

**Insurance, Climate-Related Events
and Risk Management**

in the

Caribbean and Pacific

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Introduction

Parties to the UN Framework Convention on Climate Change have committed themselves to considering the special needs and concerns of developing countries resulting from the adverse effects of climate change in the area of insurance. The needs of small island states have been highlighted for attention, due to their unique geographic features and exposure, and thus unique vulnerability.¹

In November 28, 2003, UNDP and the Foundation for International Environmental Law and Development (FIELD) facilitated a workshop for small island developing States (SIDS) on insurance and climate-related extreme weather events. The workshop was held in Milan, Italy, immediately prior to the Ninth Conference of the Parties to the UNFCCC.² The event brought together country representatives from eleven small island states across the Pacific, Caribbean and Indian Oceans to discuss particular insurance challenges for SIDS in the context of extreme weather events, and ways insurance strategies might be used to enhance the adaptive capacity of SIDS. Resource people were present from local and international insurance companies, multilateral organisations and banks, research institutions and centers of excellence

Workshop participants recognized that some insurance-related initiatives are being undertaken in all three SIDS regions. For example, Fiji has established a National Disaster Relief and Rehabilitation Fund to facilitate access to capital in the wake of extreme weather events and provide funds for risk mitigation. Belize is exploring ways to use insurance to address its national debt servicing obligations in the wake of natural disasters. In Vanuatu, an intensive pilot study has investigated the possibilities for regional risk pooling for purposes of a Pacific catastrophe insurance scheme. In the Caribbean, some private sector businesses have created their own risk pooling schemes to maintain access to insurance coverage, which can be difficult to secure at an affordable rate in the wake of extreme weather events.

However, all participants agreed that there is a need to build upon these and other efforts by actively engaging the private sector, governments, civil society and bilateral and multilateral organizations in exploring ways to use insurance concepts and mechanisms for their mutual benefit. While insurance will clearly not resolve all challenges facing SIDS in recovering from the impacts of climate-related extreme weather events, it is a useful risk management tool and safety net mechanism, and worth further detailed exploration by the SIDS at the national and international levels, in collaboration with intergovernmental organisations and multilateral agencies. The need for capacity building and information sharing within SIDS on financial risk management strategies is great. There is also a strong interest in many SIDS to facilitate collaboration between the

¹ See UN Framework Convention on Climate Change, Article 4.8.

² UNDP/FIELD Workshop SIDS Workshop on Insurance and Climate-Related Extreme Weather Events, November 28, 2003. The Workshop Report and agenda are available on the FIELD website.

private sector and national governments in assessing and valuing risks, and considering innovative approaches to these risks.

The goal of this paper is to take the outcomes of the November 2003 workshop forward by further exploring options to assist in risk management and enhance adaptive capacity to the impacts of extreme weather events -- events are likely to increase in intensity and frequency in many areas as a result of climate change. The paper reviews existing approaches and practices, and presents practical recommendations to promote cost effective risk management strategies in SIDS.

This paper is the outcome of a collaborative process facilitated by UNDP, between private insurance sector consultants and climate change experts in both the Caribbean and Pacific. FIELD has assisted in compiling and coordinating these inputs, and in plugging gaps.

I. Impacts of Climate Change

Over the last 100 years, the global average temperature has risen by about 0.6° C. According to NASA scientists, the four warmest years on record since the 1890's have been 1998, 2002, 2003 and 2004.³ Global average temperatures are expected to increase by another 1.4° to 5.8° C by the year 2100.⁴ In the tropical ocean regions in which most small island states are located, an increase in surface air temperature has occurred that is even greater than global rates of warming, particularly in the Pacific Ocean and Caribbean Sea.⁵ By 2100, a sea level rise of 0.09 to 0.88 meters (with a central estimate of 0.48 meters) is predicted to occur,⁶ as a result of thermal expansion caused by global warming.

The effects of changes of greenhouse gas concentrations in the atmosphere are already measurable at the global level. They include an increase in global mean sea level at an average annual rate of 1 to 2 mm during the 20th century; more frequent, persistent and intense El Niño events during the last 20-30 years compared with the previous 100 years, an increased frequency of coral reef bleaching, and an increase in weather-related economic losses by an order of magnitude over the last 40 years -- partly because of climactic factors.⁷

Many small island states are only a few meters above present mean sea level. Even on higher islands, most settlements, economic activity and infrastructure is located at or near the coast.⁸ For these islands, sea level rise will cause flooding, coastal erosion, salt water intrusion, and the loss of flat coastal regions. Populations in many low-lying small island

³ <http://www.giss.nasa.gov/research/news/20050208/> "Earth Gets a Warm Feeling All Over"

⁴ Third Assessment Report, Intergovernmental Panel on Climate Change (2001) ("TAR") (available at www.grida.no/climate/ipcc_tar/wg2), Summary for Policymakers.

⁵ TAR.

⁶ Id.

⁷ Id.

⁸ Id, Ch. 17.1.1.

states, such as Tuvalu and Kiribati in the Pacific, and the Maldives in the Indian Ocean, are particularly vulnerable to increases in storms,⁹ given their topography, and face severe social and economic effects from their exposure to these events. The risk of damage from these events is increased with the combination of rising sea levels and the storm surge and coastal flooding associated with extreme weather events.

Characteristics that increase the vulnerability of small island states include their small physical size, limited natural resources, relative isolation, open and small economies that are highly sensitive to external shocks and highly prone to natural disasters and other extreme events, rapidly growing populations with high densities, poorly developed infrastructure, and limited funds, human resources, and skills.¹⁰ These same characteristics limit the capacity of small island states to adapt to the impacts of future climate change.

Many small island states already experience the effects of large interannual variations in oceanic and atmospheric conditions. As a result, the most significant and more immediate consequences for small island states from climate change are likely to be related to changes in rainfall regimes, soil moisture budgets, prevailing winds (speed and direction), short-term variations in regional and local sea levels, and patterns of wave action.¹¹ Tourism, which is an important source of income and foreign exchange for many islands, is also likely to face severe disruption.

A rise in sea surface temperatures could also significantly expand the southern and northern reach of zones susceptible to tropical storm formation, of which some 50% reach hurricane level wind speeds. Of the 234 major catastrophes in the last 50 years, 35% are earthquakes, 30% are floods, and 28% are windstorms.¹² In terms of economic impact, however, windstorm has accounted for approximately 70% of losses.

The relative percentage of damages to GDP from climate extremes have been substantially greater in developing countries than in developed countries.¹³ Weather disasters set back development, particularly when funds are redirected from development projects to disaster recovery efforts.¹⁴ The relationship between adaptation to the impacts of climate change and the attainment of the Millenium Development Goals is clear. As the IPCC's TAR has noted, at Chapter 2.9,

“Many communities and regions that are vulnerable to climate change are also under pressure from forces such as population growth, resource depletion, and poverty. Policies that lessen pressures on resources, improve management of environmental risks, and increase the welfare of the poorest members of society can simultaneously advance sustainable development

⁹ Id.

¹⁰ TAR, Ch. 17.1.2.

¹¹ TAR.

¹² Munich Re ‘Topics’ – millennium issue.

¹³ TAR, Summary for Policymakers, Ch. 2.8.

¹⁴ TAR, Technical Summary, Ch. 4.6.

and equity, enhance adaptive capacity, and reduce vulnerability to climate and other stresses. Inclusion of climatic risks in the design and implementation of national and international development initiatives can promote equity and development that is more sustainable and that reduces vulnerability to climate change.

II. The Roles of Government, Risk Assessment and Insurance

A. Government

A key role of government is in facilitating a cost-effective distribution of risk that provides incentives and means for risk reduction, and safety net mechanisms for those less able to manage risk.

The financial burden of losses from extreme weather events affect different groups of stakeholders differently. Risk that is not covered by insurance is absorbed by the community (retained risk of insurance policyholders), governments, agencies, and regional, national and international aid resources. This burden is also absorbed in the short term by banks and lending agencies. Where losses from a particular event or series of events are not wholly-compensated, unmet portions often fall to the governments involved.

The cost-effective treatment of residual risk lies in forward looking, comprehensive and planned management of risk, rather than reactive ad-hoc approaches. However, economic constraints often dictate post-event responses to significant loss scenarios. It can be difficult to promote proactive approaches when there are more pressing economic needs to be addressed. Nevertheless, farsighted controls and strategies may offer significantly more cost-efficient remedies than ad hoc solutions that are borne of crises as they arise.

Another key role of government is to balance risks against benefits in guiding development activities. Even in the absence of climate change, there is a tendency for potential losses to grow at relatively high rates in the face of increasing population density and concentration of economic assets and values. In SIDS, populations are typically concentrated in coastal regions. The greater population density in these regions significantly increases their relative loss exposure. As countries develop and urban and industrial asset values grow at rates exceeding population growth, even greater loss exposures accumulate. The true cost of managing these risks will likely represent a growing share of national product over time, and may constrain development options that might otherwise be pursued.

B. Risk Assessment

It is important for all stakeholder levels to have an understanding of the nature of risks and their potential consequences. Without this information, governments may make

policy and administrative decisions that later prove to have been less effective than alternative solutions might have been. Individuals and companies may not make rational assessments of their risk exposure or make sound choices on their financial management. Some elements and issues that are key to overall risk assessment include:

- The comprehensive profile of social and economic interests at risk of damage or loss through weather events (risk categories, affected zones and 'routine' versus catastrophic exposures).
- The values exposed and their vulnerabilities (probabilities and degrees of severity for individual losses and event accumulations).
- The scope and adequacy of disaster response measures.
- Risks potentially impacted by climate change and increased climate variability/volatility.
- The economic and social consequences of loss (prioritized according to potential impact).
- The scope for risk consequences to be mitigated or controlled.
- Evolution of the risk profile.
- The efficiency of response mechanisms (allocation of powers and coordination), and the interplay between the community, governments and the private sector.
- Strategies to adapt to changing weather conditions.
- Risk management solutions

Once social and financial exposures are identified, primary risks can be analysed and eliminated or mitigated wherever feasible. Optimal risk sharing and risk management solutions can be identified, and strategies and mechanisms can be developed to treat and distribute the residual risk in the most cost effective manner.

Some risk exposures can be eliminated or substantially mitigated at little cost. At the broader community and public infrastructure levels, reductions to risk may require progressive changes to planning and development guidelines that impose constraints on some land uses (for example, flood zoning and controls), or that avoid high risk developments and design standards for structures to withstand wind forces. Risk mitigation also extends to post-disaster collaboration between the community, government and disaster relief organizations, to limit consequential loss.

Individual stakeholders have differing and sometimes competing interests and incentives in the management of risk, which need to be borne in mind. These include:

- Communities in small island states
- Charities and support groups at several levels
- Local, regional and national governments, including disaster management and relief agencies
- International donor, assistance and relief organizations
- Local, national and international banks, insurers, brokers/risk management advisers and reinsurers

- Capital market investors in or sponsors of specialized vehicles created to manage insurance or ‘quasi-insurance’ risks (for example, catastrophe risk securitizations and weather derivatives).

C. Insurance

Many potential losses from extreme weather events are beyond the financial means of individuals, companies and even governments. Insurance and reinsurance are in some senses substitutes for the capital that would otherwise have to be held to absorb these losses. A number of forms of insurance exist to permit the transfer and management of retained risk. These include mutual insurance pools, commercial insurance, reinsurance, and multi-State pooling arrangements.

Mutual insurance pools

Mutual insurance – insurance in its simplest and original form – permits a group of individuals that are exposed to the same risk to contribute premiums to a pool, which is then used to cover the losses of the small proportion of the pool members who will actually experience losses from that risk. In this way, insurance allows individuals to convert an uncertain but potentially unaffordable risk of financial loss for one ‘member’, to a known regular cost, at a fraction of that member’s potential total loss exposure. In this way, insurance permits an insured individual or entity to manage risk over time, and avoid setting aside in advance the total capital needed to cover actual losses, if losses should occur.

Mutual insurance pools offer an economic benefit and cost efficiency that derives from the predictability and manageability of the aggregate ‘claims’ experience in relation to the pool of premiums. The stability of a pool depends primarily on the range of possible loss frequencies and severities. The range of aggregate claims depends on the number of risk units in the pool. The larger the risk population, the lower the variation in the aggregate claims experience. The degree of independence between individual risks is also critical to the inherent variability in the potential losses of the pool as a whole. Thus the scale of risk, and the degree of risk independence, are highly significant to pool viability. For mutual pools, the ability to pay claims is generally limited to total premiums received.

Commercial insurance

Commercial insurance, in contrast, typically takes the form of a contractual indemnity in which the insurer takes on the risk of losses exceeding the pool of premiums against its own capital. For commercial insurance to be available, there must be a fundamentally homogeneous pool of risks that can be quantified for unit risk pricing purposes. The average ‘premium’ cost is then a function of the loss frequency (claims for each insured risk) and loss severity (cost for each realized loss).

Just as potential losses may be beyond the financial means of individuals, most direct insurance portfolios require a further ‘laying off’ of components of the portfolio risks through a reinsurance program. Programs used by underwriters typically involve several reinsurers and are designed to limit the range of losses retained by the underwriters themselves (retained losses) to levels that their own capital resources can tolerate.

Reinsurance

Insurers use reinsurance as a cost-effective means of mitigating their own risk from loss exposures. Reinsurance programs principally cover individual policies on liability and property risks with high cost exposures per risk, and accumulation exposures on multiple policies from a single catastrophe such as fire, windstorm, earthquake or volcanic eruption. The capital required by a reinsurer, or panel of reinsurers, to adequately cover the risks of a combined reinsured risk pool will be lower than the collective capital requirements of the primary insurers for these risks, if these insurers were instead to retain the gross risk to their own accounts. The capital saving is a statistical consequence of the degree of independence in the pool of reinsured risks, further mitigation of aggregate claims volatility through geographical spread of otherwise similar risks (regional, national and often international diversification), and the inherently greater relative stability of a larger scale risk pool.

Global reinsurance premium rates are always subject to hard and soft pricing cycles. Reinsurance pricing has been subject to significant swings in the last few years, though in relative terms recent increases have generally not been as great as those experienced in the aftermath of Hurricane Andrew in 1992. Because rate hikes for catastrophe cover have appeared to follow significant disaster losses, this creates the impression that the insurance industry engages in reactive premium setting, to recover from immediate past excess losses and capital depletion, rather than engaging in fair pricing based on an ongoing technical assessment of intrinsic risk.

From the insurance industry’s perspective, viable insurance requires a reasonable return on capital; losses from major disasters will from time to time erode reserves, necessitating rate hikes. In the long term, the industry’s target is a fair insurance profit -- a positive excess of premiums plus investment earnings on those premiums over claims incurred. The reinsurance industry suffered heavy losses in the last two decades (including the extraordinary losses from the ‘9/11’ terrorist attack), impacting overall reinsurance capital reserves.¹⁵

Multi-state pools

A number of proposals have been made in recent years for the formation of multi-State insurance pools. For a given risk profile, the larger the pool, the more stable its loss outcomes will be. For this reason, insurance pools combining the like risks of several States in a region are theoretically likely to operate more cost-effectively. Because of the

¹⁵ The Bermudan market still largely underwrites natural catastrophe property risk and remains relatively well-capitalized in relation to retained risk.

greater statistical stability of a larger risk pool, regional insurance pools may lead to better pricing for the broader-based pool, even if some elements of the pool are innately riskier and therefore more expensive at the margin.

Obstacles to the creation of multi-State pools include political obstacles, and concerns regarding real or perceived risk sharing inequities. However, in practice, most risk pools are characterized by degrees of cross-subsidization of risk. For this reason, short term net inflows or outflows of funds that are reasonably attributable to fortuitous risk outcomes cannot be viewed as subsidies. When one participating risk group is persistently the subject of either subsidized or excessive cost, the overburdened party or parties may seek an adjustment to reflect this extra burden. Sustainable arrangements therefore require a reasonable sharing of risk and cost between pool members, but a moderate degree of disparity between the vulnerability of individual risks does not have to compromise the working of the pool. There are equitable and efficient ways to address the perceived risk of ‘subsidizing a neighbor’s losses’.

Financial risk management framework

For SIDS, either individually or as a risk group, an optimized framework of risk distribution and management between stakeholders will require the least overall capital support and the most cost-effective and sustainable funding solution. An effective framework will combine elements of primary risk retention, discretionary mutual or self-insurance pools, intra-State or perhaps inter-State schemes, private sector insurance/reinsurance and contingent funding through banks, capital markets and donors.

To design an optimized framework, data collection is essential together with analyses of weather-related hazards and loss exposures, in order to anticipate the impacts of climate-related extreme weather events, and support and enhance risk management planning. The relative lack of data in the central and south Pacific regions constrains the thorough assessment of insurance risk for weather catastrophes in the SIDS regions. This in turn makes it difficult for international insurers and reinsurers to subjectively price insurance cover in these regions.

Insurance industries are equipped to play a valuable role in both assessing risk, and working with community and government stakeholders in developing optimal risk management frameworks. They can beneficially influence local and regional governments in planning, for example, through building standards, levies and flood basins, and tree lopping guidelines to reduce property and personal risk during windstorms. They also have a good knowledge of relative risk zones and particular areas of exposure requiring high standard construction and/or restricted development. The insurance and reinsurance industries are natural partners because they have an interest in identifying loss causes and frequencies to evaluate natural hazard behaviors, and their fundamental business is about assessing, pricing and managing risk.

III. The Caribbean

A. Climate Change, Sea Level Rise, Tropical Storms and Hurricanes in the Caribbean

The Caribbean region has always been a high risk area for the impacts of tropical storms and hurricanes. Annually, the hurricane season lasts from June to October. Some islands, such as Dominica, St Vincent, Guadeloupe and Montserrat, are also vulnerable to volcanic disaster.

During the ten-year period from 1994-2003 there have been 129 tropical storms and hurricanes which have been in the Atlantic, Caribbean, Gulf of Mexico region¹⁶. While many of these storms did not make landfall in the Caribbean, some of them nevertheless caused significant damage. For example, Hurricane Lenny in 1999 caused approximately US\$ 1.0 billion dollars in damage in the region¹⁷.

In 2004, the Caribbean had an extremely active hurricane season, with four major hurricanes affecting the region: *Ivan*; *Frances*; *Jeanne*; and *Charley*. *Hurricane Ivan*, which impacted Grenada, Jamaica and the Cayman Islands most notably, underscores the stark vulnerability of small islands states to hurricanes. Prior to *Hurricane Ivan*, Grenada's economy was projected to grow by 4.7% in 2004 and continue to grow at an average rate of 5.0% between 2005 and 2007. In the wake of *Hurricane Ivan*'s devastation, revised projections were a decline in economic activity of approximately -1.4% in 2004 (resulting in an overall impact of six percentage points of GDP growth), reflecting a contraction in tourism and the halt in production of traditional crops. As a result of the impacts of *Ivan*, the fiscal position of central government of Grenada in 2004 is now projected to deteriorate from a surplus of \$17m to a deficit of \$54m or 4.5% of GDP, reflecting the fall off in revenue, particularly from taxes on international trade and transactions.¹⁸ In the Cayman Islands insured losses alone resulting from *Hurricane Ivan* were approximately \$1.2 billion.

Table 1. Importance of tourism for selected small island states and territories

Source: IPCC Third Assessment Report, Table TS-13

Country	Number of Tourists (000s) ^a	Tourists as % of Population ^a	Tourist Receipts	
			as % of GNP	as % of Exports
Antigua and Barbuda	232	364	63	74
Bahamas	1618	586	42	76
Barbados	472	182	39	56
Cuba	1153	11	9	n/a

¹⁶ See www.nhc.noaa.gov

¹⁷ Headley O, (2000) *Comparative Cost of Fossil Fuels and Renewable in Barbados*, Centre for Resource Management and Environmental Studies, University of the West Indies-Cave Hill Campus, Barbados

¹⁸ OECS, *Grenada: Macro-Socio Economic Assessment of the Damages caused by Hurricane Ivan*, September 2004

Dominica	65	98	16	33
Dominican Republic	2211	28	14	30
Grenada	111	116	27	61
Haiti	149	2	4	51
Jamaica	1192	46	32	40
St. Kitts and Nevis	88	211	31	64
St. Lucia	248	165	41	67
St. Vincent	65	55	24	46
Trinidad and Tobago	324	29	4	8

The impacts of major hurricanes have historically been devastating on the countries of the Caribbean (in 1988, for example, *Hurricane Gilbert* caused over US\$956 million in damage, with half the losses in agriculture tourism and industry). But in addition to the economic impacts of these events, there enormous psychological and health impacts that must also be considered. In 2004, Hurricane *Jeanne* produced torrential rainfall in Haiti, resulting in flooding that claimed roughly 3,000 lives.¹⁹ This came in the wake of flooding and landslides that affected Haiti and the Dominican Republic in late May 2004, in which more than 2,000 people were killed and several thousand others were affected.²⁰

Table 2. Major Events in the Caribbean, 1980 – 2004²¹

Year	Storm	Country	Persons Affected	Damage in US\$,000)
1980	Allen	St. Lucia	80,000	87,990
1988	Gilbert	Jamaica	810,100	1,000,000
1989	Hugo	Montserrat Antigua and Barbuda, St Kitts and Nevis, Tortolla	33,790	3,579,000
1992	Andrew	Bahamas	1,700	250,000
1995	Luis	St. Kitts and Nevis	1800	197,000
1995	Marilyn	US Virgin Islands	10,000	1,500,000
1998	Georges	Dominican Republic , Antigua and Barbuda	975,595	2,193,400
2000	Lenny	Dominica, Grenada and St Lucia		268,000
2001	Michelle	Cuba	5,900,012	87,000

The Third Assessment Report of the Intergovernmental Panel on Climate Change²² noted that while there is no consensus in the conclusions of studies related to the behaviour of tropical cyclones in a warmer world, some individual studies have reported the likelihood of a possible increase of approximately 10-20% in intensity of tropical cyclones under

¹⁹ WMO ‘Statement on the Status of the Global Climate in 2004: Global Temperature in 2004 Fourth Warmest,’ Press Release for use of the media, December 15, 2004 (‘WMO December 15, 2004 Press Release’) (available at http://www.meteo.bg/reports/reports/wmo/PR.718_E.pdf)

²⁰ Id.

²¹ See www.em-dat.net

²² Intergovernmental Panel on Climate Change, Third Assessment Report - Impacts, Adaptation and Vulnerability (Cambridge University Press, 2001), (‘TAR’).

enhanced carbon dioxide conditions.²³ A recent study has also noted that that if the frequency of tropical cyclones remains the same over the coming century, a greenhouse gas-induced warming may lead to a gradually increasing risk in the occurrence of highly destructive category-5 storms²⁴.

In December 2004, a World Meteorological Organisation (WMO) Press Release, issued in conjunction with a Conference of the Parties to the UN Framework Convention on Climate Change, noted that an above-average number of hurricanes and deadly typhoons are now being seen, and that since 1995, there has been a marked increase in the annual number of tropical storms in the Atlantic Basin. During the Atlantic hurricane season, 15 named tropical storms developed, while 10 is closer to average. Nine of the named storms were classified as hurricanes, and six of those were “major” hurricanes (category three or higher on the Saffir-Simpson scale). Hurricane *Charley* in 2004 was the strongest and most destructive hurricane to strike the United States since *Andrew* in 1992. Within the United States alone, the nine named storms classified as hurricanes caused extensive damage estimated at more than US\$ 43 billion.

The global mean surface temperature in 2004 is expected to be +0.44⁰ C above the 1961-1990 annual average (14⁰C), according to World Meteorological Organization (WMO).²⁵ This places 2004 as the fourth warmest year in the temperature record since 1861, just behind 2003.²⁶ The last 10 years (1995-2004), with the exception of 1996, are among the warmest 10 years on record.²⁷ The heating of the world’s oceans leads to expansion of the world’s oceans, which in turn results in sea level rise.

Thus regardless of any differences of opinion on the specific impacts of the world’s changing climate on the severity and frequency of tropical storms in various regions, the problem of sea level rise cannot be escaped. Current projections give a rise of *5mm per year within a range of 2-9mm per year*.²⁸ Sea level rise by itself is likely to cause increased near shore flooding, increased erosion rates on beaches and saline intrusion into freshwater supplies in countries in the region dependent on coastal aquifers. In addition, sea level rise of this magnitude will compound the effects of storm surge resulting from tropical storms, hurricanes and cyclones; increasing the coastal area under threat of erosion and coastal flooding.

Many countries in the Caribbean have their highest elevation no more than 5 meters (15 feet) above sea level. These include St. Kitts and Nevis, Bahamas, Dominica, and Antigua and Barbuda. This translates directly into a vulnerable population, as it means that 100% of the population lives at no more than 5 meters above sea level. Others Caribbean countries have significant land areas with low elevation. In many islands in

²³ Id. at 6.

²⁴ Knutson T.K and R. E. Tuleya, 2004: *Impact of CO₂-induced warming on simulated hurricane intensity and precipitation: Sensitivity to the choice of climate model and convective parameterization*. Journal of Climate 17(18), 3477-3495.

²⁵ WMO December 15, 2004 Press Release.

²⁶ Id.

²⁷ Id.

²⁸ TAR, WG II at 6.

the Caribbean, much critical infrastructure is located in coastal regions. The potential impacts of sea level rise combined with tropical storms and hurricanes, can be expected to be devastating. Climate change will increase the impact of these extreme weather events, making the small island and low-lying coastal states of the Caribbean region and other regions more vulnerable than ever.

B. Disaster Management Frameworks in the Caribbean

Throughout the Caribbean there are a number of offices and government departments responsible for disaster management. For the most part, these offices co-ordinate disaster management with the assistance from the community and other government departments.

For example, in Antigua, the National Office of Disaster Services (NODS) has overall responsibility for the coordination of various aspects of disaster response and management. NODS is also responsible for provision of support and logistical services during disasters, working in collaboration with various line agencies and organizations such as the Police, Ministry of Health, Meteorological Office, Public Works, Defence Force, and non-governmental organizations such as the Red Cross and churches. NODS also works through a system of community-based committees with responsibility for facilitating relief and information dissemination at the community level. NODS serves as the secretariat and executive arm of the national Emergency Operations Committee (EOC) which is commissioned at the time of a national disaster and which comprises inter-ministerial and inter-agency representation headed by the Prime Minister.²⁹

Disaster management in Dominica is organized within the Ministry of Communications, Works and Housing (MCWH) through the National Emergency Planning Organization (NEPO). NEPO is comprised of senior officials from Government, the private sector and the NGO community and has responsibility for formulating overall disaster management policy and strategy. The National Emergency Executive Committee (NEEC) -- a sub-committee of NEPO -- manages NEPO programming. Day-to-day activities are implemented through the Office of Disaster Management (ODM), a small unit within the MCWH, which is headed by a National Disaster Coordinator and has a single staff person for support. District Emergency Committees carry out NEPO's mandate at the District level, and District Emergency Operations Centres (DEOCs) are activated in times of disaster. Community Emergency Committees carry out NEPO's mandate at Community level, with Community Emergency Operations Centres (CEOCs) that are activated in times of disaster.

In Jamaica, responsibility for disaster management lies with the Office of Disaster Preparedness and Emergency Management (ODPEM). ODPEM, unlike many other disaster management organizations in the Caribbean, is not a response-based organization but is instead involved in many risk mitigation projects. ODPEM has been involved in the implementation of community and vulnerability reduction programmes, the relocation of vulnerable persons, and the establishment of community flood warning systems.

²⁹ Brian Challenger (2003), *Needs Assessment For Capacity Building in Risk Management and Vulnerability Reduction for Antigua and Barbuda* (UWICED).

OPDEM has also been involved in the establishment of a national zonal programme of community-based disaster management structures and procedures. OPDEM relies on activities at the community level, with committees at the parish levels involved in implementation of OPDEM activities.

In Barbados, a Central Emergency Relief Organization (CERO) is responsible for the disaster management and preparedness. CERO is responsible for promoting and maintaining a comprehensive National Disaster Programme. It is also responsible for educating citizens about the various elements of disaster management, creating appropriate mechanisms which will promote and advance disaster management activities at all levels of the society, promoting and institutionalizing the practice of appropriate preventative and mitigation measures for all possible hazards, and promoting the development and maintenance of effective warning, response and recovery plans for all sectors of the society. CERO is currently composed of a National Disaster Committee, an emergency operations centre, emergency management teams, and 29 district emergency organizations which are identified by the same boundaries as political constituencies. The National Disaster Committee is tasked to ensure the formulation of agency and sectoral disaster plans, review and approve national disaster preparedness and response plans for all hazards, conduct simulations and drills in order to test and upgrade disaster preparedness plans, and promote the study, control and mitigation of disasters and the evaluation of operational research on emergency situations. The 29 district emergency organizations, which are voluntary organizations, play a key role in disaster management by providing the links to the community and thus to the “ground level” in terms of community preparedness, awareness and response to natural disasters³⁰. The function of the district emergency organizations is to provide a forum for education and training at the community level, develop a mechanism for initial emergency response, and develop a mechanism to facilitate the conduct of damage assessment, needs analysis and relief distribution.

Many non-governmental organisations (NGOs) are involved in disaster response in the region. The recent response of organisations such as the Lions and Rotary Club to the impacts of *Hurricane Ivan* in the Caribbean are examples of the role which NGOs have played in the region. The Caribbean Tourism Organisation has also established a relief fund to provide assistance with the impacts of *Hurricane Ivan*.

Extensive existing disaster management frameworks exist in the Caribbean, and these frameworks can be used to enhance pre-disaster mitigation efforts.

C. The Insurance Industry in the Caribbean

The insurance industry in the Caribbean has been in existence for well over 300 years. Barbados Mutual Life Assurance Society (now Sagicor) was founded in 1840; Standard Life Assurance Co Ltd was formed in 1847. The Caribbean thus has a well-established insurance sector. Many of the insurance companies in the Caribbean region were

³⁰ Nurse, Moore (2003) *Needs Assessment for Capacity Building in Risk Management and Vulnerability Reduction for Barbados* (UWICED).

originally British companies that expanded into the region. However, over the years many of these companies have scaled down their local operations, evolved into local agency type operations, and evolved into indigenous companies in the larger markets of Barbados, Jamaica, Trinidad and Tobago and the Bahamas. The insurance companies in these countries have expanded into smaller markets in other islands such as Dominica, Grenada, St. Lucia and St. Vincent.

The number of general and property insurance companies in the Caribbean is quite large. Barbados and Trinidad and Tobago have over twenty each. Insurance markets in the Caribbean are very intensive and competitive. The majority of the market in the Organization of Eastern Caribbean States³¹ is held by companies from Barbados and Trinidad. The proportion of commercial and residential properties in the Caribbean which are covered by insurance are significantly higher than in most developed countries, due to both the Caribbean's susceptibility to natural disasters, and its tourism industry and facilities. The insurance density in the United States of America is 3.3% of GDP for the property and casualty business, the average for the OECS, Barbados and Trinidad and Tobago is 2.3% of the combined countries GDP³².

D. Insurance Regulation

In the English-speaking Caribbean, each island has an Insurance Act which regulates the insurance industry. Typically, this legislation restricts the provision of insurance to licensed insurance companies, and requires insurance companies to meet certain regulatory requirements, including minimum capitalization requirements. For example, the minimum capital requirement in Barbados is US\$1.5 million with a reserve requirement of 40% of annual premium income. In Antigua, St Vincent & the Grenadines, and Dominica the minimum capital requirement is US\$ 0.07million. In Trinidad & Tobago, the minimum capital requirement is now \$1.6 million.

A new OECS Insurance Act is under review by OECS member governments which could substantially raise minimum capital requirements. The new OECS Act would require minimum capital of \$0.9 million for local companies and a requirement of \$1.8 million for foreign companies. This differentiation is intended to provide a competitive adaptation period for indigenous companies to reduce their costs and increase their scale economies. At the same time, it is intended to ensure that foreign companies maintain sufficient capital for operations and claims settlement. In Grenada and St. Lucia, existing regulations already provide for differentiated capital requirements for foreign companies. The new Insurance Act, however, will attempt to harmonize the regulatory requirements across all of the OECS to include uniform solvency margins (e.g.: 20% of premium).³³

³¹ OECS countries include Antigua and Barbuda, Dominica, Grenada, Montserrat, St. Kitts and Nevis, and St. Lucia.

³² The World Bank, *Managing Catastrophic Risk Using Alternative Risk Financing & Insurance Pooling Mechanisms*. June 2000.

³³ *Id* at 16.

In OECS countries, all insurers must be registered locally, whether they are foreign or domestic companies. In contrast, Barbados and Trinidad and Tobago have separate regulations applicable to non-registered foreign companies, although there is concern about monitoring these businesses more carefully, given their non-reporting status. Prior to the liberalizing of currency controls in the Caribbean, the purchase of insurance from non-licensed insurance companies was made difficult, since the purchase of foreign exchange (US dollars) to effect the coverage was monitored and permission was refused for insurance transactions. Very few of the islands (primarily Barbados) maintain strict currency controls any more so there is an increasing incidence of the purchase of insurance from unregistered insurance companies and brokers. The irony is that there are increasing regulatory controls on the operation of domestic insurance businesses, in a market with fewer controls on foreign businesses. Therefore, an insurance broker from London may solicit insurance business for a hotel in a Caribbean island where he is not licensed, yet a domestic insurer will be severely restricted in the movement of capital and services within the islands. With the implementation of the Caribbean Single Market and Economy, in 2005 the movement of labour and capital should be considerably easier and provide greater flexibility to insurance industries within the region. The single market will eliminate regulatory arbitrage, create a more orderly regional insurance business, and create a more sustainable basis for the insurance market.

Existing differences in regulatory frameworks within the Caribbean may have an enormous influence on the cost of coverage in different countries for the same risk. For example, the French and Dutch islands operate within the regulatory framework of their national centers. Martinique, for example, is part of France; insurance rates in Martinique are offered by French national insurers and are completely different from rates that are offered by regional insurers in neighbouring St. Lucia. While the risk exposure is the same, pricing is set according to French national loss experience and the coverage is based on French Contracts. A hotel may pay \$25,000 for their property insurance in Martinique based on French rates, yet a hotel in neighbouring St. Lucia might be compelled to pay \$100,000 for the same coverage, because the price in St. Lucia is driven by the insurance supply of reinsurance for the Caribbean. The Dutch islands follow a similar approach.

The U.S. Virgin Islands are regulated by a United States insurance system. Nevertheless, U.S. insurers do not wish to provide cover to these small islands primarily because local ordinances regulating liability and workers compensation make insurance uneconomic to offer. Puerto Rico is also regulated in the United States.

It is extremely difficult to apply cost effective insurance risk management measures in the Caribbean. Each island requires minimum capital/surplus notwithstanding the level of capital held by the operating Company. For example, the largest general insurance Company in the Caribbean (NEMWIL) has US \$75 million in capital/surplus which is adequate to meet certain solvency/capital requirements for the level of business it will write. Yet, if it establishes a branch operation in another island, it will need a minimum deposit within that island of whatever the minimum capitalization requirement is for that island (e.g., US\$ 1.5 million in Barbados) before it may write one dollar of premium.

Thus even though the company as a whole has a more than adequate supply of capital to cover the policies it writes, it cannot operate without meeting capitalization requirements in its islands of operation.

Several islands have enacted legislation to encourage non-CARICOM³⁴ organizations to establish captive insurance companies within their offshore jurisdictions. The benefits offered are little or no taxation on these companies, and no controls, except for a minimum premium to capital ratio and the need to file audited statements. This legislation encourages the entry of financial sector markets, attracted by a lighter regulatory cost burden, and often a favorable tax regime. Many large Canadian multinationals have established a captive insurance operation in Barbados to manage their worldwide risk.

It is extremely easy to manage a self-insurance vehicle in the Caribbean. However, captive insurance regulations issued by these islands to develop offshore captive insurance companies all prohibit Caribbean risks from being insured within a licensed captive. This prohibits ownership of captives by CARICOM investors and forces Caribbean companies, interested in self-insuring through a captive company, to establish a captive in a non-CARICOM jurisdiction. Thus, if a large Caribbean company wished to establish a self-insurance entity to more effectively manage risk and access the international reinsurance industry, rather than utilize the domestic insurance market with its high costs, the Company would be forced to establish its captive in a non-CARICOM jurisdiction, such as Bermuda or the Cayman Islands. It would also incur very high frictional tax costs, since it would be bypassing the licensed insurance company requirements. The objective of this restrictive policy is to protect the domestic insurance companies, but it also serves indirectly to protect the international reinsurance companies, who take up to 80% of the premiums generated within the Caribbean. To expand access to affordable insurance, means might be found to permit Caribbean business to collectively or individually take advantage of favourable legislation that has already been established exclusively for non-CARICOM business and organizations.

E. Government Asset Coverage

The majority of government assets in the Caribbean are either not insured or severely underinsured. Rebuilding of these assets following catastrophic damage in the past has been financed by aid, debt or grants. The Caribbean Development Bank (CDB), for example, has recently approved loans of US\$ 8.6 million to Grenada and US\$ 4.5 million to Jamaica to assist with restoration of services after *Hurricane Ivan*. The CDB assisted Antigua following *Hurricane Luis* and *Marilyn* in the mid-1990's.

In the last ten years, many government assets in the Caribbean have been moved to ownership and/or management by semi-independent statutory boards. For example,

³⁴ CARICOM member countries include: Antigua and Barbuda; The Bahamas; Barbados; Belize; Dominica; Grenada; Guyana; Haiti; Jamaica; Montserrat; Saint Lucia; St. Kitts and Nevis; St. Vincent and the Grenadines; Suriname; Trinidad and Tobago.

control over a port may be vested in a Port Authority, as a separate corporation outside of the relevant central government's assets. These quasi-independent statutory bodies do take measures to insure operations, which often involves a public tender process. However, many statutory bodies are only marginally profitable, and sometimes the cost of insurance can inhibit full insurance coverage, especially when the relevant Government will have to fund the shortfall ultimately in the event of a major loss that is not adequately insured.

Nevertheless, as this process of separation of government assets into quasi-independent statutory bodies grows, there is a higher probability that these assets will be insured relatively well compared to the normal governmental practices.

There are still significant problems with the insurance of government buildings. Schools for the most part in the eastern Caribbean islands may not be insured. Primary and secondary schools in Barbados are insured by the government-owned insurance company (which is now semi-privatised), but are nevertheless severely underinsured in the event of catastrophic loss, leaving excess losses functionally self-insured by the government.

F. The Insurance Challenge in the Caribbean

With the advent of climate change and a probable increase in the strength and frequency of climate-related extreme weather events, and the increase in costs from these events, it is possible that in the future the availability of coverage for countries in the region could be come limited at a time where insurance coverage will be needed the most.

Rates for property insurance in the Caribbean began to increase in 1989 as a result of reinsurance losses caused by *Hurricanes Gilbert* (1988) and *Hugo* (1989). In August 1992, *Hurricane Andrew* occurred, followed by winter storms in Europe. Although there was no damage to majority of the eastern Caribbean islands from *Hurricane Andrew*, these events created a difficult reinsurance market, which peaked in 1993 and continued through 1994. Prices reached levels of 200 percent to 300 percent above those of 1989 and prior years.³⁵ Several companies refused to extend coverage to the Caribbean, and those that did imposed a 2 percent deductible on the insured value. Primary insurers and agencies in the region, highly dependent on the reinsurers, had no option but to pass on the increases to property owners.³⁶

With *Hurricanes Floyd, Jose* and *Lenny*, 1999 was the third highest loss year in terms of insured losses from catastrophes (\$18 billion), with associated economic losses of \$80 billion. Similarly, 1998 was the fourth highest loss year in terms of catastrophes, with global insured losses amounting to \$15 billion and overall economic losses of \$94 billion. Of the \$15 billion in losses, almost 80% were due to windstorm disasters. These figures compare to insured losses from catastrophes of approximately \$27 billion in 1992 and

³⁵ Vermeiren, J (2000); Risk Transfer and Finance Experience in the Caribbean; Caribbean Disaster Mitigation Project, OAS/USAID

³⁶ Id.

\$18.4 billion in 1994, the two previous years of highest losses.³⁷ As a result of events in the late 1990's again reinsurance prices soared in the Caribbean region.

The insurance industry in the Caribbean is subject to changes in the international insurance market. In 2002, rates increased on property insurance in the Caribbean by 40% as a result of losses the insurance industry suffered as a consequence of the '9/11' terrorist attack in New York in 2000. This increase occurred despite the fact that no one in the Caribbean islands had been subjected to a terrorism attack, and despite the fact that policy holders in the Caribbean do not carry terrorism cover. Insurance rate increases in the Caribbean are tied to the international market, and occur regardless of whether the region is affected by a disaster or not. *Hurricane Andrew* is a prime example of this. Although there was no evidence that hurricane severity increased in the eastern Caribbean, or that properties were being built at lesser standards, insurance rates still soared following *Hurricane Andrew*. It is expected that losses resulting from the very active hurricane season in 2004 will cause insurance premiums in the Caribbean to rise again.

The Caribbean is highly dependent on the reinsurance market. Due to the Caribbean's high risk exposure and losses over the years, very few indigenous insurance companies have developed significant capital bases to retain more risk. As a result, the insurance industry is still very reliant on large international reinsurers in transferring risk. The price of insurance at the retail level is driven by these reinsurers. When there are unrelated catastrophic losses in other areas (*Hurricane Andrew* 1992, September 11, 2000 terrorist attack) reinsurance rates in the Caribbean are pushed up dramatically, and the indigenous companies have no option but to follow suit or cut back on reinsurance cover -- which carries its own risks in the absence of adequate capitalization.

With a changing climate, that is likely to result in changing weather patterns, greater impacts from extreme weather events, and further flooding and coastal damage, insurance may well become unaffordable or entirely out of reach for many in the Caribbean as reinsurance rates skyrocket. Indeed, some reinsurers may elect to remove themselves from the Caribbean market completely. This raises an obvious question: what can be done to ensure that private and public stakeholders in the Caribbean have access to effective and affordable insurance mechanisms to manage their increasing risk?

G. Mechanisms and Activities to Address Insurance Challenges in the Caribbean

Huge increases in the cost of primary insurance resulting from the losses from *Hurricane Andrew* in 1992 resulted in considerable complaints from housing and commercial sectors throughout the region. The increased cost of insurance directly affected economic activity in the region, by placing a hold on many tourism and commercial projects. A variety of measures were undertaken in response by government and the private sector.

³⁷ Id. at 16.

Government Initiatives

As a result of the concern expressed by key economic sectors, the CARICOM heads of government addressed the regional catastrophe insurance crisis at their fourteenth regular meeting in the Bahamas in July 1993. At their request, a multidisciplinary Working Group on Insurance and Reinsurance was established in 1994 to explore potential actions by government and private sector to address the issues involved in maintaining adequate catastrophe insurance coverage in the Caribbean. The Chair of the Working Group on Insurance and Reinsurance requested the Organization of American States (OAS) for assistance in preparing a working paper on Catastrophe Protection in the Caribbean to guide the Working Group³⁸

The group submitted its report to the CARICOM heads of government in February, 1996. The report's recommendations cover the following areas:

- (i) Improving financial management in the industry, including increasing the minimum capital requirements;
- (ii) Strengthening the role of insurance regulation and requiring companies to provide more timely, detailed, and accurate financial reports;
- (iii) Creating a regional reinsurance mechanism to increase risk retention, including arrangements to establish pre-event catastrophe reserves; and
- (iv) Reducing risk exposure through disaster mitigation and vulnerability reduction programs aimed at public infrastructure and residential properties.³⁹

The CARICOM Ministers of Finance reviewed the report in a subsequent meeting and endorsed its recommendations. However, by 1997 reinsurance rates for the region had returned to near pre-*Hurricane Andrew* rates, and the political will and momentum that had led to the establishment of the working group stalled. As a result, the measures recommended by the working group as necessary to facilitate the maintenance of adequate catastrophe coverage in the region, including stronger insurance regulation, were not put in place.

Regional Initiatives

The issues of risk management, disaster preparedness and climate change have been addressed through many regional initiatives in the Caribbean in the past. These include:

- Pan Caribbean Disaster Preparedness, and Prevention Project (PCDPPP) -- a joint initiative of (then) UNDRO, CARICOM, PAHO/WHO and the Red Cross;
- Caribbean Disaster Response Agency (CDERA) -- established in 1991 through CARICOM;
- Eastern Caribbean Donor Group (ECDG) -- following Hurricane Hugo in 1989;

³⁸ Caribbean Disaster Mitigation Project (1996), Insurance, Reinsurance and Catastrophe Protection in the Caribbean: A Working Paper prepared in collaboration with the World Bank, OAS/USAID.

³⁹ Id.

- Caribbean Disaster Mitigation Project (CDMP) -- funded via USAID and implemented through the OAS;
- Disaster Emergency Response and Management (DERMS) -- funded by UNDP and executed by CDERA;
- Caribbean Planning for Adaptation to Climate Change (CPACC) -- funded via the Global Environmental Facility and the World Bank, implemented through the OAS and CARICOM;
- Comprehensive Disaster Management (CDM) -- funded by UNDP and USAID and implemented by CDERA, to integrate disaster management into development planning; and the
- Disaster Mitigation Facility for the Caribbean -- Caribbean Development Bank with support from USAID.

Private sector initiatives

While Governmental political will and momentum was lost to reform the insurance sector in the Caribbean, the private sector has initiated a number of innovative activities as a result of its inability to access adequate and affordable insurance.

Barbados Light and Power Self Insurance

Following *Hurricane Andrew* in 1992, hurricane insurance for overhead transmission and distribution systems (T&D) for the electric utilities and telecommunication companies became very expensive and virtually unavailable. International insurers charged a premium equivalent to recover a loss every four or five years. Therefore, if a utility required \$10 million in T&D insurance, the premium was \$2 million.

Barbados Light and Power (BL&P), with the assistance of its insurance advisors, decided to self-insure this risk, since the historical record did not support a loss every five years. In fact, Barbados had not been affected seriously by a storm since 1955. BL&P first decided to seek professional help in determining the vulnerability to the T&D by a range of storms. The study showed that on a total value of \$60 million, a Category 3 storm would cause \$20 million in damage; a Category 4 and 5 storm would cause damage in the range of \$40 million. However, the probability of a Category 4 or 5 storm occurring was determined to be 1 in 150 years. Therefore, it was decided that BL&P would aim to build a fund of \$20 million, by simply putting away the equivalent premium that would have been charged by the insurance industry each year -- \$2 million. The actual implementation and operation of this fund required certain legislative amendments in the Barbados.

Since the payment to the fund could not be seen as a real expense, since it was simply paid from one area of the company to another, it could not be treated as an expense for tax purposes. An appeal was made to the Government of Barbados which was favourably received, and the Insurance Act of Barbados was amended to allow BL&P to establish a Self Insurance Fund for the sole purpose of reinstating damage to its T&D systems. The tax department issued an amendment to the tax act which allowed the payments to the

fund to be treated as expenses for tax calculation. It also allowed investment income generated by the fund to be credited to the fund without being treated as income to BL&P and therefore subject to taxation. A set of regulations was issued and approved that established exactly how the fund could be set up, how much could be transferred to the fund, how it could be invested, and the penalties applicable if funds were used for transactions other than reinstatement of the T&D. These regulations specified what would be covered. A Trustee approved by the Supervisor of Insurance was appointed. Today, the Self Insurance Fund holds US\$ 32million and is growing significantly by compound investments. There are no expenses other than the audit fee.

Studies have been completed through the Caribbean Disaster Mitigation Project and the Caribbean Electric Utilities Service Corporation (CARILEC), examining the vulnerability of St. Lucian Electricity Services Ltd.'s installations, and Dominica Electricity Services Ltd.'s hydroelectrical installations. Utility companies in the region have been considering a programme similar to that of the BL&P, with the Caribbean Development Bank and CARILEC. This programme has not yet been initiated, due to hesitation on the part of some utility companies in the region, who fear that they may contribute to a fund that consistently pays for damage in locations that are more susceptible to the impacts of severe weather events than they are themselves.

Caribbean Hotel Association Risk Pooling

In the wake of *Hurricane Andrew*, hotels across the Caribbean also found it difficult if not impossible to obtain affordable insurance coverage. In 1993, the Caribbean Hotel Association (CHA) retained a U.S.-based risk management firm to perform a pan-Caribbean study of windstorm risks to its members' properties, to see if there was some way of reducing the upward-spiraling costs of insurance. The computer-generated wind study provided a probable maximum loss (PML) profile of the region and divided the Caribbean into six different risk zones. The study suggested that there appeared to be enough diversification of risks among these zones to allow a regional insurance company for the CHA properties to survive a 1.3% probability of a major storm disaster event. Using expected probable loss (EPL) information as the starting point, the risk management firm determined a capitalization figure for a regional insurance company to sell 'all risks' property insurance to each of the 1,000 or so CHA members. The risk management firm then created, and managed, a Bermuda insurance company whose exclusive clientele are members of the CHA. Although this proved to be a very cost-effective solution for a time, when the market for insurance eventually softened in the Caribbean and became more competitive, members of the CHA began to source insurance at cheaper rates from other competitors, abandoning the company set up to manage CHA risks. As a result of decreased participation, that company has now gone out of business.

UNITED Insurance Company's Discounting for Retrofitting

In addition to self insurance and risk pooling schemes, designed to meet the need for comprehensive insurance, efforts have also been undertaken to reduce risk exposure.

This includes the use of building codes, which have made some limited headway. The Caribbean Unified Building Code is now in use in many Caribbean countries, though it suffers from a lack of enforcement due to a lack of political will. In a region where low income housing is widespread, the enforcement of building codes is often seen to impose a prohibitive cost on the provision of low income housing to the majority of the population.

In 1997, the Barbados-based UNITED Insurance Company (UIC) began a programme in which homeowners and businesses could qualify for significant reductions in insurance premiums by retrofitting homes and buildings to better withstand hurricane force winds. UIC's innovative program provides incentives to policyholders in the form of premium reductions ranging from 25 percent to 40 percent to apply measures designed to safeguard their properties against the perils of hurricanes. The company contracted a leading consulting engineering firm in Barbados to produce two technical booklets, "Making Your Home Hurricane Resistant," aimed at homeowners; and "Professional Guide to Performance-based Design Upgrade for Hurricane Resistant Construction," aimed at commercial property owners. Owners of residential properties can use the first booklet as a do-it-yourself guide, following simple instructions and graphics to apply the hurricane-resistant construction improvements. The second booklet, which applies to commercial structures, is more technically complex and requires the assistance of an engineer to implement the specified retrofitting interventions.

For UIC's scheme to yield benefits to the primary insurer, several conditions need to be in place. First, the primary insurer has to be able to ensure the quality of the retrofit work undertaken by the property owners. When retrofit work is applied to a sufficient number of risks in the company's portfolio, the company can expect its aggregate catastrophe Probable Maximum Loss (PML) to be lower. UIC uses two distinct methods to ensure the quality of the retrofit work: a self-declared certification in the case of residential owners; and certification by the engineer contracted to supervise the retrofit work in the case of commercial properties. Second, with information to substantiate a lowered PML, the primary insurer must negotiate lower rates for the proportional treaties and excess of loss cover from its reinsurers. For the insurance company to benefit from this scheme, savings realized from lower reinsurance premiums and lower incurred claims on the retained risk should exceed the reduced premium income.

A year after the programme was first launched in Barbados, it became evident that the programme's uptake was less than had been expected. An evaluation carried out by UIC's management and the Caribbean Disaster Mitigation Project identified the following factors as possible causes for the lack of success: (1) low perception of risk by the population (the last serious storm to affect Barbados had been Hurricane Janet in 1955); (2) a soft catastrophe insurance market (which encouraged commission-driven competition by smaller insurance agencies, undercutting the premium reductions offered by UIC without requiring retrofitting); (3) deficiencies in the promotional effort, particularly the lack of a user-friendly presentation of the guidelines for property owners; and (4) the cost associated with retrofitting

A significant hardening of the catastrophe peril insurance market will be required if the UIC programme is to have meaningful penetration in Barbados. UIC has decided to continue its incentive programme in Barbados, albeit in low gear, until the market materially hardens. After *Hurricane Ivan* there is perceptibly less indifference to taking hurricane vulnerability reduction measures in Barbados and a greater likelihood of programme uptake.

UIC has also implemented its programmes in Antigua and Barbuda, using the lessons learned from the Barbados experience. Antigua and Barbuda was selected for several reasons. The country has suffered the impact of hurricanes more frequently and more recently than Barbados, starting with *Hugo* in 1989, followed by *Luis* in 1995, and *Georges* in 1998. The public understanding of extreme weather related risk is much greater in Antigua and Barbuda, and the market for catastrophe insurance is much firmer. The country's need for hurricane vulnerability reduction measures is particularly acute with the current high premium rates driven by scarce and expensive reinsurance. Furthermore, UIC invited two other companies with major holdings in Antigua and Barbuda to join the programme. One has formally joined, and the other has agreed to support the initiative. The three companies together underwrite almost 80 percent of the property insurance in the country.

Consultation between the partners of this programme led to the following design characteristics for the program to be implemented in Antigua and Barbuda.

1. *Promotion and marketing.* Revision of the existing retrofit manuals, and dissemination of new, more user-friendly manuals. Preparation and circulation of advertisements via television, radio, and newspapers.
2. *Training and workshops.* Various core groups were identified for training and information dissemination. Included are government agencies, associations of builders, architects and engineers, financial institutions, and the Chamber of Commerce.
3. *Demonstration projects.* To generate practical how-to information, it is proposed to carry out a demonstration retrofit for one private dwelling and one commercial structure. The demonstration will be filmed, and an edited and narrated video-tape will be used as training material.
4. *Survey/certification of retrofitted risks.* An effective survey of the properties undergoing retrofit work is seen as being of crucial importance. The mechanism for carrying out the surveys and certification is awaiting final design, with the involvement of the engineers who will be responsible for this aspect.⁴⁰

The program was launched in Antigua in July 1998 by ANJO Insurance, agents for UIC. To date it has been offered exclusively to residential owners. A preliminary analysis of the damage claims generated by the participating homeowners following *Hurricanes Jose*

⁴⁰ Vermeiren, J. (2000), Risk Transfer and Finance Experience in the Caribbean, Caribbean Disaster Mitigation Project, OAS/USAID.

and *Lenny* indicates that insured losses from this group are lower as a proportion of total risk than the losses experienced by the non-participating policyholders^{41 42}

WINCROP – Crop Insurance for Banana Marketers

Another private sector initiative to assist in recovery from the impacts of tropical storms and hurricanes is WINCROP -- an insurance scheme for wind blows or tropical storms affecting bananas that has been in operation since 1988. The scheme is owned by the marketing organizations of Dominica, Grenada, St Vincent, and St Lucia and covers approximately 13,000 growers. Each pays a compulsory premium based on 5% of sales. The scheme's limited geographic spread requires WINCROP to reinsure much of its exposure (85%) to international underwriters. By 2000, 4000 claims associated with 16 loss events had been settled. Although the payout is only 20% of the estimated value of loss of deliveries (since much of the sales value is labour and delivery costs), rapid access to cash has helped farmers get back on their feet quickly after a natural disaster⁴³.

Some growers have in the past argued against compulsory membership of WINCROP, and some have opted out of the scheme within the last two years. *Hurricane Ivan* was another test for banana insurance. After *Ivan*, WINCROP expected about 1,500 claims from farmers, while growers who did not subscribe to the crop insurance scheme had to salvage and rehabilitate crops at their own expense.⁴⁴ In St. Lucia, for example, island-wide damage to banana fields was estimated at about 30%.⁴⁵ Initial damage assessment undertaken by the National Emergency Management Organisation (NEMO) put the cost of snapped and toppled trees at \$6 million. The damage was expected to slow down the steady improvements that had already seen a 35% increase in production in the first six months of this year over the same period last year.⁴⁶ However, following *Ivan*, the Chairman of the St. Lucia Banana Corporation reported that "almost all" SLBC farmers were covered by WINCROP.

Hurricane-Resistant Home Improvement Program in St. Lucia

A charity in St. Lucia, the National Research and Development Foundation (NRDF), has established a program to make low-income housing in the Eastern Caribbean safer and more environmentally sustainable through property insurance and a home retrofit programme. The NRDF had had a small revolving loan fund for low income households, and noticed a lack of insurance for many of their clients. In 1996, the NRDF established the Hurricane-Resistant Home Improvement Program (HRHIP), with the assistance of the USAID/OAS Caribbean Disaster Mitigation Project (CDMP). The programme recognizes that with few other resources available to rebuild or repair houses affected by

⁴¹ Caribbean Disaster Mitigation Project (1996), Insurance, Reinsurance and Catastrophe Protection in the Caribbean A Working Paper prepared in collaboration with the World Bank, OAS/USAID at 10

⁴² United Insurance Company Limited, Guide to Making Your Home Hurricane Resistant.

⁴³ Department for International Development (2004), Adaptation to Climate Change: Can insurance reduce the vulnerability of the poor?

⁴⁴ <http://www.stluciamirroronline.com/2004/sep17/story2.htm>

⁴⁵ Id.

⁴⁶ Id.

natural or other hazards, damage to or loss of a home can leave a family homeless, out of work and in financial peril.⁴⁷ In a hazard-prone region, it is also essential to consider the siting and construction details of a home to ensure the safety of the structure and its occupants, and minimize the impact of a building and its use on the surrounding environment. The program further recognizes that while property insurance can also limit the financial impact of hazard-related damage, low-income residents rarely have access to such insurance.⁴⁸

In addition to making loan funding available to homeowners who would otherwise not have access to mortgage funds, the focus of the HRHIP is to assist low-income homeowners in retrofitting their homes to make them more resistant to the effects of tropical storms. By making homes stronger, these properties become a more attractive risk to property insurers.⁴⁹ Since 1996 it has offered a HRHIP for low-income earners. This program trains local builders in safer construction, offers small loans to families wishing to upgrade their homes and provides the services of a trained building inspector who approves materials to be purchased, and checks minimum standards.⁵⁰ The program has prepared minimum building standards for reference by both homeowners and builders. Low-income homeowners who have strengthened their homes through the HRHIP can obtain property insurance through the program.

Through a St. Lucia broker, the NRDF was able to obtain a Homeowners Comprehensive Group Plan underwritten by a Caribbean subsidiary of a United Kingdom-based insurance company. All recipients of home improvement/retrofit loans are required to purchase insurance under the group plan. NRDF project officers are trained by the insurer in property valuation, and their estimates are accepted by the insurer. Premium rates charged to the owners range from 0.60 percent for concrete block homes, to 1.05 percent for homes constructed largely or entirely of timber. Retrofitting is thus a cost of access to insurance. Between 1996 and November 2002, NRDF disbursed 345 loans under this housing program, with an average loan size of EC\$11,000 (approximately US\$4,100).⁵¹ The majority of these loans (68%) were for either extensions to existing structures or the construction of new structures. The remainder of the loans were for repairs and renovations, purchases or relocation of homes.

H. Capacity Requirements and Possibilities for the Way Forward in the Caribbean

In the face of climate change, insurance can no longer be seen solely in the way it has been in the past in the Caribbean. It must also be viewed as an adaptation tool to the challenges that are likely to occur in the future. Critical assets in the region must have insurance so as to ensure that losses are limited in key sectors of the Caribbean economy when an extreme weather event hits, and to ensure a timely return to “normal” activities.

⁴⁷ <http://www.oas.org/cdmp/hrhip/>

⁴⁸ Id.

⁴⁹ Id.

⁵⁰ Id.

⁵¹ Id.

The way forward for the Caribbean is a step backward, and the timely and continued implementation of the outputs of the CARICOM task force which was set up to examine issues related to insurance. Governments in the region have critical role to play in providing legislation and implementing regulations that will allow the insurance industry in the region to be more flexible and more independent from the reinsurance market.

Vulnerability risk reduction and risk management for climate change and disaster management must be priority. Linking these efforts to insurance will improve overall resilience in the region. The application of a legally-enforceable building code in each country in the Caribbean is a necessity, and will enable property insurance to be linked to construction quality. The Caribbean Unified Building Code is already present, but building codes should be clearly identified and interpreted in each country. These codes must also be made legally-enforceable if construction standards are to change, and if insurance companies are to be encouraged to offer lower rates for more effectively-designed houses. The effects of *Hurricane Ivan* in Grenada should now provide enough emphasis and political will to ensure that changes are made within the construction sector.

The development of insurance schemes for low incoming housing, and the provision of access to insurance in poor communities that have traditionally lacked insurance coverage is critical. The low income sector throughout the Caribbean carries relatively little insurance against catastrophic perils. This results in a huge financial demand on Government financing following a catastrophe. The insurance industry does not presently offer hurricane insurance coverage to small timber homes that are typical in the Caribbean. However, with an effective building code with guidelines to regulate timber construction, timber homes may be constructed and retrofitted to be rendered more resilient to windstorm damage, and these homes can be made insurable, and some degree of coverage can be provided. Due to the huge volume, and relatively small value, the sector could be underwritten at reasonable returns.

Insurers have historical prejudices against covering small timber homes, and owners themselves have had a reluctance to incur the cost of insurance, since insurance is not considered a priority in a low income environment and the government has always been seen as the source of reimbursement. For these reasons, Governments will have to take the lead in addressing insurance for low income housing and appropriate construction standards. In the Caribbean, examples already exist of insurance introduced into low income, non-traditional markets. The NRDF's Hurricane-Resistant Home Improvement Program, described above, offers one approach to providing insurance to low income home owners while encouraging retrofitting and risk reduction in the construction sector. The HRHIP programme could be replicated elsewhere in the Caribbean, and in other regions where efforts to enhance the resiliency of low-income housing would be beneficial. Governments in the Caribbean will have to examine a range of public insurance schemes and approaches to address low income housing.

Risk-based derivative/bond issuance presents another possible approach to the challenge of low income housing sector protection. For example, an individual Government might

assess the amount of funding required to meet the need for reinstatement of housing that is uninsured in the event of a major extreme weather event. If this figure is \$50 million, and the State recognizes that it will have to make a contribution to this loss from its own resources, it might purchase a risk-based derivative/bond for \$40 million that will be triggered only if the island is affected by Category 3 or higher hurricane (assuming that the Government will be able to finance the loss from a storm that is less than Category 3 in strength). A bond is issued at attractive rates that will be drawn down by the government if the level of catastrophe is triggered. This approach does not rely on specific insurance coverage, but is instead a financing toll by Government if the event occurs.

Currently, the United Nations Development Programme is implementing a Caribbean Risk Management Initiative, whose objective is to aid in the management and reduction of risks associated with natural, environmental and technological hazards. Activities include: the establishment of an integrated climate risk facility to promote the experiences in climate risk management between the English, Spanish and French speaking countries; increasing the cadre of risk management personnel in the region through workshops and tertiary level capacity building; studying and making recommendations on national legislative systems; and completing disaster inventories in the region. A partnership is to be formed with the Caribbean Disaster Mitigation Facility of the Caribbean Development Bank, and a drought study is planned to examine the ongoing efforts to link climate monitoring and forecasting. The UNDP initiative will be critical in improving the overall ability of the Caribbean to prepare and to manage disasters, and will provide important information for the insurance sector.

It has been previously stated that the lack of capital in regional insurance companies exposes the consumer to the varying nature of the international reinsurance market by minimizing the ability of insurance companies to retain more risk. There are a number of possible changes to regulation of the Caribbean insurance sector that could assist the insurance industry in covering additional risk. These include:

- (a) *The establishment of a Caribbean-wide standard, minimum level of capital and surplus before a company may operate within a territory.* This could be set so the insurance company must retain no less than 30% of the property risks it underwrites, subject to suitable stop loss insurance for island or multi island exposures.
- (b) *Permitting regional companies within the Caribbean Single Market and Economy free access to trade in any other member territory without satisfying each territory's minimum capital requirements, provided they demonstrate that they have adequate surplus and capital.* For example, a regional insurance company incorporated in Trinidad could be permitted to demonstrate to Insurance Regulators in Antigua that it has a mutually-agreed minimum surplus and capital (e.g., US\$50 million), in order to be exempted from the requirement of establishing reserves/deposits within Antigua. Regulations could be established to enable the Insurance Regulator in Antigua to have direct access to the

Insurance Regulator in Trinidad, for the purpose of accessing the company's reserves in event of a problem with claims in another country.

- (c) *Encouraging insurance companies to build up larger catastrophe reserve funds.* Currently insurance companies are allowed to shelter catastrophe premium funds tax free, but only as a small percentage of their net premium retention after reinsurance costs. Typically insurance companies can build up loss reserves on other classes of business which are long tailed (e.g., liability). However, for property insurance, this reserve can only be established once a loss has occurred. In situations of catastrophic loss, there is a demand to settle claims as quickly as possible, so reserves are not held for long. As a result, insurers cannot build reserves for large catastrophe losses. Currently insurance companies circumvent the minimum percentage allowed by establishing an owned captive insurance company in a non tax domicile where they 'reinsure' part of the premium which is then retained outside the company's balance sheet. This contributes to the picture of a smaller capital/surplus on the part of the insurance company, since funds are held off balance sheet. It also makes it difficult to assess the capital adequacy of a company's audited financial position; off-balance sheet reserves are not transparent to the public and regulators, since they simply appear as outward reinsurance. There are also no controls on whether these off balance sheet reserves will be used for other purposes. Legislation should encourage insurance companies to build up catastrophe reserve funds openly on their balance sheets (which might be set at a minimum of 50% of the net premium allocated to catastrophe perils, excluding losses such as fire) and regulate the use of these reserve funds (for example, prohibiting the payment of dividends or expenses from these funds). This will greatly accelerate the growth of capital and surplus and reduce the need to purchase high levels of reinsurance.
- (d) *Relaxing restrictions on self insurance within the Caribbean.* If self insurance restrictions are relaxed, groups such as hotels will be better able to set up self insurance schemes to insulate themselves from volatile swings in the insurance market. The example of the Barbados Light and Power is so far unique. Several Caribbean states (Barbados, Cayman Islands, Bermuda, St. Vincent, St. Lucia, and Antigua) have offshore legislation that allows non-CARICOM companies to set up captive insurance companies in their jurisdictions. For these captive insurance companies, there are minimum capital requirements, no tax on profits, no control on foreign exchange movements and no premium taxes. However, if a group of hotels in Barbados wished to set up a self insurance captive, that captive could not be set up in any jurisdiction within CARICOM without incurring penalties.

With respect to reinsurance, specific risk models for the region should be developed to better link risk exposure with reinsurance rates. There are naturally different levels of risk which are associated with different areas of the Caribbean, and reinsurance rates in eastern Caribbean need not be linked to reinsurance rates in the northern Caribbean, which may be more susceptible to hurricanes. The examples of *Hurricane Andrew* and

9/11 and their impacts on reinsurance rates across the Caribbean have already been explained. The United Nations Development Programme and CARICOM, through the regional climate change centre, could work with the insurance industry in the Caribbean (through the Caribbean Association of Insurance Regulators established as a result of the CARICOM working group in 1994), and the dominant reinsurance companies in the Caribbean, such as Munich Re and Swiss Re, on mechanisms to apply reinsurance rates to the Caribbean, which appropriately take into consideration the relevant risks in different areas of the Caribbean.

The need for a catastrophe fund, linked to international capital markets, should be explored in more detail for the Caribbean. The Caribbean Development Bank has already established a Disaster Mitigation Facility, but the Eastern Caribbean Central Bank has for some time been accumulating cash reserves through mandatory contributions by member governments as a form of group self insurance. These funds are then to be used for lending to members affected by natural disasters⁵². This reserve pool provides for repayable loans rather than straight payouts. The World Bank in its report *Managing Catastrophic Risks using Alternative Risk Financing and Insurance Pooling Mechanism*, examines the issue of catastrophe funds. A catastrophe fund could be privately or publicly owned, and could be linked to the intensity of a catastrophe before resources are released from the fund. For example, a Category 3 hurricane could trigger a release from the fund, while a tropical storm might not. There are a number of catastrophe funds that have been established around the world that could provide useful examples, such as the Hawaii Hurricane Relief Fund. A catastrophe fund for the Caribbean, in a world of a changing climate, could draw funding from both governments in the region, and donations from the largest polluters of carbon emissions.

Risk pooling should also be further considered in the Caribbean. The World Bank has examined the possibility and feasibility of risk pooling in the Caribbean region, and its report takes a step-by-step approach to show how both 'risk pooling' structures as well as alternative catastrophe coverage mechanisms, in the form of long maturity risk financing facilities and capital market instruments, can achieve more optimal risk protection and financing terms and allow for expanded insured coverage for public sector assets and private properties. Although some countries in the region may be concerned about 'subsidizing' their neighbors under a pooled scheme, the World Bank report notes that this could be prevented by differentiating the price of premiums paid into the pool based on the country and structural risks insured. Concerns that high risk countries might use up a pool's initially retained capital before the reinsurance layer can be accessed ('attached'), can be alleviated through financial design options. One such option would permit access to the reinsurance layer in proportion to such countries' risk in the capital (retained) layer. In this manner, any one large disaster would not use up the capital base of the collective pool, although this advantage might be somewhat offset by the higher cost involved in "custom designing" the reinsurance policy for each country.

⁵² Department for International Development (2004), *Adaptation to climate change: Can insurance reduce the vulnerability of the poor?*

The Caribbean should also explore through the CARICOM, the use of insurance as an adaptation tool in different sectors, and the establishment of small funds for specific sectoral adaptation issues. Crop insurance has already been established in the Eastern Caribbean to address the agricultural sector through the Windward Island Crop Insurance (WINCROP), which addresses windstorm risk to the banana crop, and lessons may be learned from WINCROP's experience. This effort will require further innovative work in quantifying risk in different sectors in the region.

Public awareness and training in the region on the impacts of climate change need to be improved, particularly with respect to the insurance sector. Further collaboration with the insurance sector is needed, both to share information and bring the insurance sector on board in working on measures to assess and reduce vulnerability.

IV. The Pacific

A. Climate Change, Sea Level Rise and Tropical Cyclones in the Pacific

Small islands States in the Pacific are exposed to a wide range of hazards, both natural and man-made. These include cyclones, floods, landslides, droughts, earthquakes, tsunamis and other adverse events. Geographical, environmental, sociological and economic characteristics unique to the region also influence the vulnerability of small island states. The fact that most Pacific island countries have fragile agro-based economies, and depend heavily on their natural environment for their well-being, is also a key factor influencing their vulnerability to the impacts of climate-related extreme weather events.

In terms of physical vulnerability, Tonga, Nauru, Kiribati, Tuvalu and the Maldives all have their highest points at under 5 meters in elevation. This translates directly into populations vulnerable to the impacts of sea level rise and storm surge from extreme weather events. Palau, the Cook Islands, Seychelles and the Solomon Islands all have significant portions of their populations living at under 5 meters above sea level. Many Pacific and Indian Ocean countries also have their populations and infrastructure concentrated in coastal areas.

When disasters occur in SIDS, they often cause great social and economic devastation. The impacts of these events can set back the development process by years, by forcing the redirection of capital that would otherwise have been used to advance the development process. There is generally no distinct Governmental budget to address the immediate relief operations of victims affected. Frequently, governments are compelled to depend upon non-Government agencies and external aid to assist in emergency relief operations, and on the goodwill and generosity of foreign donors and embassies to assist victims.

In the Northern Pacific, the Federated States of Micronesia (FSM) was hit in 2002-2003 by a number of events. In 2002, *Chataan* wreaked havoc on the FSM State of Chuuk dumping 500 mm of rainfall in twenty hours. Landslides induced by torrential rains

occurred at over 100 sites, claimed forty-one lives, seriously injured over 170 people, and destroyed about 300 homes.⁵³ In 2003, *Tropical Cyclone Lupit* caused US\$1.7 million in damages in the FSM State of Yap's outer atolls, which required the assistance of the US Federal Emergency Management Agency (FEMA). In 2004, *Sudal* again damaged FSM infrastructure and the environment and again FEMA was called on for relief and recovery assistance. Damages were estimated at US\$12 million. Although it is clear that these events cause severe damage, it is difficult to obtain reliable data on their long-term economic impacts.

In 2002-2003, two major cyclones devastated the southern parts of Solomon Islands, *Tropical Cyclone Zoe*, the strongest system ever recorded in the region since the use of satellite imagery for monitoring, and *Tropical Cyclone Beni*. To survive *Zoe*, residents took shelter in mountain caves, as 5-10m storm surge waves inundated the coasts and engulfed many villages. Media reports stated that crops on the island of Tikopia were totally destroyed and it would take at least three years for the island's residents to grow the food they needed. 70 some houses were destroyed and water sources were contaminated by seawater.⁵⁴

In 2004, *Cyclone Heta* devastated a number of Pacific Island Countries and island economies and impacted others. Niue suffered US \$23 million in damage; Samoa suffered US\$35 million. These figures are enormous relative to the GDP of these countries. *Heta's* worst impact was on Niue on January, where violent winds combined with a large surge and towering waves climbed up and over Niue's 20-30 meter cliffs to inflict extensive damage on crops and infrastructure.⁵⁵ It was estimated that it might cost \$37.5 million for Niue to recover.⁵⁶ In Samoa, *Heta* caused major damage to crops and buildings. Storm surge affected infrastructure and coastal roads, strong winds downed power lines, and flooding destroyed culverts. The agricultural sector was the most affected. It was estimated that recovery could take at least eight to ten months.⁵⁷ In February, *Ivy* cut a path through Vanuatu and directly hit Efate (Port Vila), the country's capital, causing significant damage.

Due to the isolation, geography and small size of most islands in the Pacific and Indian Oceans, the effects of extreme weather events are felt country-wide and their economic, social and environmental consequences are long-lasting. Important sectors of small island economies are often affected, including tourism, agriculture and private enterprise.

The costs of rehabilitation frequently represent a very high percentage of gross national product. For example, two major cyclones hit Samoa in the early 1990s. *Cyclone Ofa* hit in 1990, causing about US\$120 million in damages (or about 25% of Samoa's GDP).

⁵³ WMO RA V Tropical Cyclone Committee for the South-Pacific and South-East Indian Ocean, Tenth Session, Brisbane Australia, 10 to 15 July, 2004) ('WMO July 2004 Report').

⁵⁴ WMO July 2004 Report.

⁵⁵ Id.

⁵⁶ Id.

⁵⁷ Id.

and leaving an estimated 10,000 islanders homeless.⁵⁸ *Cyclone Val* caused about US\$200 million in damages (or about 45% of Samoa's GDP in 1991) and 13 deaths in December 1991.⁵⁹ As a result, Samoa's GDP declined by nearly 50% from 1989 to 1991.⁶⁰

After *Cyclone Kina* hit Fiji in 1993, the Fijian government had to redeploy F\$40.12 million from its budget to address its impacts, which represented 32% of the country's total 1993 capital budget. On top of this, Fiji's total insured loss amounted to F\$50 million of which F\$42 million was reinsured on the international market. In 1994, the cost of reinsurance for calamity events increased by 300% for insurance operators in Fiji, attributed primarily to increased frequencies and intensities of major international disasters.

The repetitive nature of these events presents a substantial challenge for development and for the attainment of the Millennium Development Goals. In 2003 Fiji reported that it had suffered from 13 natural disasters over the previous 10 years – all with meteorological causes. Twelve were tropical cyclones or storms, often resulting in flooding in valleys and plains and storm surge along coastlines, as well as wind damage. These storms and floods killed 65 people, affected tens of thousands, and caused over a quarter of a billion Fijian dollars worth of damage.⁶¹ The thirteenth disaster was a severe drought in 1997/8 that affected three-quarters of the country, necessitated emergency water deliveries to nearly half the population, and resulted in economic losses estimated at F\$ 135 million.⁶² In 2003, Fiji's low rainfall caused a fall in capacity of the main hydroelectric dam. Power generation fell short of demand and large scale diesel powered generators had to be procured at significant cost to meet ordinary demand.

Table 3. Major Events in the Pacific, 1994-2004

Source: www.reliefweb.int.

Year	Location	Disaster Type	Population Affected	Estimated cost
1994	Fiji	Tropical Cyclone Thomas		
	Niue	Drought	1,200	NZ\$ 2 million
1995	Fiji	Tropical Cyclone Gavin	3,500	US\$ 18.3 million
1996	Fiji	Tropical Cyclone June		
	Vanuatu	Tropical Cyclone Beti		Vt 3 million
1997	PNG, Milne Bay	Tropical Cyclone Justine	15,000	
	PNG	El Nino Drought	3,158,961 Nationwide	US\$ 80 million+
	Solomon Islands	El Nino Drought	Nationwide	
	Fiji	El Nino Drought	400,000	US\$ 60 million
	Fiji	Tropical Cyclone Gavin	14,000	US\$ 26 million
	Tonga	Tropical Cyclone Hina	N/A	T\$ 18.2 million

⁵⁸ Salinger, M.J. and Lefale, P., 'The Occurrence and Predictability of Extreme Events over the Southwest Pacific with Particular Reference to ENSO' (Salinger and Lefale), p. 2; and U.S. Department of State website (<http://www.state.gov/r/pa/ei/bgn/1842.htm>) (US State Department).

⁵⁹ Id.

⁶⁰ U.S. State Department.

⁶¹ Fiji National Disaster Relief and Rehabilitation Fund (NDRRF), Paper distributed at the SIDS Workshop on Insurance and Climate-Related Extreme Weather Events (November 2003) (Rokovada 2003).

⁶² Rokovada 2003

Year	Location	Disaster Type	Population Affected	Estimated cost
	Tonga	Tropical Cyclone Ron	500	T\$ 1.1 million
1998	PNG, Ramu R, Madang	Floods	38,000	
	PNG, Sepik R. East Sepik	Floods	23,000	
	PNG, Aitape, Sandaun	Tsunami	12,427	
	Samoa	Tropical Cyclone Tui	1,143	SAT 2,506,602
	Samoa	Drought and bushfire		SAT 402,722
	Tonga	Tropical Cyclone Cora	77,000	T\$ 19.6 million
	Niue	Tropical Cyclone Dovi	100	NZ\$ 1 million
	Vanuatu	Tropical Cyclone Katrina		Vt 800 million
	FSM	El Nino Drought	103,000	
	Tuvalu	Drought	10,000	AU\$ 1.5 million
1999	PNG, Mid Fly, Western	Floods	10,000	
	Fiji	Tropical Cyclone Dani	2,000	US\$ 2 million
	Vanuatu	Tropical Cyclone Ela	28,600	V 700 million
	Vanuatu	Earthquake & Tsunami	5,000	
2000	PNG, Pangia, S. Highlands	Thunderstorms	400+	
	Tonga	Tropical Cyclone Mona	65,000	T\$ 4.2 million
	N Solomons	Tsunami & Flood		
	Vanuatu	Tropical Cyclone Iris		
	Fiji	Floods	5,000	
2001	Vanuatu	Tropical Cyclone Paula		
	Fiji	Tropical Cyclone Paula Storm Surge	7,000	
	Tonga	Tropical Cyclone Paula	20,000	T\$ 700,000
	Tonga	Tropical Cyclone Waka	68,000	T\$ 104 million
	Samoa	Floods	5,000 directly, 28,000 indirectly	SAT 11 million
	Palau	Tropical Cyclone Utor	11,000	US\$ 4 million
	Vanuatu	Hailstorm	3,000	Vt 800 million
	FSM	Tropical Cyclone Mitag	8,000	
	FSM	Tropical Cyclone Chata'an	1,000	
	Tuvalu	Tidal surge	50	Au\$ 20,000
	Tuvalu	Tropical Cyclone Ami	27	Au\$ 6,000
	Fiji	Tropical Cyclone Ami	60,000	US\$ 22.8 million
	Solomon Islands, Rennell & Bellona	Tropical Cyclone Beni	2,010	
	Solomon Islands, Tikopia and Anuta	Tropical Cyclone Zoe	1,678	
2003	Tonga	Tropical Cyclone Eseta	15,000	T\$ 1.9 million
	PNG, S. Highlands	Landslide		
	PNG, Bukawa, Morobe	Floods	1,197	
	PNG, Sepik R, E Sepik	Floods	4,365	
	FSM	Tropical Cyclone Lupit	2,000	
	PNG, Simbu	Landslides		
	PNG, Pamu R. Madang, Markham R, Morobe	Floods		
	Samoa	Tropical Cyclone Heta	Total	US\$ 35 million
	Niue	Tropical Cyclone Heta	1,300	US\$ 23 million**
2004	Tonga	Tropical Cyclone Heta	1200	T\$ 950,000
	Fiji	Storms and Floods	36,500	FJ\$ 3 million
	Vanuatu	Tropical Cyclone Ivy	54,000	Vt 900 million
	FSM	Tropical Cyclone Sudal	12,000	US\$12 million*

In addition to direct impacts that affect multiple insurance risks (property, life, business), SIDS whose economies are dominated by a single industry may be further impacted by long term agricultural productivity decline, crop failure or reductions in tourism activity. With respect to agriculture, due to the small size of the production base in small island states, an extreme event can wipe out export crops in one event.

Table 4. Importance of tourism for select small island states and territories

Source: IPCC Third Assessment Report, Table TS-13

Tourist Receipts				
Country	Number of Tourists (000s) ^a	Tourists as % of Population ^a	as % of GNP	as % of Exports
Cape Verde	45	11	12	37
Comoros	26	5	11	48
Fiji	359	45	19	29
Maldives	366	131	95	68
Mauritius	536	46	16	27
Papua New Guinea	66	2	2	3
Samoa	68	31	20	49
Seychelles	130	167	35	52
Solomon Islands	16	4	3	4
Vanuatu	49	27	19	41

Table 5. Main Economic Activities of selected SIDs

Source: ADB (2003) from ADB Annual Reports, ABC World Fact Finder, SPC Pocket Statistical Summary (1998).

Country	Main Economic activities	Share of GDP (%)		
		Primary Sector ^a	Manufacturing	Tertiary Sector ^b
Cook Islands	Fruit-processing, Tourism, Finance, Copra, Citrus fruits, Clothing, Coffee, Fish, Pearls and pearl shells, Mining, Handicrafts.	18.8 (1995)	2.7 (1995)	78.5 (1995)
FSM	Tourism, Construction, Fish processing, Craft items (shell, wood, pearls), Garments, Bananas, Black pepper.	N/A	N/A	N/A
Fiji	Sugar, Tourism, Copra, Gold, Silver, Clothing, Timber, Fish processing, Cottage industries.	23 (1996)	15 (1996)	62 (1996)
Kiribati	Fishing, Handicrafts, Copra	39.9 (1992)	10.8 (1992)	49.3 (1992)
Marshall Islands (the)	Copra, Fish, Tourism, Craft items (shell, wood, pearls), Offshore banking (embryonic), Coconut oil, Trochus shells	N/A	N/A	N/A
Nauru	Phosphate mining, Financial services, Coconut products.	N/A	N/A	N/A
Palau	Tourism, Craft items (shell, wood, pearl), Commercial fishing, Agriculture.	24.4 (1996)	0.8 (1996)	74.8 (1996)

^a Primary sector includes agriculture, forestry, fishing and mining

^b Tertiary sector includes all services and construction

PNG	Copra crushing, Palm oil processing, Plywood production, Wood chip production, Mining of gold, silver, and copper, Crude oil production, Construction, Tourism, Timber, Coffee, Cocoa, Seafood.	54 (1995-6)	8 (1995-6)	38 (1995-6)
Samoa	Fishing, Tourism, Timber, Food processing, Coconut oil and cream, Copra, Beer	N/A	N/A	N/A
Solomon Is.	Timber, Fish, Palm oil, Cocoa, Copra	23.4 (1996)	N/A	N/A
Tonga	Tourism, Fishing, Squash, Fish, Vanilla, Root crops, Coconut oil	N/A	N/A	N/A
Tuvalu	Fishing, Tourism, Copra; Stamps/coins.	N/A	N/A	N/A
Vanuatu	Fishing, Offshore financial services, Tourism, Food and fish freezing, Wood processing, Meat canning; Coconuts, Cocoa, Coffee.	N/A	N/A	N/A

In the past, Pacific Island communities have relied on traditional coping mechanisms to provide resilience to natural disasters. These include traditional food preservation techniques, the harvesting of wild foods, the planting of disaster resistance crops, the planting of wind breaks, traditional forms of housing design and construction and social networks of community support. Unfortunately these mechanisms have gradually eroded over the years, with the introduction of new technology, shifting cultural patterns and a greater reliance on imported food products.

B. Disaster Management Frameworks in the Pacific

In the Pacific, governmental arrangements for addressing disaster management are far more advanced than institutional mechanisms for regulating the private insurance sector. These frameworks therefore offer a good starting place for discussions on the role of financial risk management related to extreme weather events. They may also be able to offer support for improved data collection and management in areas relevant to hazard assessments and loss characteristics from extreme events.

Following the 1994 Yokohama World Conference on Natural Disaster Reduction, Pacific leaders decided on a coordinated regional approach to disaster risk reduction, with the South Pacific Applied Geoscience Commission (SOPAC) as lead agency. SOPAC now coordinates regional approaches to addressing national initiatives, which include: improving national disaster management organisational structures and institutional strengthening; building and upgrading information resources on the complex nature of disasters; developing models of good practice and tools for disaster preparedness and response; promoting wider use of building codes and regulatory frameworks to support more effective urban planning processes; and improving early warning and coordination systems and practices, including the provision of communication outreach systems to remote outer island communities.

Table 6. National Disaster Management Arrangements

Source: SOPAC

Country	National Disaster Council	National Disaster Management Office	Specific Disaster Legislation	National Disaster Response Plan	Comprehensive National Disaster Plan	Village Disaster Plans
Cook Islands	Yes	Yes	Yes	Yes	Yes	Yes
FSM	Yes	Yes				No
Fiji	Yes	Yes	Yes	Yes	Yes	N/R
Kiribati	Yes	Yes	Yes	Yes	Yes	No
Marshall Islands	Yes	Yes				
Nauru	No	No	No	No	No	No
Niue	Yes	Yes	Yes	Yes	Yes	Yes
Palau	Yes	Yes	No	Yes	No	No
PNG	Yes	Yes	Yes	Yes	No	No
Samoa	Yes	Yes	Yes	Yes	No	No
Solomon Islands	Yes	Yes	Yes	Yes	No ⁶³	No
Tonga	Yes	Yes	No ⁶⁴	Yes	Yes	N/R
Tuvalu	Yes	Yes	No	Yes	Partial	N/R
Vanuatu	Yes	Yes	Yes	Yes	Yes	N/R

In 2003 SOPAC began a new approach in integrating solutions in three programme areas: Ocean and Island Management; Community Risk Management; and Community Lifeline Management. Activities in each area include the development of regional policies and regional plans of action. The Community Risk Programme is now developing regional disaster risk reduction frameworks to translate regional programmes into national implementation.

In 2003, a SOPAC-EU Project was initiated to address vulnerability reduction in the Pacific ACP States through the development of an integrated planning and management system -- Island Systems Management. The project system concentrates on a range of key focal areas, including hazard mitigation and risk assessment. It also focuses on SOPAC Member Countries that are also ACP states: Fiji, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. The project may be expanded to include Cook Islands, Federated States of Micronesia, the Marshall Islands, Nauru, Niue and Palau.

C. The Insurance Industry in the Pacific

The insurance sector in the Pacific is far younger than that of the Caribbean, and insurance is largely supplied by insurance companies outside the region that are based in the United States, Guam, Australia, or elsewhere. Some countries in the Pacific are completely without insurance, or have extremely low insurance penetration. Much of the legislation that exists to regulate the provision of insurance has only been enacted over the past decade. Where legislation does exist to regulate the industry, this legislation varies greatly across the Pacific and Indian Ocean SIDS in scope and content.⁶⁵ See Table 4.

⁶³ Drafted but not accepted.

⁶⁴ Currently being developed.

⁶⁵ Insurance legislation for many Pacific SIDS can be accessed at: www.pacii.org, which contains many laws of the member countries of the University of the South Pacific.

Table 7. Pacific and Indian SIDS Insurance Legislation*Source: www.paclii.org*

COUNTRY	RELEVANT LEGISLATIVE FRAMEWORK
Indian Ocean	
Maldives	No Insurance Legislation, but interim regulatory framework for the development and supervision of the insurance industry
Mauritius	The Insurance Act 1987 The Insurance Regulations 1988
Seychelles	Insurance Act 1994
Pacific Ocean	
Cook Islands	Off-shore insurance Act 1981 - 82
Federated States of Micronesia	No national legislation as yet -- FSM Code Title 37 on Insurance is reserved
Fiji	Insurance Amendment Act 1986
Kiribati	Insurance Act 1981
Marshall Islands	No legislation found
Nauru	Insurance Act 6/74 Insurance (Information) regulations 1977 Insurance (Application for Licence) Regulations 1977
Niue	--
Palau	--
Papua New Guinea	Insurances (Miscellaneous Provision) Act 1975 Insurance Act 1995 Insurance Corporation Act 1977
Samoa	Insurance Act 1976 Insurance Amendment Act 1998
Solomon Islands	-- Title XIII, Ch. 82.
Tonga	--
Tuvalu	--
Vanuatu	Insurance Act [Cap 82]

There are a number of challenges for the engagement of the private insurance sector in the Pacific. These include small numbers of potential policy holders, dwellings that would typically be considered uninsurable, a lack of private capital available with which to pay for insurance coverage. At the same time, the relative absence of data in Pacific island countries, relative to the Caribbean, presents a substantial challenge in encouraging insurance penetration. The lack of data in these regions limits insurers' capacity to make meaningful forecasts of weather trends and significant events. This constrains the thorough assessment of insurance risk for weather catastrophes in the SIDS regions, and therefore constrains the subjective pricing of insurance covers by the international insurers and reinsurers.

Compiling details of disasters in the Pacific Island Region is particularly difficult because of poor record keeping, short corporate memories and limited national database collection.⁶⁶ The economic costs of hazard impacts are rarely assessed, despite the significant effects they may have on development and on national aspirations.⁶⁷ It is

⁶⁶ www.sopac.org/tiki/tiki-download_file.php?fileId=175

⁶⁷ Id.

essential to improve data collection and analysis of weather related hazards and loss exposures in Pacific Island countries in order to assist in risk assessment, risk management and ultimately the use of appropriate risk transfer mechanisms.

In most Pacific island countries, traditionally-built houses outnumber engineered design houses. An array of building codes are practiced and a number of countries, including Fiji, Niue, Vanuatu and Tonga, are proceeding to legislate their own national building codes. The Federated States of Micronesia (FSM) has building codes in place at the State level.⁶⁸ Houses constructed with support from financial institutions often have insurance requirements. For non-engineered houses, the sturdiness of construction is enhanced through the trade-skill training of village craftsmen, and increasing use is made of a wider range of imported construction materials. These are some of the safety nets applied to reduce risks within the housing sector.

D. Mechanisms and Activities to Address Insurance Challenges in the Pacific

Government Initiatives

Fiji's National Disaster Relief and Rehabilitation Fund

In Fiji, a number of governmental initiatives have been undertaken to address the impacts of repeated extreme weather events on development. These include the creation of a national disaster fund, and proactive risk reduction mechanisms.

Given the unpredictability of occurrence of natural disasters, funding to address the needs of victims often results in the diversion of budgeted funds for priority developments projects in the approved budget. In response to this challenge, Fiji has established a National Disaster Relief and Rehabilitation Fund to assist in ensuring that Government has a source of fund to draw from in emergency situations resulting from the occurrence of natural disasters. The Government established the NDRRF in its 2004 budget. The NDRRF will address the funding requirements to assist victims of disaster both during the emergency relief and disaster rehabilitation phases of this program. The Ministry of Finance is required to conduct a study of the best way to create a stand alone self sustaining fund where community contributions from the private sector and external donors can be solicited and entertained, similar to other Trust Funds. It is hoped that funds received from aid donors and the private sector for this program will enhance the capital endowment of this Fund, to assist victims of disaster in Fiji during times of disaster. To enhance the participation of the private sector in this program, tax incentives will be considered for contributions to this Fund by the private sector.

Development Banks

Nearly all island governments have government-owned development banks. Development banks offer potential to encourage safer building practices and risk

⁶⁸ www.fsmlaw.org

reduction measures through concessionary financing for smart building practices, and further potential to increase the economic resiliency of their client base by linking insurance with loans for new construction, and offering advantageous insurance rates in conjunction with smart building practices. For example, in the State of Chuuk in the FSM, new construction that is funded with low-interest home loans from the Farmers Home Mortgage Administration (FHA) must comply with specific building code requirements.⁶⁹ In the State of Kosrae in the FSM, all state-funded buildings must comply with the Kosrae State Building Code.⁷⁰

Table 8. Development Banks and/or Large Lending Agencies

Source: www.pftax.com ('Survey on ownership profiles'); www.adb.org

COUNTRY	Development Banks and Large Lending Agencies
Pacific Ocean	
Cook Islands	Cook Islands Development Bank, Asian Development Bank
Federated States of Micronesia	FSM Development Bank, Asian Development Bank
Fiji	Fiji Development Bank, Asian Development Bank
Kiribati	Development Bank of Kiribati, Asian Development Bank
Marshall Islands	Marshall Islands Development Bank, Asian Development Bank
Nauru	Asian Development Bank
Niue	Niue Development Bank
Palau	Palau Development Bank, Asia Development Bank
Papua New Guinea	Papua New Guinea Development Bank, Asian Development Bank
Samoa	Development Bank of Samoa, Asian Development Bank
Solomon Islands	Development Bank of Solomon Islands, Asian Development Bank
Tonga	Tonga Development Bank, Asian Development Bank
Tuvalu	Development Bank of Tuvalu, Asian Development Bank
Vanuatu	Asian Development Bank
Indian Ocean	
Maldives	Bank of Maldives, Asian Development Bank
Mauritius	Development Bank of Mauritius
Seychelles	Development Bank of Seychelles

Regional Initiatives

Pacific Catastrophe Insurance Pilot Project

In 1999 the Pacific Forum Economic Ministers requested advice on the possibility of establishing a catastrophe insurance scheme for the Pacific islands region. A study was conducted by SOPAC and its partners, with World Bank and AusAID support in response

⁶⁹ Chuuk State Code, Title 18.

⁷⁰ KSL Title 11, Ch. 21.

to this request. The study was completed in December 2003, and in February 2004, the Forum Secretariat issued a Press Release announcing its completion.⁷¹

The February announcement noted that at their June 2003 meeting, the Forum Economic Ministers had recognised the extreme vulnerability of the region to natural disasters and the substantial economic imposts these events created, and had concluded that risk financing needs to be placed within the broader set of risk management strategies. Ministers agreed to give priority to the implementation of national risk management strategies, including appropriate enabling public policy, the use of the private insurance market where feasible, and expenditure on hazard assessment and risk management. Ministers also urged donors to support the collection of information on hazards facing member countries, and the vulnerability of these countries.⁷²

The Catastrophe Insurance Pilot Study, conducted by SOPAC and its partners, discusses options to manage disaster risks in the Pacific Island region.⁷³ The study models risk-losses attributed to past cyclones, storm surges, earthquakes, tsunamis and landslides in a pilot city (Port Vila, Vanuatu), and provides estimates on the potential costs of future disasters in Port Vila, extrapolated to the Pacific Island region.⁷⁴

The project first looks at average annual losses from these events in Port Vila, and the risks and return rates of these events, to serve as input to actuarial, damage and pricing modules, and to assist in developing an understanding of the relevance of a catastrophe insurance model for the wider region. Port Vila's exposure is 35,000 people, 6,300 buildings, fixed assets valued at \$925 million. A Pacific Regional scheme, encompassing Fiji, the Solomon Islands, Vanuatu, Samoa and Tonga, would address a population of about 1.6 million people, 320,000 buildings, and fixed assets estimated at over \$AUD 50 billion.⁷⁵ The Study concludes by proposing a framework for a regional disaster insurance system grounded on national risk management principles. It sets out a list of recommendations for consideration to support the creation of such a regional disaster insurance system. This report is available on the web.⁷⁶

The proposal for a regional system recognizes that individual Pacific Forum Island Countries are not likely to be able to afford catastrophe insurance because of high rates of return of disasters, small pools of contributors, the complete exposure of low-income groups, and difficulties in raising a sufficiently large fund pool.⁷⁷ However, a regional

⁷¹ http://www.forumsec.org.fj/news/2004/Feb/feb_03.htm

⁷² Id.

⁷³ Catastrophe Insurance Pilot Study, Port Vila, Vanuatu: Developing Risk-Management Options for Disasters in the Pacific Region, G.G. Shorten, S. Goosby, K. Granger, K. Lindsay, P. Naidu, S. Oliver, K. Stewart, V. Titov, G. Walker.

⁷⁴ <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/PACIFICISLANDSEXTN/0,,contentMDK:20218070~pagePK:141137~piPK:217854~theSitePK:441883,0.html> ('Catastrophe Insurance Pilot Study')

⁷⁵ Catastrophe Insurance Pilot Study at 125.

⁷⁶ Id.

⁷⁷ Workshop Report, SIDS Workshop on Insurance and Climate-related Extreme Weather Events (November 2003) (summarizing presentation by Graham Shorten) at 11.

scheme could serve to spread the risk, increase the pool of contributors, and reduce the cost of administration.⁷⁸ Funds to the pool could be provided by Forum Island Countries, built gradually through taxes, or by external donors at low or no interest.⁷⁹ The size of the fund pool or reinsurance scheme would be determined by the degree to which a major donor would act as a guarantor of last resort for the fund. Premiums would be determined by affordability, which would be below the premium required to cover the risk, with coverage limited to a certain amount per building to reduce losses to the fund.

CHARM

The South Pacific Applied Geosciences Commission (SOPAC), through its Community Risk Programme, is implementing a Comprehensive Hazard and Risk Management Program (CHARM) designed to mainstream risk management. CHARM is a comprehensive hazard and risk management tool / methodology, for use within the context of an integrated national development planning process, which aims to facilitate greater collaboration between risk reduction projects at all levels and across sectors to enhance sustainable development. Pilot projects are being implemented in several peri-urban communities in four Pacific island countries.

The project addresses the concern that risk management activities in the Pacific tend to be limited to single government departments or regional organisations. In many instances national risk reduction efforts are uncoordinated, resulting in duplication of effort and planning gaps exist. The CHARM national risk management decision-making tool has been developed to help guide countries towards establishing effective integrated disaster risk reduction decision-making processes. It is intended to enhance the sustainability of national development planning processes and encourage a more coordinated and integrated regional approach to risk reduction. Training is conducted through broad consultation workshops involving both national and regional stakeholders.

CBDAMPIC

Currently, the South Pacific Region Environment Programme (SPREP) is implementing a pilot climate change adaptation project called Capacity Building for the Development of Adaptation Measures in Pacific Island Countries (CBDAMPIC) that focuses largely on reducing the vulnerabilities of communities from climate related risks in four countries, Cook Islands, Fiji, Samoa and Vanuatu. The Canadian Government has also worked collaboratively with SPREP to implement climate change adaptation projects at the community level in a number of Pacific countries, which is believed to be a first of this type of project for the Pacific region.

Regional Natural Disaster Relief Fund

⁷⁸ Id.

⁷⁹ Id.

The Regional Natural Disaster Relief Fund was established in 1975 by Forum Island Countries. These include the Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. It is able to provide a token amount of funding to countries recovering from natural disasters.

For example, in April 2004, the Pacific Island Form (PIF) Secretariat announced that amounts of US\$ 11,500 would be provided to assist with relief efforts, following recent damage from *Typhoon Sudal* in Yap and the flash floods in Fiji. The Secretariat also offered to provide technical assistance similar to the relief that was extended in January 2004 to Niue and Samoa following *Cyclone Heta*, and to Vanuatu in February 2004 in the wake of *Cyclone Ivy*.⁸⁰

Regional Adaptation Facility

The objective of the Regional Adaptation Facility for Pacific Island Countries is to provide financial support for the implementation of climate change adaptation and risk management projects within the Pacific island countries and territories. The Facility would finance primarily the implementation of adaptation measures for which alternative funding is not readily available. A study being carried out to examine the details of the design and structure of the Facility and the likelihood that additional funding could be secured through use of such a Facility.

The concept of such a facility was advanced at Pacific High Level Adaptation Meetings in 2002 and 2003. The Second High Level Meeting approved elements of the Facility's governing structure, which include a small Board of Trustees to report to a regional body, a technical advisory panel including CROP organisations, experts and civil society, and a regional organisation to physically host the Facility. The Facility is expected to fund a range of activities implemented by governments, non-state actors and communities including project development; adaptation strategies; capacity development for vulnerability and adaptation assessment; mainstreaming adaptation; management of critical ecosystems; and policy development, evaluation, technology assessment and transfer.

In the initial stages of operation of the Facility, preference would be given to “no regrets” adaptation investments, which would be beneficial even if climate change turned out to have impacts different than anticipated. These measures would minimize the risk of mal-adaptation. Some examples likely activities including “no-regrets” activities include:

- Management of risks related to climate change and natural disasters;
- No regrets adaptation investments, such as strengthened management of coral reefs and coastal ecosystems to protect against erosion and wave action; mangrove re-plantation and beach nourishment; better management of freshwater resources; coastal zone planning and hazard management; control of vector borne diseases

⁸⁰ http://www.goasiapacific.com/news/GoAsiaPacificBNP_1087492.htm

and pollution likely to increase vulnerability to climate events; diversification of agricultural practices and adoption of weather resistant varieties; mainstreaming adaptation into economic planning, environmental assessments and building codes; and planning and implementation of adaptation strategies.

- In exceptional cases where strong justification exists, ‘regrets’ adaptation measures could also be considered for funding (such as elevation and/or displacement of infrastructure to lower risk areas).

Criteria for funding would include:

- The relative vulnerability of the country or island(s);
- The priority that countries themselves attach to adaptation (as evidenced in domestic resource allocation for adaptation and effective mainstreaming),
- The availability of solid background analysis, such as that included in the National Communications to the United Nations Framework Convention on Climate Change, National Adaptation Programmes of Action and other,
- The quality of the proposals, i.e. those that clearly demonstrate the need for the proposed support,
- A preference for “no-regrets” measures; and
- The matching contributions offered by the proponents – with a minimum matching contribution of 20 percent of the total proposal recommended in cash or in-kind.

Private Sector Initiatives

Insurance sector

In the wake of several cyclones, in Fiji pressure from insurers and reinsurers encouraged the upgrading of dwellings. Insurers encouraged risk mitigation by reducing premiums to reflect improved resistance to windstorm damage. Under the insurance terms that were imposed, ‘Level A’ building standard attracted full cyclone cover at unchanged premium; ‘Level B’ attracted either full cover at higher premium or reduced cover at existing rates. Coverage was declined for sub-standard risks. These terms of insurance dictated by the insurance sector led to a considerable improvement in the standard of buildings.

Micro-insurance

Small and micro-finance enterprise development schemes exist in the Pacific to benefit economically or socially disadvantaged groups, including young people and women. Micro-finance schemes provide a range of financial services, including savings programmes, loans and insurance for poor and low-income earners, as well as for certain types of enterprises. The objective of micro-finance schemes is to assist in reducing poverty, generating self-employment, sustaining livelihoods, assisting small and micro business operations and providing skills training.

These schemes are operational in at least the following countries in the Pacific: Fiji; Vanuatu (VANWODS); Solomon Islands (SIMIWODS); Samoa (Micro-finance Bank for

Women); and Papua New Guinea.⁸¹ Policies for these schemes may include a provision for emergencies, which in instances have provided for loans to victims of natural disasters. In Labasa, Fiji, victims of *Cyclone Ami* that were members of the micro-finance scheme in the geographical area were approved loans to assist in rebuilding. Overseers of the scheme reported a 100% repayment of all loans approved for this period.⁸²

Regional Organisation Initiatives

A number of regional organizations offer assistance to PICs in addressing the impacts of climate change in the region. These include the South Pacific Regional Environment Programme (SPREP), the South Pacific Applied Geosciences Commission (SOPAC), the University of the South Pacific (USP) and the Forum Secretariat (Forum). A number of other entities provide financial and technical support to SIDs in addressing various issues related to climate change. These include multilateral lending institutions, such as the Asian Development Bank (ADB) and the World Bank (WB); donors such as the Canadian International Development Assistance (CIDA), Australian Aid (AUSAID), and the United States government. Intergovernmental organizations active in the Pacific include the United Nations Development Programme (UNDP) and United Nations Environment Programme (UNEP). The activities these actors support, implement or coordinate include research, capacity building, training, policy advice, mainstreaming and community pilot projects.

Multi-lateral lending institutions

The World Bank and ADB, in collaboration with AUSAID, UNEP and others, are working towards mainstreaming climate change adaptation at the national and regional levels. The main goal is to assist governments, communities, the private sector and key stakeholders in the Pacific to jointly manage the challenges posed by the increasing vulnerability of Pacific Islands to natural disasters and climate change. The programs treat adaptation in the Pacific as an evolving process. Within this process, assistance has focused on five strategic activities:

1. Selected economic and sector work, with particular focus on economic impact modeling;
2. Facilitating high-level consultation among policy makers, donors and regional organizations;
3. Dissemination and awareness of potential climate change impacts and adaptation options, with particular focus on presentations at major regional and international meetings and academic institutions;
4. Donor coordination and lobbying, aimed at leveraging further grant financing for adaptation in the Pacific, and promoting a coordinated regional adaptation program; and

⁸¹ See www.fdc.org.au/mfpacificmcs SummitFeb04.pdf

⁸² Information provided by SOPAC.

5. Linkages to operational work as an iterative way to gather lessons of experience and apply key program principles.

External debt in the region varies greatly, from 0 for some countries, to billions for others, such as Mauritius and PNG. Another possibility means to enhance the uptake of risk reduction measures in the Pacific may be the linking of these measures at the national level to debt forgiveness.

Table 9. External debt, private and public for selected countries and territories in the Pacific and Indian Oceans

Source: CIA, Worldfactbook 2002.

Country	External Debt
Mauritius	\$2.3 billion (2000 est.)
Maldives	\$202.6 million (2002 est., Worldbank, 2004)
Cook Islands	\$141 million (1996 est.)
Seycelles	\$240 million (1999 est.)
Fiji Islands	\$162.7 million (1999)
Kiribati	\$10 million (1999 est.)
Palau	\$0
Papua New Guinea	\$2.6 billion (2000 est.)
Samoa	\$192 million (1999)
Solomon Islands	\$137 million (2001 est.)
Tonga	\$57.5 million (June 2001)

E. Capacity Requirements and Possibilities for the Way Forward in the Pacific

The way forward for the Pacific will require the involvement of many stakeholders, at the local, national, regional and international levels. Non-governmental organisations involved in disaster response, insurance companies, development agencies and development banks all have a role to play.

In island countries where subsistence living still plays a significant role, concerted efforts are needed to *improve national and community resilience*, particularly through the strengthening of traditional building practices, conservation of traditional planting materials, food preservation techniques and community awareness programmes, such as theatre groups. Some very innovative ideas practiced elsewhere, such as micro-finance insurance schemes linked to micro-insurance schemes, may be adaptable to island country situations.

Improved capacity for data collection and management at the governmental and regional level is urgently needed. It is difficult to access information on the direct costs associated with past extreme weather events, and the consequential effects of these events on Pacific island economies. The better collection and management of this data will help anticipate and plan for the impacts of weather-related hazards in the future. Hazard mapping is also needed, to assess potential loss exposures, anticipate the impacts of and enhance risk management planning. This is an area in which public-private partnerships may be very beneficial.

Legislative frameworks for regulation of the insurance sector in PICs require review and analysis, with thought given to how these frameworks might facilitate the reporting of data by the insurance sector on policy provisions, coverage, claims, and insured losses. Consideration should also be given to how these frameworks may facilitate the use of building codes and create incentives for wise building practices.

Development plans and projects that are currently under consideration have a life expectancy that requires future climate conditions and sea levels to be given due consideration. Examples include the design and placement of settlements and houses, the design and construction of infrastructure in ways that avoid and limit flood damage, water catchment and storage facilities, coastal protection, and land management programmes.

Development banks active in each PIC offer a good vehicle for the sharing of information on good practices, as well as the development and implementation of appropriate building codes and planning codes. Incentives for safer construction practices may be linked to loan availability, and incentives provided through lower-interest loans.

Micro-insurance schemes may warrant consideration in facilitating risk management for small ventures.

The *Pilot Study on Catastrophe Insurance in the Pacific* requires broadening and extension within the Pacific. Recommendations have been made on how to take this forward through four general steps⁸³:

1. *Developing further support for the concept.* This can be done through the Forum Economic Ministers Meeting (FEMM) which gave the mandate for further work on catastrophe insurance in the Pacific, by continuing to raise awareness on the issue using the outcomes of past efforts on the Port Vila Pilot Study, and by establishing a working group representing all relevant stakeholders, including donors, to maintain the direction of the initiative and to develop a source of funding which is crucial to take the work forward. Work in the Pacific should be disseminated to international agencies working in the area of risk management and related issues such as climate change, to ensure coordination and cooperation, and establish links and support where possible. Encourage PICs to adopt principles of comprehensive risk management (including a consideration of catastrophe insurance) at the national and regional level as essential to good governance.

2. *Developing preliminary options for risk financing and risk transfer.* This can be done using reinsurance/risk management professionals with relevant expertise to administer the process, arrange stakeholders meetings, promote a consensus on the most acceptable form of catastrophe risk financing/transfer in the Pacific context, and develop

⁸³ SOPAC Joint Contribution Report 147, Catastrophe Insurance Pilot Study, Port Vila, Vanuatu at 131.

preliminary options for the Pacific using risk-finance modelling based on existing limited information.

3. *Defining hazards, assets portfolio and risk environment.* This can be done through expanded hazard and risk-loss investigations and modelling from the local pilot study undertaken into a broader Pacific regional scheme. This requires a definition of the complete regional risk environment, including natural and human-induced hazards, and vulnerability. It also requires the development of a rapid and objective means of assessing and verifying damage levels from any disaster in the region for the purpose of claims assessment or trigger events for insurance payouts.

4. *Develop detailed risk financing arrangements.* This can be done by encouraging PICs to explore appropriate risk financing methods to deal with their specific problems, and to consider how to joint options or packages of risk financing methods may work to address regional challenges, including a mitigation programme. With facilitated assistance, PICS might be able to arrive at an agreement relating the risk perceptions of each country to proportional contributions to be made by each state, in order to adopt the most efficient and appropriate regional catastrophe insurance scheme for risk financing of catastrophes. Risk financing expertise will be needed to calculate the cost of such a programme and to determine means of funding it. Regional and international support and funding agencies should be involved in this process, so that PICs and regional and international support and funding agencies can jointly implement a catastrophe insurance scheme to better manage risk in the region.

V. Conclusion

The preceding pages have highlighted some of the daunting challenges and constraints that small island states in the Pacific and Caribbean face in addressing the impacts of climate-related extreme weather events. These challenges will only increase with the changes brought on by a changing climate, which can be expected to include sea level rise and the likelihood of more frequent and severe extreme weather events.

It is clear that much work remains to be done to explore and exploit the potential that insurance mechanisms hold for enhancing the adaptive capacity of small island states to the impacts of extreme weather events – both physical and financial. There is a need to build on past and ongoing initiatives, and the existing legislative, policy, and institutional frameworks and private-public partnerships described in this paper provide a starting point.

Approaches will necessarily differ in the Caribbean and in the Pacific; these regions are in different developmental stages. However, it is clear that in both regions, international assistance will play a critical role in facilitating the necessary interaction between relevant stakeholders, and in building the capacity of these stakeholders to fashion cost-effective financial risk management strategies.