at PaCE-SD and is involved in research on climate-change-related risks, climate insurance, resilience, and policy and institutional structures for the implementation of risk resilience initiatives. She has served as a contributing author to Chapter 5 ('Strengthening the global response in the context of sustainable development') of the special report on *Global warming of 1.5°C* produced by the Intergovernmental Panel on Climate Change (IPCC). She has also served as an adviser to Pacific islands delegations at the UN Framework Convention on Climate Change negotiations.

Vanuatu

Malcolm Dalesa is an environmental manager and sustainability consultant with over 10 years of experience, working mostly in Vanuatu and the Pacific region. He has spent those years proposing, implementing and assessing environmental management, climate change or DRR policies, and has supported and analysed country and organisation sustainable development strategies since 2012. He has been substantively involved in the integration of environment and climate change considerations into planning, investments and project design as part of the UNDP's Pacific Risk Resilience Programme.

Mr Dalesa is currently supporting the implementation of a project on technology needs assessment (adaptation sector) in Vanuatu, funded by the UN Environment Programme. He holds a Master of Environmental Science, Policy and Management from the Central European University, Hungary, and a Bachelor of Applied Science (environmental health major) from Massey University, New Zealand.

Rebecca McNaught is a partner of Pacific Connections (Australia), which is a boutique consultancy business providing research and advisory services on issues relating to the Pacific region. She spent 14 years working across Asia, the Pacific, the Middle East and North Africa as a climate and disaster risk management adviser for both the UN and the Red Cross. In Australia, she has worked for the Victorian Government on sustainable agriculture and revegetation programs and has written extensively for academic and practitioner audiences on climate change and DRM.

Ms McNaught is currently undertaking her PhD at Griffith University's Business School. She holds a Master of Philosophy (Geography) from the University of Melbourne, a Bachelor of Environmental Science (Integrated Catchment Management) from Deakin University and a Diploma of Natural Resource Management from South West TAFE.

Dr Johanna Nalau is an adaptation scientist with a PhD in climate change adaptation at Griffith University. Her research focuses on understanding climate adaptation decision principles and what role adaptation science does and can play in decision-making and policymaking. She is an Australian Research Council DECRA Fellow and is leading an Australian first project on the development and feasibility of core adaptation decision principles. The project aims to uncover such key principles, investigate their feasibility as decision guides, and provide more robust advice on how to invest and pursue effective and successful adaptation to climate change that enables benefits to the environment, society and security.

Dr Nalau is lead author in the IPCC's 6th assessment report (in Working Group II, Chapter 15, 'Small islands'), managing editor of the *Journal of Climate Risk Management*, and Science Committee Member of the World Adaptation Science Program. She also leads the Adaptation Science Research Theme at Cities Research Institute at Griffith University, which focuses on bringing together the university's key thinkers on adaptation. She was recently recognised as the Griffith University Young Outstanding Alumni 2019 for the Sciences Group and is passionate about building the capacity of the next generation through leadership, career development guidance and research excellence.

Samoa

Filomena Nelson is the Climate Change Adaptation Adviser at the Secretariat of the Regional Environment Programme. She took up that position in October 2017 after serving the Government of Samoa through the Ministry of Natural Resources and Environment for 18 years in various roles, including finance, project coordination and DRM. She was formerly the Assistant Chief Executive Officer for the Disaster Management Office. In that role, she spearheaded governance and policy reviews as well as enhancing operational arrangements for the efficient and effective coordination of DRM in Samoa, which led to the establishment of the fully-fledged and resourced Disaster Management Office as a division of the Ministry of Natural Resources and Environment. In that role, she initiated the establishment of the community DRM program, national tsunami warning system and national emergency evacuation drills, and secured resources to develop the National Emergency Operation Centre and Search and Rescue Facility. She was the National Response Coordinator for the 2009 Pacific tsunami that affected Samoa, American Samoa and Tonga, and for TC Evan in 2012.

On the international front, Ms Nelson represented the Government of Samoa as its lead on DRM, including in the negotiations on the Sendai Framework. She was one of the co-chairs for the steering committee that led the development of the FRDP. She was also the chairperson of the Intergovernmental Oceanographic Commission's Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System.

Ms Nelson holds a Bachelor of Arts degree with a double major in financial management and public administration from the University of the South Pacific, Fiji, and a Postgraduate Certificate in Humanitarian Partnership from Deakin University in Melbourne, Australia. She is a *matai* title holder of her village of Faleapuna on the island of Upolu.

Fiji and Tonga

Anna Schimel is a resilience and sustainability specialist with a multifaceted background. She has held research positions around the globe in the US, Norway and Fiji. During her time in the Pacific, she worked on the AusAID Enhanced Climate Change Adaptation Project, producing the *Best practices in community climate adaptation project implementation* report for the Pacific Centre for Environment and Sustainable Development. Ms Schimel worked with the Fijian Government on the Second National Climate Adaptation Workshop. She provided communication and outreach support to the diverse 12th Pacific Science Inter-congress, 'Science for Human Security and Sustainable Development in the Pacific Region', hosted by the University of the South Pacific, and to the inspiring inaugural summit of the Pacific Islands Development Forum, 'Sustainable Blue-Green Economies'. Ms Schimel worked at the White House Council on Environmental Quality, assisting in the inaugural State, Local, and Tribal Leaders Task force on Climate Preparedness and Resilience, created at the direction of President Obama's Climate Action Plan.

Ms Schimel has a BSPA from the University of Indiana's School of Public and Environmental Affairs and an MA in Climate and Society from Columbia University's Earth Institute. She worked at the University of Bergen's Bjerknes Center for Climate Research to map the Bjerknes Center Strategic Plan and research projects to the UN SDGs and targets.

Tonga

Professor Elisabeth Holland is Norway-Pacific Chair in Oceans and Climate Change. She was the director of the Pacific Centre for Environment and Sustainable Development (PaCE-SD), and the University of the South Pacific's professor of climate change from 2012 to 2019. She's passionate about research, students, and working collaboratively with communities to support sustainable development practices that protect the health of PICs. The PaCE-SD team and Professor Holland established a locally managed climate adaptation network of 100 villages in 15 PICs: Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, PNG, the Republic of the Marshall Islands, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.

Before coming to the University of the South Pacific, Professor Holland was internationally recognised for her work on the Earth system. She is an author of five of the six IPCC reports, having served as a US, German, and Pacific islands representative, and was a co-recipient of the 2007 Nobel Peace Prize for her contribution to the IPCC.

With a career spanning more than three decades, Professor Holland is a Fellow of the American Association of the Advancement of Sciences and a Leopold Fellow, led her university's delegation to support eight PIC governments in negotiating the Paris Agreement, and served as a professor at the Max Planck Institute for Biogeochemistry in Germany and senior scientist and interdisciplinary leader at the National Center for Atmospheric Research in Boulder, Colorado, USA.

Kiribati

Dr Colleen Butcher-Gollach holds an honorary appointment as Principal Fellow in the Faculty of Architecture, Building and Planning, University of Melbourne, Australia. As associate professor, she's responsible for postgraduate teaching on 'Cities without slums' and related research on spatial planning and regulatory frameworks for risk-informed affordable land and housing, DRR and urban governance issues. She was a senior urban specialist and task team leader in the World Bank's Africa Urban and Water Unit and, more recently, as staff consultant, continues to work in Southeast Asia and the Pacific on numerous World Bank infrastructure, affordable housing and post-disaster needs assessment and reconstruction project teams, including in eight PICs.

Dr Butcher-Gollach is appointed to the Programme Design Support Services Panel on International Development and the Monitoring Evaluation and Learning Panel for the New Zealand Aid Programme, Ministry of Foreign Affairs and Trade, and was a senior urban development expert on the Asian Development Bank's Pacific Region Infrastructure Facility Infrastructure Advisory Panel. She has undertaken practice-oriented research and documentation for the UNDP with a focus on building the knowledge, attitudes and practices of poor and extremely poor communities and local governments for climate change adaptation and resilience strengthening.

Nauru

Mavis Depaune is currently enrolled as a PhD candidate with the School of Earth, Atmospheric and Life Sciences at the University of Wollongong. She graduated with a Masters in Environmental Science at the university in 2014 and a Bachelor of Environmental Science at the University of the South Pacific in 2009. Her current research is focused on 'Explaining how fish contribute to blue carbon'. She was the national project coordinator of the Pacific Adaptation to Climate Change project funded by the UNDP through the secretariat of the Pacific Regional Environmental Programme from 2009 to 2013. After completing her Masters, she initially worked out of the Department of Foreign Affairs and Trade on the Pacific Climate Change on Migration project funded by the UN Economic and Social Commission for Asia and the Pacific, a national focal point for the Pacific Islands Development Forum, and as environmental adviser to the Office of the President. She was appointed as the Secretary for Commerce, Industry and Environment in 2016 until she submitted her resignation to pursue further studies.

Ms Depaune is a member of EcoNauru and an advocate on environmental, waste and climate change issues. She has represented the Republic of Nauru on such issues in her capacity as project coordinator, adviser and head of Commerce, Industry and Environment.

Monte Depaune is with the Nauru Fisheries Marine Resources Authority as a senior fisheries officer and is currently a PhD candidate at the University of Wollongong in the School of Law and the Australian National Centre for Ocean Resources and Security (ANCORS). He completed his Masters in Fisheries Policy with distinction with ANCORS in 2014 and obtained his Bachelor of Arts (Marine Affairs and Economics) degree in 2007 from the University of the South Pacific. He has represented the Republic of Nauru at international, regional, subregional and national meetings since 2001, including on trade from 2009. His current research focus is on optimising economic benefits from the tuna fishery for Nauru within the context of the Western and Central Pacific Fisheries Commission, the parties to the Nauru Agreement and international trade.

Mr Depaune is a member of EcoNauru, a strong advocate for the safety and protection of fisheries observers and a firm supporter of continuously improving monitoring, control and surveillance in preventing and combating illegal, unregulated and unreported fishing. He believes in sustainable fisheries for food security and the livelihoods of Pacific people.

Future challenges

Patrick Haines is an experienced project manager with a strong background in corporate services and aid implementation. As a Vanuatu national, he spent 16 years working for the Australian Government in several senior management positions, including as the senior program manager overseeing the TC Pam response and recovery programs, valued at over A\$50 million. He has a strong background in humanitarian action. During his time at the Australian High Commission in Port Vila, he used his extensive network of key humanitarian stakeholders to provide advice to senior management, including the Australian High Commissioner, on shaping Australia's humanitarian response in both early relief and long-term recovery.

Mr Haines currently works with the Pacific Community as head of the Pacific Islands Emergency Management Alliance (PIEMA) project, which aims to strengthen coordination and collaboration between whole-of-government emergency management agencies in 14 PICs. Through his work at the regional level, he has built a strong network of contacts across the Pacific, including with Pacific disaster management and security agencies.

Mr Haines has a particular passion for gender equality and empowerment in the disaster management sector. Through the PIEMA project, he has commissioned work on a strategy to guide the project's efforts in addressing gender equality and empowerment in the Pacific region's emergency management sector, including identifying leadership pathways for high-potential women. His connection to the Pacific, combined with his deep understanding of working with development partners and NGOs, has allowed him to inform government policy and represent at senior levels.

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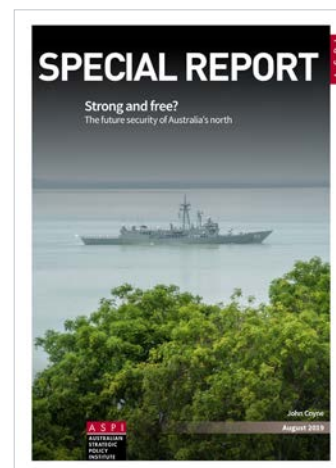
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ACRONYMS AND ABBREVIATIONS

CIVA tool	Community Integrated Vulnerability Assessment tool
DMO	Disaster Management Office (Samoa)
DRM	disaster risk management
DRR	disaster risk reduction/resilience
EEZ	exclusive economic zone
EU	European Union
FRDP	Framework for Resilient Development in the Pacific
GDP	gross domestic product
HFA	Hyogo Framework for Action
JNAP	joint national action plan
KMS	Kiribati Meteorological Service
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology (Solomon Islands)
ML	megalitre
MORDI Program	Mainstreaming of Rural Development Innovations Program (Tonga)
NDC	National Disaster Centre (PNG)
NDMO	National Disaster Management Office (Vanuatu)
NDMP	National Disaster Management Plan (Samoa, Fiji)
NDRM Act	National Disaster Risk Management Act 2008 (Nauru)
NDRM Plan	National Disaster Risk Management Plan (Nauru)
NDRRF	National Disaster Risk Reduction Framework 2017–2030 (PNG)
NDS	National Development Strategy (Solomon Islands)
NGO	non-government organisation
NSDS	National Sustainable Development Strategy (Nauru)
PaCE-SD	Pacific Centre for Environment and Sustainable Development
PARTneR	Pacific Risk Tool for Resilience
PDC	provincial disaster committee (PNG)

PDNA	post-disaster needs assessment
PICs	Pacific island countries and territories
PIEMA	Pacific Islands Emergency Management Alliance
PNG	Papua New Guinea
RONadapt	Republic of Nauru Framework for Climate Change Adaptation and Disaster Risk Reduction
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
TC	tropical cyclone
UN	United Nations
UNDP	UN Development Programme
UNDRR	UN Office for Disaster Risk Reduction
UNOCHA	UN Office for the Coordination of Humanitarian Affairs

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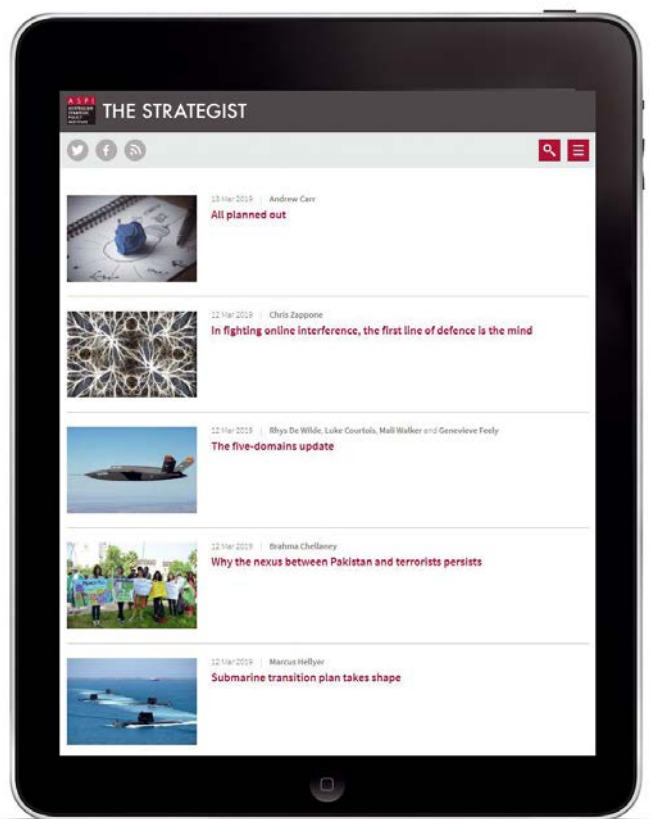


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