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Country Note

TONGA

February 2015

Disaster Risk Financing and Insurance

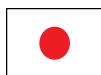
PCRAFI 2015



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The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) is a joint initiative between the Secretariat of the Pacific Community

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The Disaster Risk Financing and Insurance Program is grateful for the financial support received from the government of Japan and the Global Facility for Disaster Reduction and Recovery.

Acronyms and Abbreviations

DRFI	Disaster Risk Financing and Insurance
GDP	gross domestic product
HFA	Hyogo Framework for Action
JNAP	Joint National Action Plan
ISR	Industrial Special Risks
MoF	Ministry of Finance
NEMO	National Emergency Management Office
NPI	National Pacific Insurance
PIC	Pacific Island Country
PCRAFI	Pacific Catastrophe Risk Assessment and Financing Initiative
RFA	Regional Framework for Action
SOPAC	Applied Geoscience and Technology Division of SPC
SPC	Secretariat of the Pacific Community
SOE	state-owned enterprise
TAL	Tonga Airports Ltd.
TC	Tropical Cyclone
TPL	Tonga Power Ltd.
T\$UNDP	United Nations Development Programme
UNISDR	United Nations International Strategy for Disaster Risk Reduction

Currency: Tongan pa'anga (T\$)

Average exchange rate: US\$1 = T\$1.79

Section

A

Executive Summary

Tonga is an archipelago composed of 172 islands spread across a combined land and sea area of 720,000km². According to the 2011 census, Tonga had a population of 103,252 people spread across 36 of the 172 islands. A population scattered so widely across such a large area can pose logistical problems for efforts to facilitate and finance disaster response.

In January 2014, Tropical Cyclone Ian caused widespread damage and destruction on the islands of Ha'apai and Vava'u. Approximately 1,094 buildings in Ha'apai were either destroyed or damaged, and some 2,335 people sought shelter in evacuation centers. There were reports of significant damage to houses, infrastructure, and agriculture across 18 villages located on the islands of Ha'apai, including Uiha, Uoleva, Lifuka, Foa, Ha'ano, and Mo'unga'one. Total ground-up loss for this event was estimated at T\$90 million (US\$50.3 million), of which T\$20.5 million (US\$11.5 million) was attributable to emergency loss (PCRAFI 2014).¹

Tonga is expected to incur, on average, T\$28.2 million (US\$15.8 million) per event per year in losses due to earthquakes and tropical cyclones. In the next 50 years, Tonga has a 50 percent chance of experiencing a per event loss exceeding T\$319 million (US\$178.2 million), and a 10 percent chance of experiencing a per event loss exceeding T\$783 million (US\$437.4 million) (PCRAFI, 2012).

Tonga has the ability to raise a maximum of T\$21.5million (US\$12 million) for disaster response. This figure is based on the contingency budget for the fiscal year 2013/14, the maximum

annual appropriation into the emergency fund, and the aggregate coverage limit from the catastrophe risk insurance pilot. It should be emphasized that this amount is a maximum and—given the nature of the contingency budget—dependent on how much remains in the budget during the fiscal year when the event occurs. Similarly, the aggregate payout is the absolute maximum that Tonga could receive following an earthquake/tsunami or tropical cyclone. It is estimated that there is a 4.4 percent chance that disaster losses will exceed this amount in any given year.

The Tongan government does not have an indemnity property insurance program in place for its infrastructure assets or property. The government keeps no centralized register of insurance arrangements made by individual government departments, public authorities, or state-owned enterprises.

This report presents for consideration a number of options for improving current measures for disaster risk financing and insurances:

- (a) develop an overarching disaster risk financing strategy aligned to existing processes;
- (b) develop an operations manual detailing the processes required to facilitate swift post-disaster budget mobilization and execution; and
- (c) develop an insurance program for key public assets.

Section

A

Introduction

Tonga is an archipelago composed of 172 islands spread across a combined land and sea area of 720,000km². According to the 2011 census Tonga had a population of 103,252 people spread across 36 of the 172 islands; this represents an increase of only 1.2 percent since 2006. A population scattered so widely over such a large area can pose logistical problems for efforts to facilitate and finance disaster response.

In January 2014, Tropical Cyclone (TC) Ian caused widespread damage and destruction on the islands of Ha’apai and Vava’u.

Approximately 1,094 buildings in Ha’apai were either destroyed or damaged, and some 2,335 people sought shelter in evacuation centers. Significant damage was reported to houses, infrastructure, and agriculture across 18 villages located on the islands of Ha’apai, including Uihia, Uoleva, Lifuka, Foa, Ha’ano, and Mo’unga’one. Total ground-up loss for this event was estimated at T\$90 million (US\$50.3 million), of which T\$20.5 (US\$11.5 million) was attributable to emergency loss (PCRAFI 2014).²

The government of Tonga, in conjunction with the Secretariat of the Pacific Community Applied Geoscience Division (SPC-SOPAC), the Secretariat of the Pacific Regional Environment Programme (SPREP), the United Nations Development Programme (UNDP) Pacific Centre, and the United Nations International Strategy for Disaster Risk Reduction (UNISDR) as well as other partners, has developed several institutional frameworks on disaster risk management and climate change

adaptation at the national, subregional, and international level. These include the following:

- Hyogo Framework for Action (HFA) 2005–2015
- Pacific Disaster Risk Reduction and Disaster Management Framework for Action (Regional Framework for Action, or RFA) 2005–2015
- Tonga’s National Disaster Management Plan and Emergency Procedures
- Tonga’s Joint National Action Plan (JNAP) for Disaster Risk Management and Climate Change Adaptation, 2010–2015

Disaster risk financing and insurance (DRFI) is a key activity of the HFA Priorities for Action 4 and 5.³ The HFA is a result-based plan of action adopted by 168 countries to reduce disaster risk and vulnerability to natural hazards and to increase the resilience of nations and communities to disasters over the period 2005–2015. In the Pacific, the HFA formed the basis for the development of the Pacific Disaster Risk Reduction and Disaster Management Framework for Action (Regional Framework for Action, or RFA).

The Regional Framework for Action cites DRFI activities as a key national and regional activity. Theme 4—“Planning for effective preparedness, response and recovery”—has an associated key national activity, “Establish a national disaster fund for response and recovery.” Moreover, Theme 6 of the RFA—“Reduction of underlying risk factors”—cites the development

of “financial risk-sharing mechanisms, particularly insurance, re-insurance and other financial modalities against disasters as both a key national and regional activity” (SOPAC 2005). These regional implementation activities align with the three-tiered disaster risk financing strategy promoted by the World Bank.

DRFI is included in Goal 1 of Tonga’s Joint National Action Plan for Disaster Risk Management and Climate Change Adaptation (GoT 2010). The overarching outcome for this goal is to mainstream disaster risk management and climate change adaptation into planning, decision making, and budgetary processes.

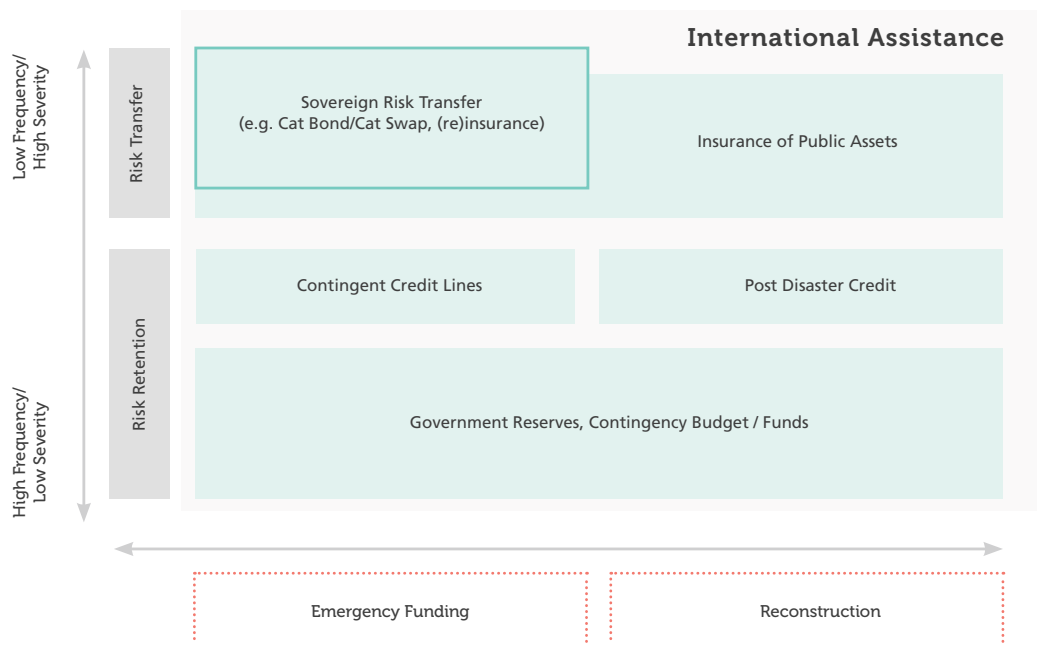
The Pacific DRFI Program enables countries to increase their financial resilience against natural disasters by improving their capacity to meet post-disaster funding needs without compromising their fiscal balance. This program is one application of the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI). The Pacific DRFI Program is built upon a three-tiered approach to disaster risk financing. These layers

align to the basic principles of sound public financial management, such as the efficient allocation of resources, access to sufficient resources, and macroeconomic stabilization. The three tiers acknowledge the different financial requirements associated with different levels of risk:

- (a) Self-retention, such as a contingency budget and national reserves, to finance small but recurrent disasters;
- (b) A contingent credit mechanism for less frequent but more severe events; and
- (c) Disaster risk transfer (such as insurance) to cover major natural disasters. See Figure 1.

This report aims to build understanding of the existing DRFI tools in use in Tonga. Specifically, it aims to encourage peer exchange of regional knowledge through dialogue on past experiences, lessons learned, optimal use of these financial tools, and their effect on the execution of post-disaster funds.

Figure 1 — Three-Tiered Disaster Risk Financing Strategy



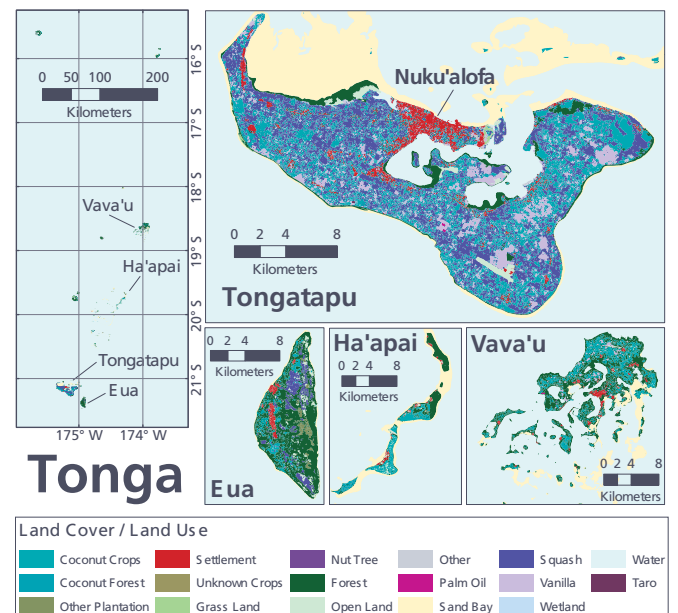
Source: World Bank 2010.

Economic Impact of Natural Disasters

Since 1997 Tonga has experienced approximately 14 natural disasters. These affected a total of 109,000 people and damaged over 1,500 homes.⁴ In 1982 TCs Isaac and Waka destroyed many homes along with much of the country's agricultural crops, causing T\$134.2 million (US\$75 million) in losses and severely harming the local economy. Tonga is also susceptible to earthquakes and was affected by the 2009 magnitude 8.1 earthquake and subsequent tsunami, which destroyed over half of the houses on Niuatoputapu before continuing to cause further damage on the shore of Samoa.

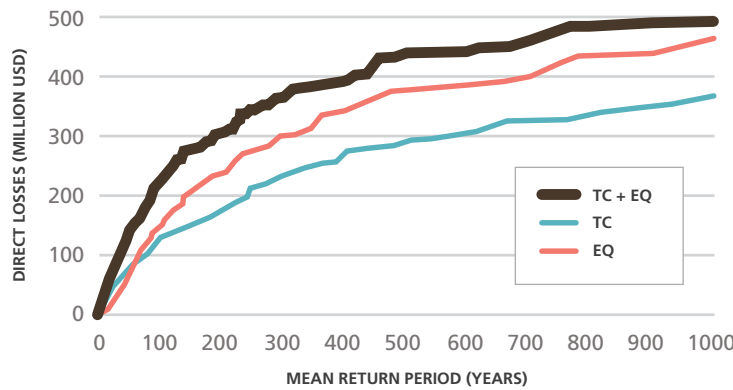
Tonga has a narrow economic base that is led by the agriculture sector, closely followed by tourism; both of these industries are susceptible to natural disasters. In 2012/13, the commerce, restaurants, and hotels sector and the agriculture, fisheries, and forestry sectors grew by 2.1 percent. Figure 2 shows land use and land cover in Tonga and demonstrates the level of agricultural production, in particular the level of investment in coconut and squash production.

Figure 2 — Land Use/Land Cover



Source: PCRAFI 2012.

Figure 3 — Direct Losses by Return Period



Source: PCRAFI 2012

Note: TC = tropical cyclone; EQ = earthquake

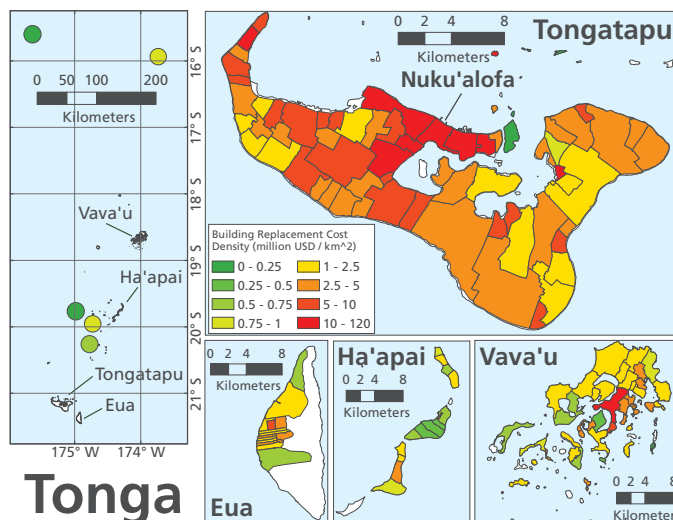
Tonga is expected to incur, on average, T\$28.2 million (US\$ 15.8 million) per event per year in losses due to earthquakes and tropical cyclones. In the next 50 years, Tonga has a 50 percent chance of experiencing per event loss exceeding T\$319 million (US\$178.2 million), and a 10 percent chance of experiencing a per event loss exceeding T\$783 million (US\$437.4 million) (see Figure 3).

Average annual loss is depicted by area in Figure 4. Those areas in red indicate high levels of average annual losses, with a range of loss between

T\$0.9 million and T\$2.3 million (US\$0.5 million–1.3million).

The post-disaster economic assessment conducted following TC Ian estimates the combined physical damage and economic loss from this event to be T\$90 million (US\$50.3 million), equivalent to 11 percent of Tonga’s gross domestic product (GDP). This figure is based on the immediate physical damage, which was largely to houses, transport infrastructure, and agriculture. Recorded damage accounts for 80 percent of this figure, with losses accounting for the remaining 20 percent.

Figure 4 — Average Annual Loss by Area



Source: PCRAFI 2012

Public Financial Management of Natural Disasters

Effective post-disaster financial response relies on two fundamental capabilities:

- (a) The ability to rapidly mobilize funds post-disaster; and
- (b) The ability to execute funds in a timely, transparent, and accountable fashion. This section discusses the existing procedures for post-disaster budget mobilization and execution.

Where possible, the discussion will use examples from Tonga's experience with TC Ian, a category 5 cyclone (with winds over 200kph recorded) that struck on January 11–12, 2014.

TC Ian caused widespread damage and destruction over the northeast islands of Ha'apai, and the response efforts placed considerable pressure on core government staff.

In particular, there was pressure on the National Emergency Management Office (NEMO) and the Ministry of Finance (MoF), both of which act immediately following a disaster. Following a statement of emergency, the MoF relocates a member of staff to the NEMO.

This move helps to ensure that procurement of emergency supplies occurs as quickly as possible; normally it is senior staff with signing authority who are relocated.

Post-Disaster Budget Mobilization

Tonga has a variety of ex-ante and ex-post financial tools at its disposal, and the timing for mobilizing and executing these funds varies significantly. Building on the World Bank framework for disaster risk financing and insurance (see annex 1), table 1 shows the ex-ante and ex-post financial tools available, indicates those utilized by Tonga, and gives indicative timings for mobilization of the funds. The tools utilized by Tonga are highlighted in blue. Those sections highlighted in gray are for generic instruments that to date have not been used in Tonga.

The sections below discuss in detail the ex-ante and ex-post finance tools available to Tonga, including the time it takes to mobilize these funds and the amount of funds available.

Ex-Ante Practices and Arrangements

The uncertainty surrounding international assistance following a disaster has put pressure on countries to establish domestic sources of finance for post-disaster relief, such as national reserves and instruments that transfer risk to the international insurance market. The ex-ante arrangements that have been made by Tonga include an emergency fund, a contingency budget, and sovereign catastrophe risk insurance.

Emergency fund

Tonga's emergency fund was established in June 2008. An annual appropriation up to a maximum of T\$5 million (US\$2.79 million) can be placed into the fund in any fiscal year. The fund is able to accrue, and the monies are used exclusively for the purpose of providing timely and efficient relief and reconstruction following

an emergency. It is estimated that there is a 21 percent chance that disaster losses will exceed the maximum amount that can be appropriated in any given year.

On January 10, 2014, the day before TC Ian made landfall, the early warning system and subsequent statement of emergency facilitated access to the emergency fund via the national emergency operations account.

Access to the fund facilitated the purchase of rations and electrical supplies and ensured that sufficient stock was available for mobilization immediately after the event.

Contingency budget

Each year, the level of the contingency fund is agreed upon by the Legislative Assembly, with the stipulation that it must not exceed 5 percent of the Tonga Government Fund. With

Table 1— Sources of Funds Available

	SHORT TERM (1-3 MONTHS)	MEDIUM TERM (3-9 MONTHS)	LONG TERM (OVER 9 MONTHS)
<i>Ex-post Financing</i>			
Donor Assistance (relief)			
Budget Reallocation			
Domestic Credit			
External Credit			
Capital Budget Realignment			
Donor Assistance (reconstruction)			
Tax Increase			
Flash Appeal			
<i>Ex-ante Financing</i>			
Emergency Fund			
Contingency Budget			
Contingent Credit			
Sovereign (parametric) Catastrophe Risk Insurance			
Traditional Disaster Insurance			

Source: Government of Tonga; World Bank.

Box 1— The Pacific Catastrophe Risk Insurance Pilot

The Pacific Catastrophe Risk Insurance Pilot aims to provide immediate budget support following a major tropical cyclone or earthquake/tsunami. The insurance is designed to cover emergency losses, which are estimated using both a modeled representation of the event based on hazard parameters and a calculation of total modeled physical damage. Unlike a conventional insurance scheme, where a payout would be assessed against actual incurred costs, this scheme pays out on the results of a model. The advantage of this approach is that it results in a much faster payout. The payout would act as a form of budget support and would go some way to cover the costs that would be incurred by the

government in the aftermath of a severe natural disaster that disrupts the provision of government services. Countries can choose between three layers of coverage—low, medium, and high—depending on the frequency of events. The lower layer will cover events with a return period of 1 in 10 years, that is, more frequent but less severe events. The medium layer will cover events with a 1-in-15-year return period, while the higher layer will cover less frequent but more severe events, or those with a return period of 1 in 20 years. However, countries may request that a more customized option be developed for them.

the approval of the Privy Council, the minister of finance may release funds from the contingency fund as deemed necessary, as long as they remain within the limits of the set contingency. In 2013/14, the contingency budget was set at T\$1.5 million (US\$0.84 million), equivalent to 0.75 percent of total expenditure.

Sovereign catastrophe risk insurance

The coverage selected by Tonga provides an aggregate coverage limit worth more than five times the unforeseen payments

(contingency budget) for the fiscal year 2014/15 (see table 2). Tonga chose the lowest level of coverage available, that is, it opted for coverage of more frequent but less severe events (those with a return period of 1 in 10 years) for both tropical cyclone and earthquake/tsunami. The coverage is in effect from November 1, 2014, to October 31, 2015.

In January 2014, the government of Tonga received T\$2.3 million (US\$1.27 million) from its catastrophe risk insurance policy,

Table 2— Sources of Funds Available

	TROPICAL CYCLONE	EARTHQUAKE
Policy period	November 1, 2014–October 31, 2015	
Peril selected	Tropical cyclone	Earthquake
Layer of coverage selected	1 in 10 years	1 in 10 years
Coverage limit as a percentage of contingency budget	>300 percent	>300 percent
Reporting agencies	Joint Typhoon Warning Center	United States Geological Survey

Source: Government of Tonga; World Bank.

Section

03

equivalent to more than the 2013 contingency budget, or half of the current reserves of the Tonga National Reserve Fund. Following TC Ian, Tonga was the first country to receive a payout under the Pacific Catastrophe Risk Insurance Pilot.

Ex-Post Practices and Arrangements

By definition, a disaster exceeds a country's capacity to cope with it, and there will therefore always be a need for ex-post practices and arrangements. An optimal strategy for DRFI relies on a combination of ex-ante and ex-post financial instruments. Ex-post arrangements benefit from being able to establish the extent of the disaster and prioritize the response needs. Hence these arrangements take longer to implement than ex-ante arrangements, but they can often mobilize larger amounts of finance. This section discusses the ex-post practices and arrangements that have been made by Tonga.

Budget reallocation

Under the Public Financial Management Act (2002), program funds may be transferred within a ministry at the request of the minister and with the approval of the minister of finance. The amount transferred must leave the total appropriation for that ministry unaltered and cannot increase the appropriation for that particular program by more than 10 percent. These budget variations must be reported in the

financial statements for that year. Anecdotally it is understood that it may take two to three days to transfer funds.

External debt

The stock of debt at the end of fiscal year 2013/14 was T\$368.2 million (US\$206 million), equivalent to 44 percent of GDP, with external debt accounting for approximately 92 percent of this. Following steps to strengthen fiscal management, including a debt sustainability analysis conducted by the World Bank and the International Monetary Fund, in 2013 Tonga's rate of debt distress was downgraded from high to moderate.

Debt-servicing costs in fiscal year 2013/14 amounted to T\$19.5 million (US\$10.9 million), of which 61.5 percent was attributable to external creditors. This figure is expected to increase in fiscal year 2014/15, as repayments for three major loans commence. The majority of loans are split between three main providers, the Asian Development Bank, the International Development Association, and the Export-Import Bank of China.



Flash appeal

The Cyclone Ian Relief Account was established by Ministry of Finance and had received over T\$1.5 million (US\$837,000) in contributions by March 20, 2014. These donations came from development partners, communities, businesses, individuals, and the Tongan diaspora, all of whom wished to contribute toward the relief efforts.

Five weeks after TC Ian, all relief and early recovery expenditures were diverted to the Cyclone Ian Relief Account. This means that any further contributions will be deposited into this account; the goal is to keep any remaining funds in the emergency fund in case another event occurs during the same fiscal year.

Donor funds for relief and reconstruction

While donor funds will always be required following a disaster, there is often an element of uncertainty surrounding how much will be provided, what will be provided, and when funds will arrive in country. Consequently, overdependence on international relief as a source of post-disaster financing can delay the provision of initial relief and inhibit ex-ante contingency planning. Development partners, international organizations, local nongovernmental organizations, businesses, and individuals contribute in the form of cash grants and aid in kind. The provision of aid in kind, while vital, can affect the costs borne by governments for the distribution of these goods.

In addition to the cash donations received from the international community in the month after TC Ian—as mentioned above, worth over T\$1.5 million (US\$837,000)—a further T\$25.7 million (US\$14.4 million) has been committed to facilitate the Tropical

Cyclone Ian Response Plan (GoT 2014). As of March 2014, however, a further T\$64.5 million (US\$36 million), which was needed to fully implement the response plan, was still lacking. It is anticipated that this figure will get smaller as donors align the work to their existing development priorities in country. This experience serves to demonstrate that while smaller amounts for initial relief and recovery may arrive quickly, it can take time to mobilize larger amounts of funding to finance reconstruction activities.

Total Response Funds Available

Tonga has the ability to raise a maximum of T\$21.5million (US\$12 million) for disaster response. This figure is based on the contingency budget for the fiscal year 2013/14, the maximum annual appropriation into the emergency fund, and the aggregate coverage limit from the Pacific Catastrophe Risk Insurance Pilot (see figure 5). It should be emphasized that this amount is a maximum and—given the nature of the contingency budget—dependent on how much remains in the budget during the fiscal year when the event occurs. Similarly, the aggregate payout is the absolute maximum that Tonga could receive following an earthquake/tsunami or a tropical cyclone. It is estimated that there is a 4.4 percent chance that disaster losses will exceed this amount in any given year.

Post-Disaster Budget Execution

Because of the early warning system and subsequent statement of emergency, access to the emergency fund was granted before TC Ian made landfall. This early access facilitated the purchase of rations and electrical supplies and ensured that sufficient stock was available for mobilization immediately after the event.

The Cyclone Ian Relief Account was established alongside the emergency fund to facilitate donations from members of the public, donors, and development partners.

One month after TC Ian made landfall, all relief and response expenditures were diverted to this account; the goal is to preserve the remaining balance of the emergency fund in case another event occurs within the same fiscal year.

On January 31, 2014, T\$2.3 million (US\$1.27 million) was received under Tonga’s policy with the Pacific Catastrophe Risk Insurance Pilot and deposited into the emergency fund. Anecdotal evidence from the government suggests that knowledge of the payout not only enabled initial expenditures (since the government knew it would be reimbursed), but also provided an injection of cash to ensure that relief efforts could continue.

During the first week after TC Ian, some line ministries made internal budget reallocations to facilitate their own response efforts. It is not known how much was reallocated via these intraministry transfers, since at the time of writing the acquittal process was still underway.

Figure 5 — Sources of Response Funds Available

Disaster risks	Disaster risk financing instruments	Amount of funds available
High-risk layer (E.G. Major earthquake, major tropical cyclone)	Disaster risk insurance	Total catastrophe risk insurance coverage top 15m (US\$8.4M)
Medium-risk layer (E.G. Floods, small earthquakes)	Contingent credit	
Low-risk layer (E.G. Localized flood, landslides)	Contingency budget, national reserves, annual budget allocation	Contingency: top 1.5M (US\$0.8M) Emergency fund: top 5m (US\$2.8M)

Source: Government of Tonga; World Bank.

Fuel, distribution, and travel and freight accounted for 39 percent of initial relief expenditures from the emergency fund. This large share demonstrates how costly it can be to access the outer islands when facilitating response efforts.

On January 31, 2014, the cabinet approved the Tropical Cyclone Ian Response Plan, which identified T\$90.2 million (US\$50.4 million) in total requirements for the 12 to 18 months following TC Ian (GoT 2014). By March the government had been able to identify T\$25.7 million (US\$14.4 million) toward this amount from a combination of government and donor funds.

One of the key lessons learned following TC Ian was the importance of adequately equipping the NEMO for response and ensuring that its budgetary allocation is sufficient to pay for satellite phones subscriptions

and stockpile relief goods. NEMO was provided with the funds to purchase satellite phones but not for the required subscription; this meant that communications to Ha'apai were delayed while NEMO sought to source access to satellite phones from Tonga Communications Corporation and New Zealand.



Domestic Catastrophe Risk Insurance Market

The non-life (general) insurance market in Tonga is small not only in absolute terms, but also relative to the size of the country's population and economy. Total non-life insurance premium is T\$7.6 million (US\$4.3 million). This equates to premium per capita of around T\$75.2 (US\$42), which is lower than rates in other Pacific Island Countries (PICs). It is estimated that around 15 percent of the insurance business in Tonga is placed offshore by international insurance brokers.

Tonga has no legislation in place to regulate its insurance industry. In the absence of a regulator, the solvency of domestic insurers, and hence their ability to pay claims and withstand shocks such as natural disasters, are not being assessed by any government agency. It is not

possible to confirm that insurers have adequate financial security to meet any catastrophe exposures. The absence of a regulator also has implications for consumer protection, as no government agency is ensuring the appropriateness of insurance products sold in the market.

The main catastrophic hazard in Tonga is the tropical cyclone, although earthquake and tsunami exposures are also present. Insurers advised that they were aware of the potential cyclone exposure and that they insured only those properties that had an engineer's certification of compliance with the cyclone (wind load) standard. The primary accumulation of exposure is on the island of Tongatapu, which includes the capital, Nuku'alofa.



Tonga’s comparatively low non-life premium per capita—T\$75.2 (US\$42), as mentioned above—suggests low uptake of insurance across the country. This could be because Tonga, unlike many other PICs, does not make motor vehicle insurance compulsory.

Insurance for catastrophic perils of earthquake and cyclone is available in the market and can be included in property insurance products.

The peril of earthquake is covered as standard under property policies (such as homeowner policies, for example). Cyclone insurance is not covered under standard property coverage wordings, and is available by extension only. Property insurance rates for the cyclone peril (0.25 percent) and earthquake peril (0.15 percent) are average for PICs.

The Tongan government does not have an indemnity property insurance program in place for its infrastructure assets or property.

The government keeps no centralized register of insurance arrangements made by individual government departments, public authorities, or state-owned enterprises (SOEs).

Most public enterprises in Tonga that manage public assets have insurance programs in place that include indemnity property insurance.

The Ministry of Public Enterprises does not keep a central record of those programs, leaving it to the individual public trading authorities and SOEs to report to their respective boards. It is not known whether catastrophe risks are covered in the existing property insurance programs.



Options for Consideration

Tonga has implemented several DRFI tools to improve its financial resilience to natural disasters. To strengthen those tools, the following recommendations have been suggested for consideration.

Recommendation 1: Develop an overarching disaster risk financing strategy aligned to existing processes. Tonga has a proactive ex-ante approach to DRFI. To further enhance existing procedures, it is recommended that Tonga create an overarching DRFI strategy for endorsement by the cabinet. This would create a single document that articulated the financing options available along with the associated policies behind these tools. An action plan for implementation activities is also recommended.

Recommendation 2: Develop an operations manual detailing the processes required to facilitate swift post-disaster budget mobilization and execution. This manual should clearly document the post-disaster budget mobilization and execution procedures and processes for MoF staff. A manual that details the processes in a single document would embed existing process, such as the transfer of a staff member from MoF to the NEMO, and would thus be useful to staff who need to understand the correct procedures to follow during a disaster.

Recommendation 3: Develop an insurance program for key public assets. This program would include a full review of the current insurance program for the government by MoF. In addition, it would identify assets to be included and indicate appropriate coverage selection for these assets. The potential for establishing an insurer vehicle could also be investigated if deemed if appropriate.

End Notes

1 Modeled emergency loss is estimated to be 23 percent of total ground-up losses. Losses are modeled to provide an estimate of some of the costs that governments face when providing relief supplies to those affected.

2 Modeled emergency loss is estimated to be 23 percent of total ground-up losses. Losses are modeled to provide an estimate of some of the costs that governments face when providing relief supplies to those affected.

3 Priority for Action 4—“Reduce the Underlying Risk Factors”—has an associated key activity of financial risk-sharing mechanisms, such as insurance, while Priority for Action 5—“Strengthen disaster preparedness for effective response at all levels”—includes the establishment of emergency funds such as contingency budget, national reserves, and annual budgetary allocations (UNISDR 2005).

References

- GFDRR (Global Facility for Disaster Reduction and Recovery) 2012 *The Sendai Report: Managing Disaster Risks for Resilient Future*, Washington D.C., U.S.A.
- GoT (Government of Tonga). 2008. "Tonga's National Disaster Management Plan." Government of Tonga, Tongatapu, Tonga.
- . 2010. "Tonga's Joint National Action Plan for Disaster Risk Management and Climate Change Adaptation." Government of Tonga, Tongatapu, Tonga.
- . 2014. "Budget Statement 2014/2015." Government of Tonga, Tongatapu, Tonga.
- . 2014. "Tropical Cyclone Ian Response Plan." National Emergency Operations Committee, Government of Tonga, Tongatapu, Tonga.
- IMF (International Monetary Fund). 2012. "Tonga 2012 Article IV Consultation." IMF, Washington, DC.
- PCRAFI (Pacific Catastrophe Risk and Financing Initiative). 2012. "Country Risk Profile: Tonga." PCRAFI, [<http://pacris.sopac.org>] (<http://pacris.sopac.org>).
- . 2014. "TC Ian Event Brief." Prepared by AIR Worldwide. San Francisco.
- SOPAC (Pacific Islands Applied Geoscience Commission). 2005. *Pacific Disaster Risk Reduction and Disaster Management Framework for Action (Regional Framework For Action or RFA) 2005-2015*. SOPAC, Suva, Fiji.
- SPC (Secretariat of the Pacific Community) 2011 *Cook Islands: Investment in DRM*, Suva, Fiji
- SPC (Secretariat of the Pacific Community) 2011 *Republic of Marshall Islands: Investment in DRM*, Suva, Fiji
- SPC (Secretariat of the Pacific Community) 2011 *Vanuatu: Investment in DRM*, Suva, Fiji
- SPC (Secretariat of the Pacific Community) 2012 *Papua New Guinea: Investment in DRM*, Suva, Fiji
- UNISDR (United Nations International Strategy for Disaster Reduction). 2005. *Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters*. UNISDR, Hyogo, Japan.
- World Bank 2010 *Financial Protection of the State against Natural Disasters; A Primer*, Washington D.C., U.S.A.
- World Bank. 2011. *Pacific Catastrophe Risk Financing Initiative: Catastrophe Risk Assessment and Options for Regional Risk Financing. Phase 1 Report*. Washington, DC: World Bank.

About PCRAFI

The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) is a joint initiative between the Secretariat of the Pacific Community through its Applied Geoscience and Technology Division (SPC-SOPAC), the World Bank, and the Asian Development Bank, with financial support from the government of Japan, the Global Facility for Disaster Reduction and Recovery (GFDRR), and the European Union, and with technical support from Air Worldwide, New Zealand GNS Science, and Geoscience Australia.

The initiative aims to provide the Pacific Island Countries (PICs) with disaster risk modeling and assessment tools for enhanced disaster risk management, and to engage PICs in a dialogue on integrated financial solutions to increase their financial resilience to natural disasters and climate change. The initiative is part of the broader agenda on disaster risk management and climate change adaptation in the Pacific region.

The Pacific Disaster Risk Financing and Insurance (DRFI) Program is one of the many applications of PCRAFI. It is designed to increase the financial resilience of PICs by improving their capacity to meet post-disaster financing needs without compromising their fiscal balance. Through DRFI, technical assistance is available to PICs to build capacity in the public financial management of natural disasters. The technical assistance will build on the underlying principles of the three-tiered

disaster risk financing strategy and focus on three core aspects:

- the development of a public financial management strategy for natural disasters, recognizing the need for ex-ante and ex-post financial tools;
- the post-disaster budget execution process, to ensure that funds can be accessed and disbursed easily post-disaster; and
- the insurance of key public assets, to resource the much larger funding requirements of recovery and reconstruction needs.

The PICs involved in PCRAFI are the Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, the Solomon Islands, Timor-Leste, Tonga, Tuvalu, and Vanuatu.

For further information, please visit <http://pacrisk.sopac.org> or contact PCRAFI@spc.int.

Annex 1

World Bank Framework for Disaster Risk Financing and Insurance

Major disasters increase public spending requirements and reduce revenues, placing further strain on limited national budgets. The immediate and long-term fiscal consequences of a disaster depend on the sources of revenue available to the government versus its public expenditure commitments. Investment in disaster risk financing instruments can help prevent the diversion of funds from key development projects and significantly reduce the time needed to activate an initial response. Financial protection is a core component of any comprehensive disaster risk management strategy, and should be implemented alongside the pillars of risk identification, risk reduction, preparedness, and post-disaster reconstruction (see figure A.1).

The World Bank framework for disaster risk financing and insurance advocates a three-tiered approach for the development of financing arrangements to cover the residual disaster risk that cannot be mitigated. These layers align to the basic principles of sound public financial management, such as the efficient allocation of resources, access to sufficient resources, and macroeconomic stabilization. The first layer, retention, relates to countries' development of an internal layer of protection against natural disasters to prevent the diversion of funds from

development projects (see figure A.2). This layer uses tools such as contingency budgets and national reserves. The aim is to finance small but high-frequency disasters. The second layer is aimed at less frequent but more severe events that are too costly to pre-finance through retention mechanisms. Here, liquidity mechanisms—such as contingent credit, which can mobilize additional funds immediately following an event—become cost-effective.

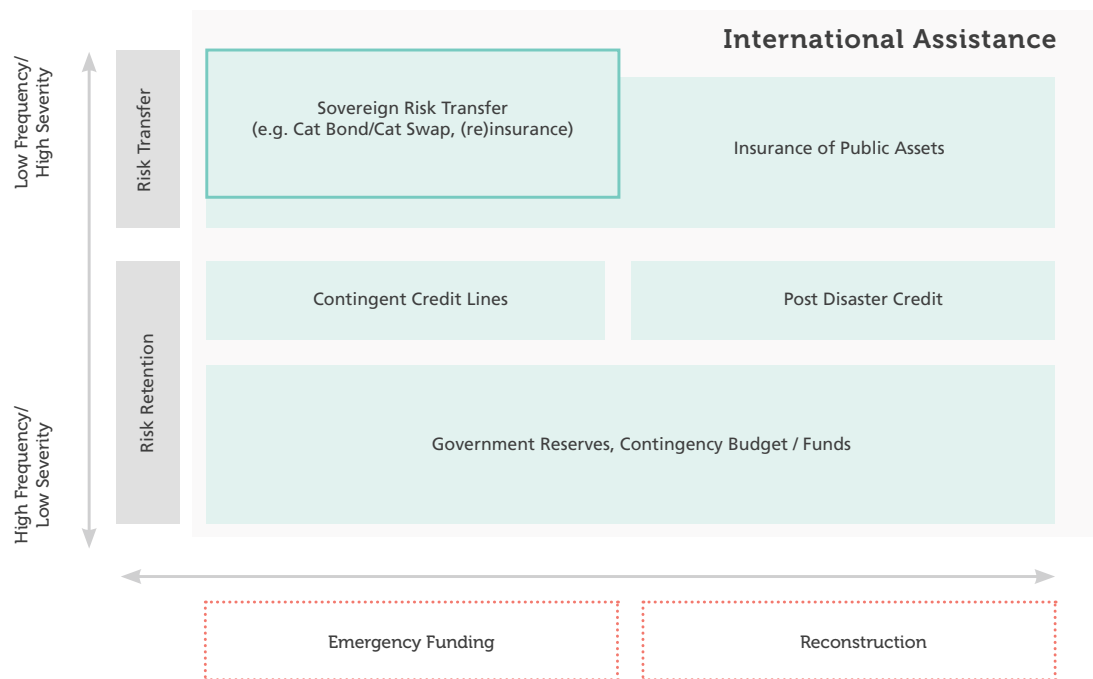
The third layer, disaster risk transfer (such as insurance), focuses on mobilizing large volumes of funds for large but infrequent natural disasters. For events of this type, risk transfer instruments—such as insurance or catastrophe swaps and bonds—become cost-effective in averting a liquidity crunch.

There is a clear time dimension to post-disaster funding needs and the various phases of relief, recovery, and reconstruction. Some financing instruments can be activated rapidly. Others may take longer to activate but can generate substantial funding. The disaster risk financing strategy needs to reflect both time and cost dimensions, ensuring that the volume of funding available at different stages in the response efforts matches actual needs in a cost-efficient manner.

Figure A.1 — Disaster Risk Management Framework



Figure A.2 — Three-Tiered Disaster Risk Financing Strategy



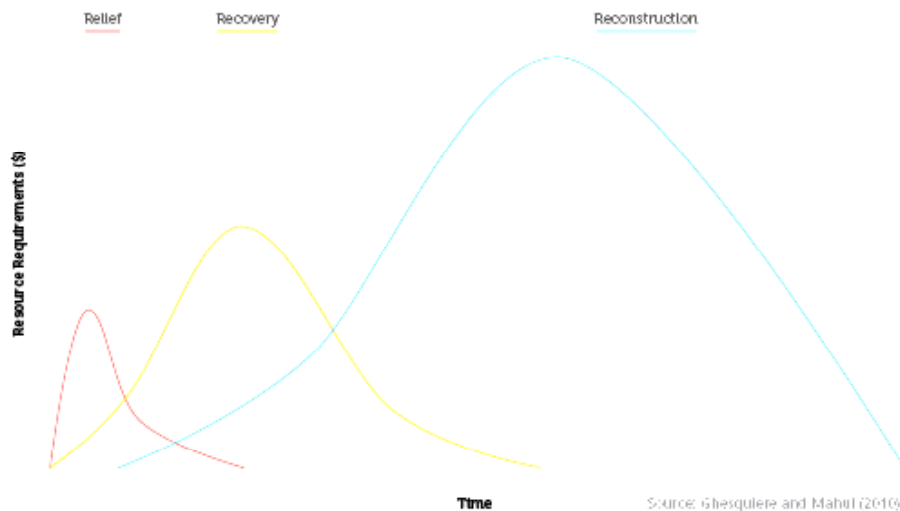
The initial relief phase requires a quick injection of liquidity from day 0 but does not need to be sustained for a long period of time (see figure A.3). Rapid budget mobilization and execution are key for financing initial disaster response, and governments should develop appropriate policies and procedures for procurement and acquittals to facilitate them. Initial relief should be met via annual budget allocations and the establishment of dedicated reserves for disaster response that can be accessed immediately; major catastrophes will exhaust these funds quickly. The residual risk associated with higher-cost events should be transferred to third parties via a mixture of more expensive (re)insurance tools and catastrophe bonds and, for the most extreme events, international assistance.

The recovery phase requires additional funds but not immediately (see figure A.3). Some of

the funds for this phase can therefore be raised via post-disaster budget reallocation and the realignment of national investment priorities. However, the opportunity cost for these options is high, given that they can lead to reduced expenditure on other key investment areas, such as health and education. Consequently, governments may also choose to utilize development partner contingent credit arrangements.

In contrast, the reconstruction phase has much larger financing requirements needed over a much longer period of time (see figure A.3). Given the large funding requirements associated with reconstruction, this phase often requires post-disaster reconstruction loans to complement traditional disaster insurance. Governments may also introduce temporary post-disaster tax increases aligned to budget restructuring.

Figure A.3 — Post-Disaster Phases: Funding Requirements and Duration



If adequate and timely funding arrangements are not in place, the adverse socioeconomic impact of a disaster can be significantly exacerbated, at both the macroeconomic and household levels. An optimal disaster risk financing and insurance strategy aims to combine ex-ante and ex-post financial instruments to secure adequate and timely funding at lower cost for the successive post-disaster phases. The optimal mix of finance instruments will be unique to each country based upon its associated hazard and exposure. Table A.1 lists potential finance instruments that can be used to address disasters. Those that are shaded in blue indicate the generic timelines for mobilizing and executing these funds, though each country may be slightly faster or slower depending on its internal processes. The table can be adapted by countries to reflect these differences according to the financial instruments they have utilized and the time it takes to mobilize these funds. Given the

innovative nature of the work in this area and the number of products under development, this list is not exhaustive.

Ex-post financing vehicles are those that become available in the wake of an event. The most familiar form of ex-post disaster financing is donor assistance for relief. There are two forms this finance can take, cash grants and aid in kind, and both play an important role in response. The provision of aid in kind, while vital, can affect the distribution costs for these goods. While donor funds will always be required, there can often be an element of uncertainty surrounding how much will be provided, what will be provided, and when funds will arrive in country.

Budget reallocation often plays a key role for the continuation of relief and the initial stages of the recovery program. Generally, this process takes time, as the reallocation of funds will need to be

Table A.1— Availability of Financial Instruments Over Time

	SHORT TERM (1-3 MONTHS)	MEDIUM TERM (3-9 MONTHS)	LONG TERM (OVER 9 MONTHS)
<i>Ex-post Financing</i>			
Donor Assistance (relief)			
Budget Reallocation			
Domestic Credit			
External Credit			
Capital Budget Realignment			
Donor Assistance (reconstruction)			
Tax Increase			
Flash Appeal			
<i>Ex-ante Financing</i>			
Emergency Fund			
Contingency Budget			
Contingent Credit			
Sovereign (parametric) Catastrophe Risk Insurance			
Traditional Disaster Insurance			

Source: World Bank 2013.



agreed upon by the cabinet and across ministries. Budget reallocation can sometimes divert funds from key development projects and hence seriously harm the long-term growth prospects of the country. The same issues are relevant to capital budget realignment, although the timelines for that process are typically significantly longer.

Domestic credit, such as the issuance of government bonds, can be used to raise additional revenue to fund post-disaster expenditures. Again, due to the processes involved, domestic credit will take some time to operationalize and is best suited to financing recovery and reconstruction activities. External credit will likewise take time to be agreed upon with providers and will require clear articulation of the activities it is to finance. Both of these forms of credit will have an impact on the debt-servicing ratio of a country and may not be a viable option for heavily indebted countries.

Donor assistance for reconstruction can be delivered as a form of direct budget support, grant, or a post-disaster reconstruction loan. The form of finance used here will depend on the size of the event, the development status of a country (for example, low-income countries may have access to concessional loans and have more access to grants), and the debt-servicing ratio of a country. Typically, this form of finance is conditional and requires sufficient lead time for aligning the priorities of countries and donors to meet reconstruction and recovery needs.

Tax increases will help redress the increase in public expenditure following a disaster by generating additional revenue. Although higher taxes could be politically unfavorable, they create a sustainable source of finance for reconstruction activities. Conversely, some governments have applied tax incentives to encourage donations to response

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funds from both the private sector and members of the public. This approach can be popular when tax credits are written off on annual tax returns.

Ex-ante financing provides an element of financial certainty during a disaster, because governments have established these sources of finance in advance. These funds can be quickly disbursed following an event so that essential relief work commences immediately. A reserve fund provides a dedicated amount of funding for response and if properly managed can accrue over time to increase the level of funding available. However, the opportunity cost of holding money in a dedicated fund is high, as it diverts funds from the operational budget. Careful analysis should be undertaken to identify the optimal level of reserves that a country should hold and maintain.

Contingent credit is a relatively new instrument, with current forms offering disbursement following an event whose magnitude has been agreed upon in advance. It can be fungible or conditional by design. As with other sources of credit, the amount available will depend on the development status of the country and the debt-servicing ratio. The advantage of contingent credit is that a drawdown can be made within a 24-hour period.

Parametric insurance uses hazard triggers, linking immediate post-disaster insurance payouts to specific hazard events. Unlike traditional insurance settlements that require an assessment of individual losses on the ground, parametric policies do not pay based on actual losses incurred. Instead, the payout disbursements are triggered by specific physical parameters for the disaster (e.g., wind speed and earthquake ground motion). The payouts provide a rapid, yet limited, injection of liquidity that can be a valuable boost to relief funds.

Traditional disaster insurance offers indemnity coverage. Receipt of funds may take longer than with parametric insurance, as a detailed damage assessment is required. However, as payouts are directly linked to the damage experienced, the payout will better match the needs of the insured party.

Public financial management in the Pacific is dictated by the fact that many PICs are classified as Small Island Developing States (SIDS). Typically, countries in this classification have a narrow revenue base, are net importers, and have a consequential reliance on aid as an income stream. These characteristics can limit the options available for post-disaster finance. It is unlikely that a SIDS government could afford to reallocate the capital



budget, and a tax increase could make many items unaffordable and hence be detrimental to citizens' quality of life. Given these constraints on the national budget, alternatives such as contingent credit and risk transfer options should be used to reduce the drain on limited public funds.

PIC governments face critical challenges for financial resilience to natural disasters. Most PICs have restricted options for securing immediate liquidity for swift post-disaster emergency response without compromising their long-term fiscal balance. In addition, PICs are constrained by their size, borrowing capacity, and limited access to international insurance markets. In the absence of easy access to debt and well-functioning insurance markets, a large portion of the economic losses stemming from adverse natural events is borne by governments and households, with support from development partners.

The Pacific has seen several recent cases that show the need for immediate liquidity post-disaster. In the Cook Islands, in the immediate aftermath of TC Pat in 2010, a delay in the receipt of travel funds meant that key government personnel could not immediately commence the initial damage assessment. Following TC Vania in 2010, Vanuatu had to reallocate a significant amount of the national budget. Similarly, Fiji and Samoa had to reallocate budgetary funds in the wake of TC Evan in 2012 and 2013; and the Santa Cruz earthquake in the Solomon Islands in February 2013 drained the annual budget for the National Disaster Management Office and used the majority of the national contingency budget.

Lacking contingency reserves and access to short-term loan funds, PICs have limited post-disaster budget flexibility and rely heavily on post-disaster donor assistance. Studies by SPC (2011 and 2012) that look at the fiscal impact of past disasters in selected PICs demonstrate the financial constraints

in post-disaster budget reallocation and build a case for establishing national reserves. While international assistance will always play a valuable role, overdependence on such assistance as a source of financing carries limitations; international aid can be uncertain, which inhibits contingency planning, and can be slow to materialize. Increasingly, PICs such as the Cook Islands are establishing national reserves for funding initial response.

The World Bank, SPC, and their partners, with grant funding from the government of Japan, have implemented the Pacific Disaster Risk Financing and Insurance Program to help the PICs increase their financial resilience to natural disasters and improve their financial response capacity in the aftermath of natural disasters. This program is part of the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI).

Section**07**

Annex 2

Glossary

Attachment point. The attachment point (deductible) amount is essentially the excess payable before any payout is made under a policy. That is, anything under this value will be borne by the policy holder.

Catastrophe swap. A catastrophe swap, also known as a cat swap, is a financial tool used to transfer some of the risk that the covered party faces from catastrophes to the international reinsurance or capital markets. In the case of the Pacific Catastrophe Risk Insurance Pilot, tropical cyclone and/or earthquake risk is passed to the financial markets.

Coverage limit. This indicates the maximum payout as defined under the policy.

Emergency losses. Emergency losses in the context of the Pacific Catastrophe Risk Insurance Pilot are calculated by using a percentage of the estimated ground-up losses.

Exhaustion point. The exhaustion point indicates the loss level at which the payout under a policy reaches its maximum point.

Ground-up losses. Ground-up losses in this context refer to estimated total damage to buildings, infrastructure, and cash crops.

Payout. A payout refers to the amount of cash that countries will receive following an eligible event.

Premium. The premium is the cost that an insured party will pay for a given level of coverage: the more that is included in the coverage provided, the higher the premium will be. Premiums are determined by the amount of coverage a country chooses, the event attachment point (deductible) and exhaustion point (limit) of that coverage, and the risk profile of the country.

Risk pool. A risk pool is a group of people, institutions, or countries that collaborate to manage risk financially as a single group.

Annex 3

Insurance Market Review, February 2014

Executive Summary

The non-life (general) insurance market in Tonga is small not only in absolute terms, but also relative to the size of the country's population and economy. Total non-life insurance premium is T\$7.6 million (US\$4.2 million). This equates to premium per capita of around T\$75.2 (US\$42), which is lower than rates in other Pacific Island Countries. It is estimated that around 15 percent of the insurance business in Tonga is placed offshore by international insurance brokers.

Tonga has no legislation in place to regulate its insurance industry. In the absence of a regulator, the solvency of domestic insurers, and hence their ability to pay claims and withstand shocks such as natural disasters, are not being assessed by any government agency. It is not

possible to confirm that insurers have adequate financial security to meet any catastrophe exposures. The absence of a regulator also has implications for consumer protection, as no government agency is ensuring the appropriateness of insurance products sold in the market.

The main catastrophe hazard in Tonga is tropical cyclone, although earthquake and tsunami exposures are also present. Insurers advised that they were aware of the potential cyclone exposure and that they insured only those properties that had an engineer's certification of compliance with the cyclone (wind load) standard. The primary accumulation of exposure is on the island of Tongatapu, which includes the capital, Nuku'alofa.

Table A.1— Non-life Insurers Operating in Tonga 2012

COMPANY	COUNTRY OF INCORPORATION	STATUS	FINANCIAL SECURITY
National Pacific Insurance [Tonga] Ltd	Tonga	Local company	None prescribed
Federal Pacific Insurance Company Ltd	Samoa	Branch	None prescribed
Dominion Insurance [Tonga] Ltd.	Tonga	Local company	None prescribed

Source: World Bank

Table A.2— Pacific Non-life Insurance Premium per Capita 2012 (US\$)

MARKET	GDP MILLIONS	POPULATION	GDP PER CAPITA	MARKET PREMIUM	PREMIUM PER CAPITA
Cook Islands	\$305	19,300	\$15,823	\$6,600,000	\$342
Fiji	\$3,908	874,700	\$4,467	\$97,500,000	\$111
Marshall Islands	\$182	52,560	\$3,470	\$3,000,000	\$57
Samoa	\$683	188,900	\$3,619	\$17,000,000	\$90
Solomon Islands	\$1,008	549,600	\$1,130	\$13,000,000	\$24
Tonga	\$471	104,900	\$4,495	\$4,400,000	\$42
Vanuatu	\$781	247,300	\$3,182	\$16,500,000	\$67

Source: World Bank

Tonga's comparatively low non-life premium per capita—T\$75.2 (US\$42), as mentioned above—suggests low uptake of insurance across the country. This could be because unlike many other PICs, Tonga does not make motor vehicle insurance compulsory.

Insurance for catastrophic perils of earthquake and cyclone is available in the market and can be included in property insurance products.

The peril of earthquake is covered as standard under property policies (such as homeowner policies, for example). Cyclone insurance is not covered under standard property cover wordings, and is available by extension only. Property insurance rates for the cyclone peril (0.25 percent) and earthquake peril (0.15 percent) are average for PICs.

The Tongan government does not have an indemnity property insurance program in place for its infrastructure assets or property.

The government keeps no centralized register of insurance arrangements made by individual government departments, public authorities, or state-owned enterprises (SOEs).

Most public enterprises in Tonga that manage public assets have insurance programs in place

that include indemnity property insurance.

The Ministry of Public Enterprises does not keep a central record of those programs, leaving it to the individual public trading authorities and SOEs to report to their respective boards. It is not known whether catastrophe risks are covered in the existing property insurance programs.

Insurance Market Overview

Total non-life (general) insurance premium, all classes including aviation, is estimated in Tonga at T\$7.6 million (US\$4.2 million). The

majority of risks underwritten are placed with domestic insurers. Insurance industry sources estimated that only 15 percent of the local insurance business is placed with offshore insurers, which is low in the context of the region.

There are three non-life insurers operating in the Tongan market: National Pacific Insurance (Tonga) Limited (NPI) is a subsidiary of NPI (Samoa); Dominion Insurance (Tonga) Limited is a subsidiary of Dominion Insurance Limited (Fiji); and Federal Pacific Insurance Company Limited is a branch of a Samoan company (see table 1).

Table A.3— Pacific Commercial Property Insurance Rate and Deductible Comparison

MARKET	AVERAGE EARTHQUAKE RATE	GENERAL EARTHQUAKE DEDUCTIBLES	AVERAGE CYCLONE RATE	GENERAL CYCLONE DEDUCTIBLE
Cook Islands	0.12%	2% of sum insured	0.45%	20% of sum insured
Fiji	0.08%	10% of sum Insured	0.30%	20% of loss
Samoa	0.12%	2% of sum insured, or 5% of loss	0.20%	2% of sum insured, or 5% of loss
Tonga	0.15%	5% of sum insured	0.25%	5% of sum insured
Vanuatu	0.30%	5% of loss	0.17%	20% of loss

Source: World Bank 2013

Note: Average market rate percentage of value based on insurance industry sources.

The main broker active in the market is Willis New Zealand Limited; it handles most insurance arrangements for commercial businesses, public authorities, and state-owned enterprises (SOEs) in Tonga. Insurance industry sources reported that there were other brokers from New Zealand and Australia who managed some smaller business insurance accounts.

As shown in table 2, the estimated non-life premium per capita in Tonga—T\$75.2 (US\$42)—is lower than rates in other Pacific Island Countries (PICs). The low premium per capita could be explained by a number of factors. On the supply side, limited market penetration by non-life insurers could result from the pricing of policies, an effect of competition in a small market and of insurers having offices on Tongatapu only. On the demand side, there could be limited awareness of the role and value of insurance products, or issues with products' affordability. A mix of all these factors may explain why take-up of insurance is low in Tonga.

There are no restrictions on placing insurance offshore. Of the estimated 15 percent of the market premium that is placed offshore by Willis New Zealand Limited, most is placed into the

London market, a major international insurance market that includes Lloyd's of London.

Local property insurance rates in Tonga are similar to those charged in other PICs, as detailed in table 3. The local earthquake insurance average basis rate used in Tonga is 0.15 percent, which is consistent with the earthquake basis rate used in other Pacific countries and by New Zealand's Earthquake Commission. The local average basis rate for cyclone extension was quoted at 0.25 percent, again consistent with other PICs.

There are a number of limitations with this comparison, such as variation in property insurance rating due to the location of premises, construction, occupation, fire protection, frequency of expected losses, and the amount and type of deductible on policies. It is not possible to use average rating data as an exact basis for a specific company or individual risk. It is possible, however, to get a general sense of how property insurance rates in respective markets compare to one another.

Catastrophe Risk Exposure and Capacity

The main catastrophe hazard in Tonga is from tropical cyclones, although earthquake and tsunami exposures are also present. Insurers advised that they were aware of the potential exposure and insured only those properties that had an engineer's certification of compliance with the cyclone (wind load) standard. Anecdotal comments suggest that under half of insured properties are insured for cyclone. The primary insurance accumulation exposure was on the main island of Tongatapu, which includes the capital, Nuku'alofa.

Catastrophe risk insurance presents a particular challenge to insurers' exposure management, because unlike other types of insurance, it presents the possibility of large correlated losses. Insurers need to use a combination of reinsurance, reserves, and diversification within their portfolio to ensure that they can withstand large disaster shocks without threatening their solvency. The capacity of the domestic market in Tonga is constrained by the small number of participants and the limited premium volume. Although some risk is placed offshore, the high cyclone risk has proved a deterrent to market expansion in the past. In 1985, for example, New Zealand Insurance Limited withdrew from the Tonga market; and in general New Zealand-based insurers have shown limited willingness to provide catastrophe risk insurance capacity to Tonga because of its exposure to cyclones (Crocombe 1992).

Reinsurance

It is understood that at least one of the three domestic insurers uses the international reinsurance markets to increase its capacity to underwrite catastrophe risks. NPI (Samoa) advised that its operation in Tonga is included in the group reinsurance program arranged by Tower Insurance Limited for all Pacific subsidiaries, including the

NPI companies. In its 2011 annual report, Tower Insurance Limited specifically advised that its event excess (net retention) had increased to \$NZ 6.7 million and that it had protection for two catastrophe events within the program for the 2011–2012 period (Tower Limited/Tower Capital Limited 2011). The reinsurance program is not detailed in the 2012 report, but it would be expected to follow the previous arrangements.

Insurers in the Pacific region using the international reinsurance markets have been adversely impacted by significant increases in reinsurance costs in recent years. These increases have been partly driven by a number of catastrophe events in the Asia Pacific region, which have caused large losses to the international markets and prompted them to review their pricing of "nonpeak risks—that is, risks underwritten outside of the core markets of the United States, Europe, and Japan. In particular, in 2011 the global market suffered natural catastrophe insured losses of over US\$110 billion—the second-largest ever (Swiss Re 2012). What made this year significant for insurers (and reinsurers) in the Pacific was the number of events that occurred in the Asia Pacific region: earthquakes in New Zealand and Japan, floods in Australia and Thailand, and a cyclone in Australia. The Global Insurance Market Report (IAIS 2012) advised that these Asia Pacific events accounted for 61 percent of the insured losses from natural catastrophes in 2011, compared to a 30-year average of 18 percent. As a consequence, adjustments were made in reinsurance capacity and risk premiums went up.

Products

NPI uses Industrial Special Risks (ISR) wordings for major commercial, public authority, and SOE property insurance. Its ISR wording is based on PNG insurance industry standard wording. If the insurance is placed with the London market, then a Material Damage/Business Interruption (MDBI) wording, which is similar to the ISR wording, is

Box 2— Past Catastrophe Events

Cyclones

Damaging cyclones within Tonga have been reported in 1961 (unnamed), 1982 (Isaac), 1997 (Hina), 2001 (Waka), and 2004 (Heta). Of these, Cyclone Hina caused the most damage—the total was estimated at T\$18.2 million (US\$10.2 million) in 1997 values (Fiji Meteorological Service 1997). Information on the insurance impacts of these earlier events is not available.

More recently—that is, in January 2014—Cyclone Ian caused significant damage to property in the Ha’apai island group. Modeled ground-up losses from the cyclone have been estimated at US\$49.3 million (PCRAFI 2014), with damage reported to 1,094 buildings. As Tonga has no insurance regulator, it has not been possible to obtain accurate details of insurance claims. But according to industry sources, 70 claims have been lodged locally with an estimated incurred value of T\$1.18 million (US\$660,000). There are no data available on insurance claims lodged with offshore insurers. The low number of claims and low value suggest a very low insurance penetration in the Ha’apai group, and this was confirmed by Darryl Williamson, NPI (Samoa) General Manager, in a Radio New Zealand International interview on February 11, 2014.

used. These wordings include coverage of specified natural perils, such as earthquake, but do not automatically cover cyclone risk.

Cyclone insurance is available only by extension from local insurers and is limited to those buildings where the insurers are provided with an engineering cyclone certificate confirming that the building meets the building code for cyclone. These certificates are valid for seven years. The London market may include windstorm automatically, but with higher deductibles, increasing the risk retained by the insured party.

Commercial Package or Business Protection wordings are used for small to medium enterprises, and coverage is taken as either Multi Risks (accidental damage including earthquake and cyclone by extension) or as Specified Risks (fire and extraneous perils). These policies generally follow the perils insured under the MDBI, although coverage may be more restricted.

Earthquakes

On September 29, 2009, an 8.1 magnitude earthquake struck 185km (115 miles) east-northeast of Hihifo in northern Tonga. It is reported that houses on islands nearest to the epicenter suffered damage. The resulting tsunami killed nearly 200 people, injured hundreds more, and caused damage in Tonga, American Samoa, and Samoa. There have been no insurance claims reported in Tonga, but insurance industry sources in Samoa advised that approximately 150 claims were lodged there, with insured losses estimated at SAT \$10 million (US\$4.3 million).

Insurance consequences of recent catastrophe events

The earthquake and tsunami in 2009 and Cyclone Ian in 2014 have had limited impact on local insurers in Tonga. But these events are likely to affect reinsurance capacity and rates for property catastrophe risk over the next few years, and possibly to raise property insurance rates for Tonga.

Insurance Law and Regulation

There is currently no insurance law or regulation in place in Tonga. The National Reserve Bank of Tonga is currently the regulator for banks, and in many PICs the reserve or central bank also acts as insurance regulator. The National Reserve Bank of Tonga advised that it would give consideration to taking the role of supervisor of pension funds and insurance, but would need technical assistance with any legislation.

With no insurance law, there are no specific requirements for local insurers in relation to capital and solvency, other than those provided in the Companies Act 1995. Insurance accounting is specialized, and most countries have recognized that specific insurance capital and solvency requirements are needed, over and above those provided in company legislation.

Box 3— Tonga Airports Ltd.

Tonga Airports Ltd. (TAL) is a state-owned entity managing the airport facilities. TAL has an operational risk management policy in place, which includes risk mitigation and financial solutions. It also has a risk register in place and is able to assess the potential financial impacts of identified risks. TAL advised that it has property insurance, though this insurance is for current market (indemnity) value only. The property insurance includes the perils of earthquake and cyclone. The airport runway pavements are also insured for physical damage. TAL advised that its insurance is placed with the London market (Lloyd's).

TAL has a reserve fund and contingency budget to cater for small events that are below policy deductibles. They also have retained earnings to cover a long-term development plan, and in the event of a major disaster these could be reallocated to assist with reconstruction.

Tonga Power Ltd.

Tonga Power Ltd. (TPL) is a state-owned entity that has the concession to manage the electricity supply. TPL has a risk management policy and risk register in place, and its risk management committee meets every six months to review them. Included in the policy is a section on risk financing, including insurance. Under the terms of the concession agreement, TPL

is required to insure the public assets and report details of the insurance program to the Electricity Commission. TPL has a coinsured MDBI property insurance policy; 50 percent is placed with NPI and 50 percent is with a panel of London market (Lloyd's) insurers. Buildings, generation plant, and other contents are insured. Transmission and distribution lines are excluded. The perils insured include earthquake, tsunami, cyclone, and flood. TPL is aware of deductibles and property excluded from the coverage, and has set aside T\$1 million to allow for potential disasters, such as earthquakes or cyclones.

In January 2014, when Cyclone Ian passed over the outer island Ha'apai group, it damaged property managed by TPL. It has been reported that the costs to repair the damage to transmission and distribution lines will exceed T\$3 million (US\$1.7 million) (PACNEWS 2014). Because the existing coverage excludes damage to transmission and distribution lines, these costs will be an uninsured loss. TPL advised that insured losses to generator building, transformers, and equipment totalled over T\$700,000 (US\$391,000). In addition to the insurance claim, T\$2.1 million (US\$1.2 million) has been donated by the New Zealand government for restoration and upgrading of the power network (Radio New Zealand International 2014).

Building Controls and Standards

Tonga has a solid legal basis for all construction in the Building Act 2002, Building Regulations 2007, and a standard building code. The code is based on Australian and New Zealand standards, including the New Zealand earthquake code (NZS4203) and Australian wind loads code (AS1170.2) for cyclone. A local engineer in Tonga advised that most commercial and government buildings constructed after 2007 were built in accordance with the code for both earthquakes and cyclones. Building inspectors are known to carry out inspections on larger construction projects, which suggests that the building code is being followed for commercial structures. According to the engineer, there is limited supervision of residential construction, and it is not clear whether residential properties comply with codes.

Insurers have taken proactive steps to ensure cyclone building standard compliance by requiring engineering certificates for insured properties, rather than relying on the government's enforcement of the building code.

Insurance of Public Assets

There is no insurance program in place for government property or infrastructure assets in Tonga. The Ministry of Finance and National Planning has a project underway to complete an asset register, which will allow the government to identify those key public assets to be insured. According to the Ministry of Finance and National Planning, consideration was being given to including government property indemnity insurance in the 2015 plan.

The Ministry of Public Enterprises is responsible for the overall supervision of all public trading

authorities and SOEs. The ministry advised that most public trading authorities and SOEs had property insurance programs in place. It does not keep a central record of those programs, leaving it to the individual public trading authorities and SOEs to report to their respective boards. It is not known whether catastrophe risks are covered in the insurance programs in place.

The government keeps no centralized register of insurance arrangements made by individual government departments, public authorities, or SOEs. A register of this type would allow a more coordinated approach to property insurance management and purchasing, which in turn might provide premium cost benefits.

Options for Consideration

Recommendation 1: The government should develop an insurance program for key public assets and include this in a broader disaster risk financing and insurance strategy. This approach would include completing a centralized asset register with up-to-date replacement values, an assessment of probable losses, and a review of existing indemnity insurance to ensure that the major catastrophe perils of earthquake/tsunami and cyclone/ sea surge are included, and that the government and SOEs are getting the best available terms and conditions for the property insurance premiums paid.

Recommendation 2: The government should set up a central insurance register as part of the disaster risk financing and insurance strategy and update the register as insurance contracts fall due. The government currently has no central register of property insurance in place for individual government departments, public authorities, and SOEs.

Recommendation 3: Tonga should introduce legislation to regulate insurance companies, modeled on insurance acts already in place

in other PICs. Tonga has no regulator, so insurer capital, solvency, reinsurance, catastrophe exposures, and aggregates are not reviewed by any government agency. Proper regulation would ensure that local insurers have adequate financial security and capacity to meet any catastrophe exposures.

References

- Crocombe, R. G. 1992. *Pacific Neighbours: New Zealand's Relations with Other Pacific Countries*. Christchurch, New Zealand: MacMillan Brown Centre for Pacific Studies and Institute for Pacific Studies.
- Fiji Meteorological Service. 1997. "Tropical Cyclone Report 96/8: Tropical Cyclone Hina, 13–16 March 1997." <http://www.pacificdisaster.net/pdnadmin/data/original/CRPTON1998TC Hina.pdf>.
- IAIS (International Association of Insurance Supervisors). 2012. *Global Insurance Market Report*. 2012 edition. <http://www.iaisweb.org/index.cfm?event=getPage&nodeId=25308>.
- PACNEWS. 2014. "\$3 Million to Rebuild Ha'apai Power Network." *Vanuatu Daily Post*, January 16.
- PCRAFI (Pacific Catastrophe Risk and Financing Initiative). 2014. "TC Ian Event Brief." Prepared by AIR Worldwide. San Francisco.
- Radio New Zealand International. 2014. "US\$3.5 Million to Restore Ha'apai in Tonga's Power." January 22.
- Standards Australia Limited, AS1170 Minimum design loads on structure, Part 2 Wind forces 1989, (superseded standard, replaced by AS/NZS 1170.2:2011)
- Standards New Zealand, NZS4203 1984, Code of practice for general structural design and design loadings for buildings, Part 3 Earthquake provisions, (superseded standard, replaced by NZS 1170.5:2011)
- Swiss Re. 2012. "Natural Catastrophes and Man-Made Disasters in 2011." *Sigma* 2/2012. [<http://www.swissre.com/sigma/>] (<http://www.swissre.com/sigma/>).
- Tower Limited/Tower Capital Limited. 2011. *Annual Reports*. <http://www.tower.co.nz/investor-centre/reports/>.

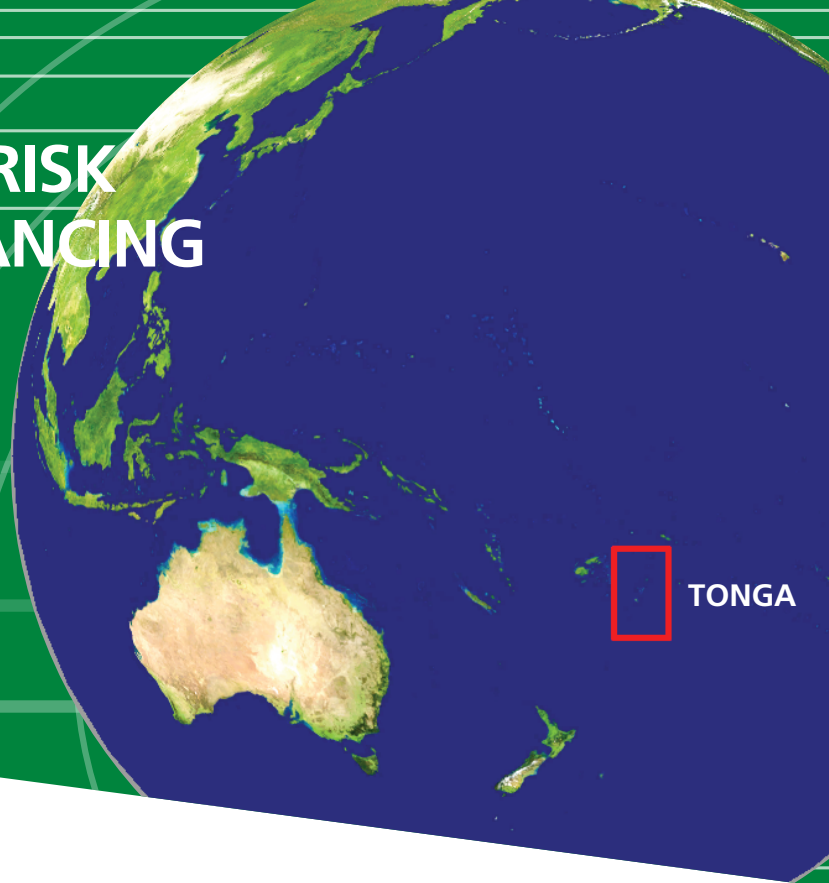
Glossary

Agent	Someone who acts for the insurance company in arranging insurance contracts. There are two main types of agents: tied agents, who act for one insurer only, and general agents, who act for multiple insurance companies.
Broker	Someone who acts as an agent for the insured in arranging an insurance or reinsurance program with a provider of capacity.
Capacity	The ability of an insurance company to provide insurance protection to clients, which is limited by its own financial strength and the reinsurance protection it has in place.
Captive insurer	An insurance company wholly owned by a company or entity that insures the risks of the parent entity and subsidiaries.
Indemnity insurance	Insurance that reimburses individuals or entities for loss or damage to a financial position as close as possible to the position they were in prior to the event, in the context of the financial terms of the coverage [such as deductible/excess and limit].
Intermediaries	The general term given to insurance agents and brokers.
Net retention	The amount that an insurance company retains on a reinsurance contract and in particular an excess of loss of contract.
Parametric insurance	A type of insurance that is triggered by the occurrence of a specific measured hazard event, such as a certain magnitude of earthquake or category of cyclone.
Probable maximum loss (PML)	The maximum value of a claim from a large or catastrophe event. May also be called MPL.
Property insurance	The insurance of physical assets such as buildings, plant and equipment, stock, and machinery. The products used for this insurance are variously named as fire and perils, commercial or business package, industrial special risks, or material damage insurance.
Reinsurance	A risk transfer method used by insurance companies to transfer part of a single large risk or an accumulation of similar risks and so increase their capacity. Reinsurance helps to smooth the extreme results and effects of specific perils [such as catastrophe events] and therefore to reduce the volatility of an insurance portfolio.
Solvency margin	The extent by which an insurer's assets exceed its liabilities. Minimum statutory solvency requirements are normally included in insurance acts or regulations.

Annex 4

Country Risk Profile

PACIFIC CATASTROPHE RISK ASSESSMENT AND FINANCING INITIATIVE



SEPTEMBER 2011

COUNTRY RISK PROFILE: TONGA

Tonga is expected to incur, on average, 15.5 million USD per year in losses due to earthquakes and tropical cyclones. In the next 50 years, Tonga has a 50% chance of experiencing a loss exceeding 175 million USD and casualties larger than 440 people, and a 10% chance of experiencing a loss exceeding 430 million USD and casualties larger than 1,700 people.

POPULATION, BUILDINGS, INFRASTRUCTURE AND CROPS EXPOSED TO NATURAL PERILS

An extensive study has been conducted to assemble a comprehensive inventory of population and properties at risk. Properties include residential, commercial, public and industrial buildings; infrastructure assets such as major ports, airports, power plants, bridges, and roads; and major crops, such as coconut, palm oil, taro, vanilla and many others.

TABLE 1: Summary of Exposure in Tonga (2010)	
General Information:	
Total Population:	103,000
GDP Per Capita (USD):	3,470
Total GDP (million USD):	357.5
Asset Counts:	
Residential Buildings:	30,156
Public Buildings:	1,594
Commercial, Industrial, and Other Buildings:	3,001
All Buildings:	34,751
Hectares of Major Crops:	36,010
Cost of Replacing Assets (million USD):	
Buildings:	2,525
Infrastructure:	259
Crops:	32
Total:	2,816
Government Revenue and Expenditure:	
Total Government Revenue	
(Million USD):	81.8
(% GDP):	22.9%
Total Government Expenditure	
(Million USD):	99.2
(% GDP):	27.7%

¹ Data assembled from various references including WB, ADB, IMF and The Secretariat of the Pacific Community (SPC).

² The projected 2010 population was trended from the 2006 census using estimated growth rates provided by SPC.

Table 1 summarizes population and the inventory of buildings, infrastructure assets, and major crops (or "exposure") at risk as well as key economic values for Tonga. It is estimated that the **replacement value of all the assets in Tonga is 2.8 billion USD** of which about 90% represents buildings and 9% represents infrastructure.

Figures 1 and 2 illustrate the building exposure location and replacement cost distribution, respectively. The footprints of about 28,000 of the approximately 35,000 buildings shown in Figure 1 were digitized from high-resolution satellite imagery. More than 10,000 of such buildings, all in the main island of Tongatapu, and most near the vicinity of the nation's capital of Nuku'alofa, were also field surveyed and photographed by a team of inspectors deployed for this purpose. Figure 3 displays the land cover/land use map that includes the location of major crops. The data utilized for these exhibits was assembled, organized and, when unavailable, produced in this study.

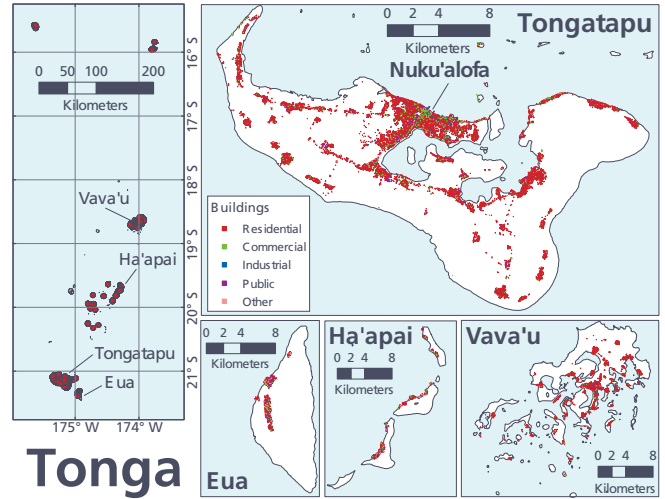


Figure 1: Building locations.

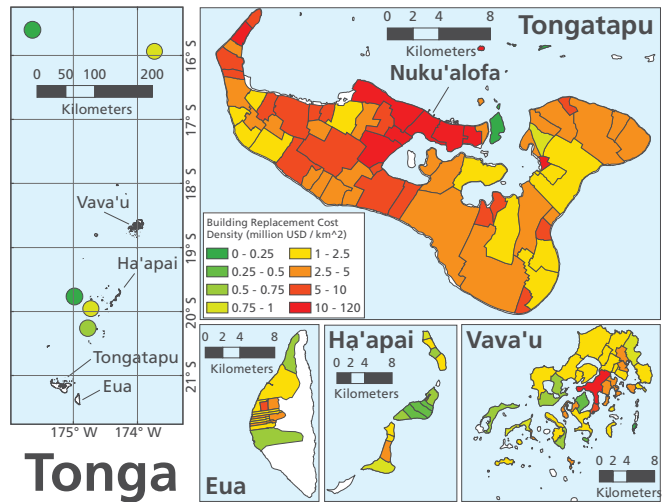


Figure 2: Building replacement cost density by village.

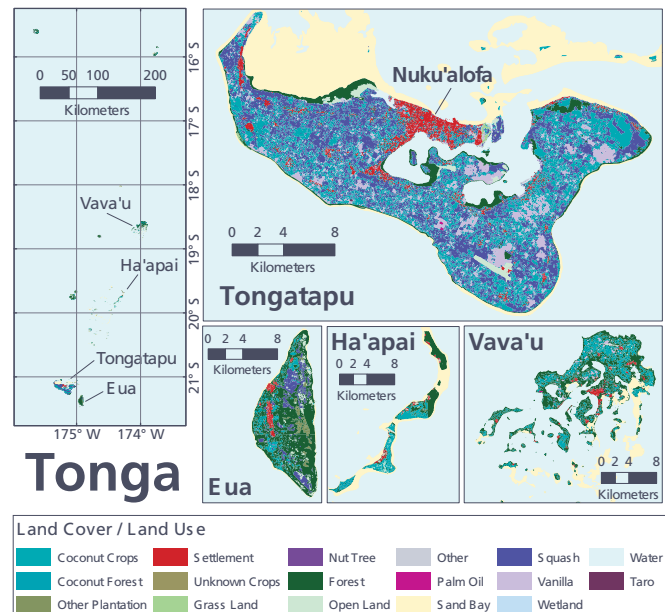


Figure 3: Land cover/land use map.

TROPICAL CYCLONE AND EARTHQUAKE HAZARDS IN TONGA

The Pacific islands region is prone to natural hazards. Tonga is located south of the equator in an area known for the frequent occurrence of tropical cyclones with damaging winds, rains and storm surge between the months of October and May. In the South Pacific region from the equator to New Zealand in latitude and from Indonesia to east of Hawaii in longitude almost 1,000 tropical cyclones with hurricane-force winds spawned in the last 60 years, with an average of about 16 tropical storms per year. Tonga was affected by devastating cyclones multiple times in the last few decades. For example, tropical cyclones Isaac and Waka, in 1982 and 2001, caused 7 fatalities, destroyed the shelters of tens of thousands of people as well as much of the nation's agriculture crops and caused about 75 million USD in losses that crippled the local economy. Figure 4 shows the levels of wind speed due to tropical cyclones that have about a 40% chance to be exceeded at least once in the next 50 years (100-year mean return period). These wind speeds, if they were to occur, are capable of generating severe damage to buildings, infrastructure and crops with consequent large economic losses.

Tonga is situated along one segment of the Pacific "ring of fire," which aligns with the boundaries of the tectonic plates. These tectonic plate boundaries are extremely active seismic zones capable of generating large earthquakes and, in some cases, major tsunamis that can travel great distances. In 1977, a magnitude 7.2 earthquake violently shook the southern islands of Tonga caused considerable damage to structures. A recent and tragic example is the offshore magnitude 8.1 earthquake in 2009, which generated a devastating tsunami that killed 9 people and destroyed over half of the houses in the Tongan island of Niuatoputapu before hitting the shores of Samoa. Figure 5 shows that Tonga has a 40% chance in the next 50 years of experiencing, at least once, moderate to very strong levels of ground shaking. These levels of shaking are expected to cause damage ranging from moderate to heavy to well-engineered buildings and even more severe damage to structures built with less stringent criteria.

RISK ANALYSIS RESULTS

To estimate the risk profile for Tonga posed by tropical cyclones and earthquakes, a simulation model of potential storms and earthquakes that may affect the country in the future was constructed. This model, based on historical data, simulates more than 400,000 tropical cyclones and about 7.6 million earthquakes, grouped in 10,000 potential realizations of the next year's activity in the entire Pacific Basin. The catalog of simulated earthquakes also includes large magnitude events in South and North America, Japan and the Philippines, which could generate tsunamis that may affect Tonga's shores.

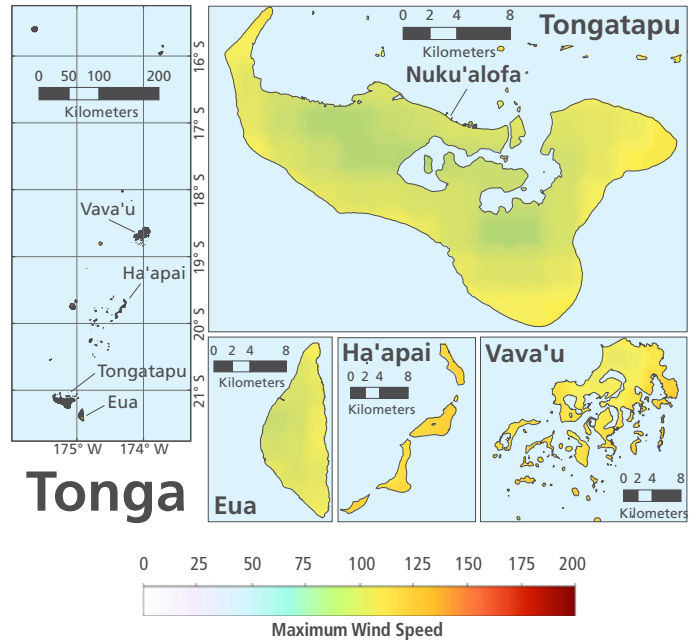
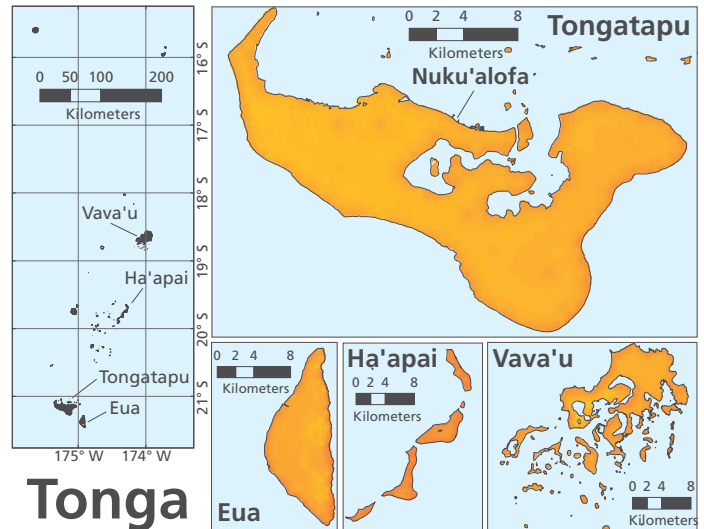


Figure 4: Maximum 1-minute sustained wind speed (in miles per hour) with a 40% chance to be exceeded at least once in the next 50 years (100-year mean return period).



Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
Potential Damage	none	none	none	Very light	light	Moderate	Moderate/Heavy	Heavy	Very Heavy
Peak ACC. (%g)	<0.17	0.17-1.4	1.4-4.0	4.0-9	9-17	17-32	32-61	61-114	>114
Peak Vel. (cm/s)	<0.12	0.12-1.1	1.1-3.4	3.4-8	8-16	16-31	31-59	59-115	>115
Instrumental Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X

Scale based upon Wald, et al: 1999

Figure 5: Peak horizontal acceleration of the ground (Note: 1g is equal to the acceleration of gravity) that has about a 40% chance to be exceeded at least once in the next 50 years (100-year mean return period).

The country's earthquake and tropical cyclone risk profiles are derived from an estimation of the direct losses to buildings, infrastructure assets and major crops caused by all the simulated potential future events. The direct losses include the cost of repairing or replacing the damaged assets, but do not include other losses such as contents losses, business interruption losses and losses to primary industries other than agriculture. The direct losses for tropical cyclones are caused by wind and flooding due to rain and storm surge, while for earthquakes they are caused by ground shaking and tsunami inundation. After assessing the cost of repairing or rebuilding the damaged assets due to the impact of all the simulated potential future events, it is possible to estimate in a probabilistic sense the severity of losses for future catastrophes.

The simulations of possible next-year tropical cyclone and earthquake activity show that some years will see no storms or earthquakes affecting Tonga, while other years may see one or more events affecting the islands, similar to what has happened historically. The annual losses averaged over the many realizations of next-year activity are shown in Figure 6 separately for tropical cyclone and for earthquake and tsunami, while the contributions to the average annual loss from the different villages are displayed in absolute terms in Figure 7 and normalized by the total asset values in each village in Figure 8. Figure 8 shows how the relative risk varies by village across the country.

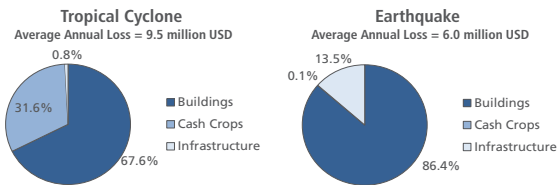


Figure 6: Average annual loss due to tropical cyclones and earthquakes (ground shaking and tsunami) and its contribution from the three types of assets.

The same risk assessment carried out for Tonga was also performed for the 14 other Pacific Island Countries. The values of the average annual loss of Tonga and of the other 14 countries are compared in Figure 9.

In addition to estimating average risk per calendar year, another way of assessing risk is to examine large and rather infrequent, but possible, future tropical cyclone and earthquake losses. Table 2 summarizes the risk profile for Tonga in terms of both direct losses and emergency losses. The former are the expenditures needed to repair or replace the damaged assets while the latter are the expenditures that the Tongan government may need to incur in the aftermath of a natural catastrophe to provide necessary relief and conduct activities such as debris removal, setting up shelters for homeless or supplying medicine and food. The emergency losses are estimated as a percentage of the direct losses.

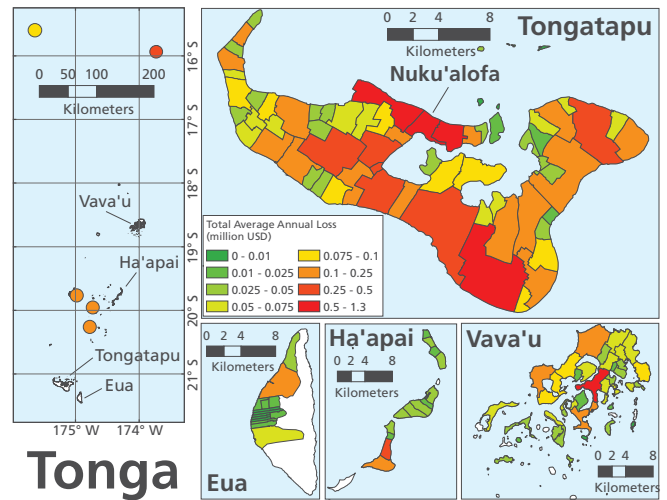


Figure 7: Contribution from the different villages to the average annual loss for tropical cyclone and earthquake (ground shaking and tsunami).

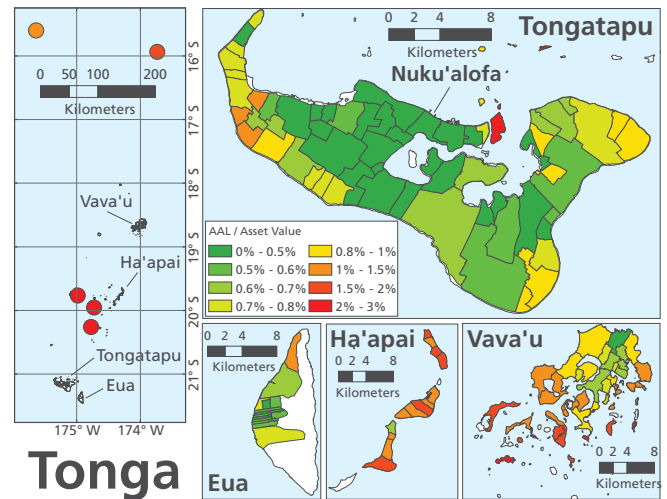


Figure 8: Contribution from the different villages to the tropical cyclone and earthquake (ground shaking and tsunami) average annual loss divided by the replacement cost of the assets in each village.

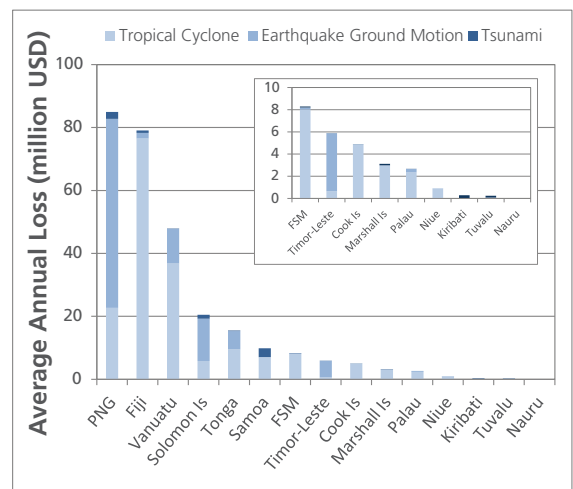


Figure 9: Average annual loss for all the 15 Pacific Island Countries considered in this study.

Table 2 includes the losses that are expected to be exceeded, on average, once every 50, 100, and 250 years. For example, **an earthquake and tsunami loss exceeding 154 million USD, which is equivalent to about 43% of Tonga's GDP, is to be expected, on average, once every 100 years.** In Tonga, tropical cyclone losses are comparable to losses due to earthquake ground shaking and tsunami. The latter, however, remain potentially catastrophic events.

A more complete picture of the risk can be found in Figure 10, which shows the mean return period of direct losses in million USD generated by earthquake, tsunami and tropical cyclones combined. The 50-, 100-, and 250-year mean return period losses in Table 2 can also be determined from the curves in this figure. The direct losses are expressed both in absolute terms and as a percent of the national GDP.

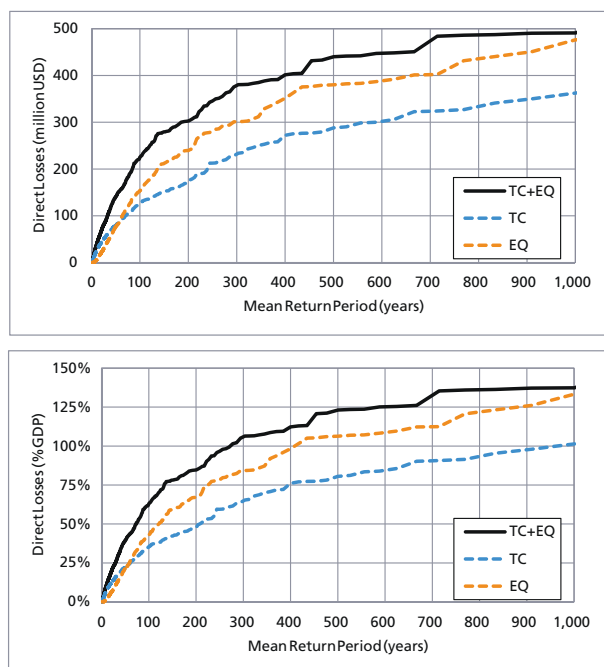


Figure 10: Direct losses caused by either tropical storms or earthquakes that are expected to be equaled or exceeded, on average, once in the time period indicated. Losses represented in absolute terms and normalized by GDP.

In addition to causing damage and losses to the built environment and crops, future earthquakes and tropical cyclones will also have an impact on population. The same probabilistic procedure described above for losses has been adopted to estimate the likelihood that different levels of casualties (i.e., fatalities and injuries) may result from the future occurrence of these events. As shown in Table 2, our model estimates, for example, that there is a **40% chance in the next fifty years (100-year mean return period) that one or more events in a calendar year will cause casualties exceeding about 600 people in Tonga.** Events causing 2,000 or more casualties are also possible but have much lower likelihood of occurring.

TABLE 2: Estimated Losses and Casualties Caused by Natural Perils				
Mean Return Period (years)	AAL	50	100	250
Risk Profile: Tropical Cyclone				
Direct Losses				
(Million USD)	9.5	78.7	126.0	212.6
(% GDP)	2.7%	22.0%	35.2%	59.5%
Emergency Losses				
(Million USD)	2.2	18.1	28.9	48.9
(% of total government expenditures)	2.2%	18.2%	29.1%	49.3%
Casualties	10	87	134	209
Risk Profile: Earthquake and Tsunami				
Direct Losses				
(Million USD)	6.0	76.3	154.2	280.1
(% GDP)	1.7%	21.4%	43.1%	78.4%
Emergency Losses				
(Million USD)	0.0	12.4	24.7	44.8
(% of total government expenditures)	0.0%	12.5%	24.9%	45.2%
Casualties	24	245	575	1,160
Risk Profile: Tropical Cyclone, Earthquake, and Tsunami				
Direct Losses				
(Million USD)	15.5	140.2	225.3	345.6
(% GDP)	4.3%	39.2%	63.0%	96.7%
Emergency Losses				
(Million USD)	3.2	28.1	41.8	63.6
(% of total government expenditures)	3.2%	28.3%	42.1%	64.1%
Casualties	34	299	600	1,174

¹Casualties include fatalities and injuries.



Country Note

TONGA

This note on Tonga forms part of a series of country Disaster Risk Finance and Insurance (DRFI) notes that were developed to build understanding of the existing DRFI tools in use in each country and to identify gaps future engagements in DRFI that could further improve financial resilience. These notes were developed as part of the technical assistance provided to countries under the Pacific DRFI program jointly implemented by the World Bank and the Secretariat of the Pacific Community financed by the Government of Japan. The technical assistance builds on the underlying principles of the three-tiered disaster risk financing strategy and focuses on three core aspects: (i) the development of a public financial management strategy for natural disasters, recognizing the need for ex-ante and ex-post financial tools; (ii) the post-disaster budget execution process, to ensure that funds can be accessed and disbursed easily post-disaster; and (iii) the insurance of key public assets, to resource the much larger funding requirements of recovery and reconstruction needs. The Pacific DRFI Program is one of the many applications of PCRAFI. It is designed to increase the financial resilience of PICs by improving their capacity to meet post-disaster financing needs without compromising their fiscal balance.

The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) is a joint initiative of SOPAC/SPC, World Bank, and the Asian Development Bank with the financial support of the Government of Japan, the Global Facility for Disaster Reduction and Recovery (GFDRR) and the ACP-EU Natural Disaster Risk Reduction Programme, and technical support from AIR Worldwide, New Zealand GNS Science, Geoscience Australia, Pacific Disaster Center (PDC), OpenGeo and GFDRR Labs.