CATASTROPHE INSURANCE PILOT PROJECT, PORT VILA, VANUATU:

Developing Risk-Management Options for Disasters in the Pacific Region

Project Summary

A ***SOPAC*** project to define options for risk transfer and risk financing for Pacific Island Countries at threat from natural catastrophe

In partnership with the **World Bank** and **AusAID**

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SUMMARY

The Pacific – A region plagued by natural hazards, where the people of the small island nations are struggling for survival in a global economy, faced with the problems of limited resources, lack of capacity and the continual burden of recovery from the impacts of disasters.

In recent years, countries have acknowledged the need to plan for disasters and to mitigate their impact. By and large, national disaster management programs have attempted to address issues of physical and social planning for disasters, focussing on areas of disaster response, advocacy and awareness raising. To date, little has been done to specifically address the financial cost of recovery which, in itself, has a profound social impact.

This project is an initiative of the World Bank, the Australian Government, and the Pacific Islands Forum Secretariat. It was executed through SOPAC, and takes the first steps towards considering the option of catastrophe insurance as a financial tool against the impact of disasters, sharing the costs in a regional scheme.

Catastrophe insurance is a complex and specialised area. Put simply, it is a method of calculating risk (in this instance, risk from natural hazards), defining the extent of the cover, and assessing an appropriate premium to cover the costs of recovery. In the case of the Pacific, the members of the scheme would share the cost of the premium. In addition, donors (who are usually called on for financial assistance in the aftermath of disasters) may wish to consider contributing a premium to the fund or developing a pool that would help to lessen the burden on future aid funds.

This project, while focussing on Port Vila as the pilot city, has highlighted the work that needs to be done in each country as a prerequisite to developing a regional scheme. It has required input from a wide range of disciplines including urban planning, geotechnical engineering, social development, asset valuation, insurance broking, and numerical modelling.

Catastrophe insurance should go hand-in-hand with all the other elements of effective disaster management, including mitigation. Issues to be considered include improved urban planning and building standards appropriate to the situation. Workable solutions require baseline data on geotechnical information, assessment of building and infrastructure assets and the assessment of natural hazards. Gathering all of this information and working towards improved safety will bolster disaster management at a national level as well as provide the foundation for a regional catastrophe insurance scheme.

BACKGROUND

The Pacific Island Countries collectively face an immense but largely undefined risk from natural hazards. The economic, social and environmental impact of disasters is undermining progress for the PICs already struggling with special development problems including isolation, limited capacity and small economies which are particularly vulnerable to global events. National development efforts, (including programmes funded by donors) are set back each time a country has to recover from the effects of a disaster making the prospect of sustainable development seem more remote.

The real danger, though, lies in the long-term prognosis for the islands. Extreme meteorological events such as cyclones are on the rise; long gaps in the seismic record often obscure the true potential risk from earthquakes. The record of disaster events in the Pacific region is brief and sketchy, so numerical modelling techniques must be relied upon to draw a clear picture of the future. Given the long return-periods of extreme events, it is almost certain that the region will suffer more damaging events than hitherto experienced – the worst is yet to come.

This vulnerability to natural disasters is one of the special development challenges identified by the Joint Commonwealth Secretariat/World Bank Task Force on Small States. One option being investigated by the World Bank to lessen the economic and social impact of disasters is that of risk transfer through Catastrophe Insurance. For most Small Island Developing States (SIDS), including those in the Pacific, risk-transfer at the national level is not feasible as many disasters would affect the entire country. Regional or global risk-pooling arrangements are seen to have much greater potential.

The World Bank has previously promoted work on Catastrophe Insurance in the Caribbean Region. The Caribbean study had the advantages of starting with a much more established, well-defined and coordinated insurance market, and a situation where the hazard climate had been more closely studied and modelled for a number of years and where certain risk-loss analyses had been conducted. Some of these jump-off points had yet to be established for the Pacific region and the first steps to do so are taken in the current project.

The concept of a Pacific regional catastrophe insurance scheme was accepted by the Pacific Islands Forum Economic Ministers Meeting (FEMM) as a possible ***component of a broader more comprehensive disaster management strategy for the Pacific.*** FEMM requested that SOPAC carry out a pilot study in one of the member countries for which hazard and portfolio data was already available. The purpose of the SOPAC pilot study was to gather and analyse data on hazard and disaster events pertinent to the requirements of the insurance industry. The pilot project would also examine the effects that factors such as the non-homogeneity, cultural differences and variations in asset ownership of Pacific islands may have on a proposal for regional catastrophe insurance, within the broader context of disaster mitigation. SOPAC would engage ni-Vanuatu and regional stakeholders and raise awareness.

The scope of the project included the following work:

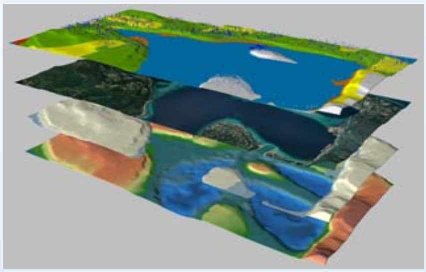
- Produce a comprehensive Risk-GIS database of Port Vila
- Complete multi-hazard risk and damage analyses
- Establish a basis for structural damage functions and losses
- Quantify the factors in catastrophe risk, including the impact and frequency of hazards and the infrastructure elements at risk
- Evaluate various risk-transfer models following damage-cost assessment
- Identify appropriate risk-transfer models taking into account asset-ownership diversity and issues

PORT VILA

Port Vila typifies the risk situation present in many Pacific Island Countries. It is also one of the urban centres most advanced in a SOPAC hazard and risk-assessment program called ***Pacific Cities***. This program which started some 6 years earlier in Port Vila, Suva, Nuku'alofa, Honiara, and Apia, has provided most of the base-line geographic and geotechnical information, the fundamental assessment of building and infrastructure assets, and the assessment of natural hazards for the cities. More importantly, the program has captured all of this diverse information in a single, interactive Geographic Information Systems (GIS) database.

Port Vila is located well within the cyclone belt on the island of Efate in the Vanuatu group. It lies only 50 km east of the New Hebrides Trench, astride the tectonically active plate-subduction zone – a source of major earthquakes and tsunamis. It is exposed to severe hazard from earthquakes, tsunamis, river floods, cyclonic winds, storm surges and storm waves. The whole southwestern quarter of Efate, including greater Port Vila, is an expression of the collapse of the volcanic edifice of the island. Steep slopes in the area are prone to landslides triggered during earthquakes or heavy rain.

Building Class	Brief Description of Structure	Lowest Estimate USD$	Best Estimate USD$	Highest Estimate USD$
Class A	Well engineered structures: Schools, hospitals	608	780	956
Class B	Concrete or concrete block structures; Moderate quality construction, poor earthquake provisions	780	956	1,128
Class C	Wooden bungalows; poor wind, earthquake provisions	608	780	956
Class D	Poor quality: Shacks and sheds	260	436	520



The central business district, the commercial and harbour facilities and some of the peri-urban villages and informal settlements lie less than 10 m above sea level and within several hundred metres of the shoreline. Those facilities are critically exposed to tsunamis, cyclonic winds, storm surges and storm waves. Many parts of the city, built either on reclamations over areas of thick sediment or atop high plateaus, will experience earthquake effects magnified up to several times. At least one active fault cuts through the city.

Building Class	Number of Buildings Port Vila	Value USD$ M
A	254	32.0
B	2,822	298.5
C	1,629	105.1
D	98	3.3
All	**4,803**	**438.9**

Building Class	Mele Bay% Assets	Port Vila% Assets
A	12	5
B	22	59
C	52	34
D	14	2
Total	100	100

Construction codes and standards for buildings and foundations are largely uncontrolled, and many foreshore reclamations are badly sited and poorly compacted. Urban planning is severely limited by land ownership issues, and a burgeoning class of peri-urban settlers is crowding into the poorly serviced city fringes. Poverty here is defined less in terms of low income and more by issues of insecure land tenure which serve to compound the problems of inadequate access to clean water, sanitation, education, housing and health care. Lack of sewage treatment for the city, and oil shipping and storage facilities located in the restricted harbour, bring with them their own potential hazards.

The contributing factors for catastrophe all exist in an area where more than 36,000 people live and work in over 6,300 buildings in Port Vila and Mele Bay which have an estimated replacement value over USD$585 M. The additional estimated reinstatement cost of infrastructure following a catastrophe is almost USD$26 M. It is only a matter time before Vanuatu - and many other developing Pacific Island Countries in similar situations - face a disaster of a proportion that tests the very survival of the national economy.

METEOROLOGICAL HAZARDS

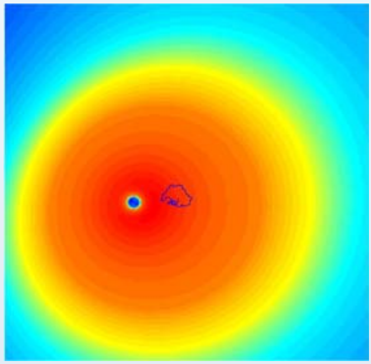
In order to develop estimates of future damage, computer-modelling of cyclonic winds, based on historic records back to 1950, has been calibrated against the known effects of Cyclone Uma which caused around USD$65 M damage to Port Vila in 1987 – probably the largest single recorded disaster in Vanuatu to date. Storm surge and storm wave modelling, based on Cyclone Beni in 2003, indicates that the potential damage from these secondary hazards is more limited. The predicted worst-case cyclone, together with associated surge and wave events, might cause losses to the city approaching USD$415 M.

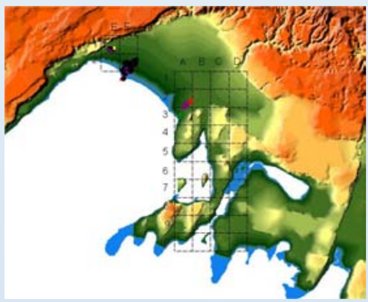
Cyclonic Winds

A statistical climatology of tropical cyclone events based on historic records was used to generate random events in a cyclone modelling system run for storms equivalent to 5,000 years. A topography-wind model was set up and a damage-loss analysis was carried out, using wind speed-damage vulnerability models developed specifically for building classes in Port Vila. The loss analysis was calibrated using known Cyclone Uma losses. By applying the wind and vulnerability models over a large number of cyclone events, the results could be integrated to estimate the levels of damage expected for Port Vila in the future and the relative frequency of occurrence of those damage levels. The model was re-run to measure the potential benefit of retrofitting and upgrading of Class B and Class C buildings.

Damage levels were also computed for each of the topographic 42 wind zones imposed over Port Vila. Damage levels were calculated for each building class for recurrence intervals of 50, 100, 450 and 1,000 years. The relative differences between the cells largely reflect the topographic/terrain differences between locations. The model was also used to estimate the frequency (recurrence interval) of levels of damage, expressed as percentage of buildings damaged to a particular level. For example, 10% of Class A buildings would be impacted to a level of 50% damage once every 455 years but Class C buildings would experience the same level of damage more frequently - every 88 years - underlining the importance of raising building standards.

The total losses expected to buildings and infrastructure combined might be more than USD$170 M in the 100-year event cyclone. The 100-year event has about a 50% chance of occurring in a 70-year lifetime.

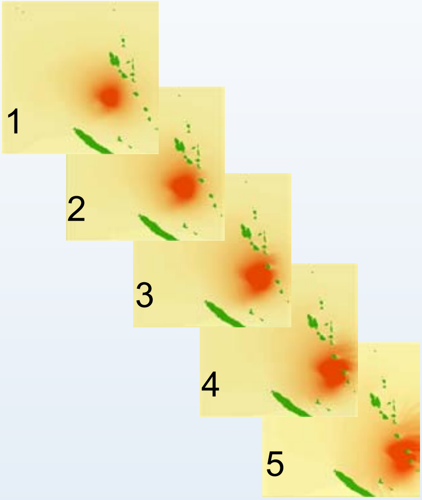


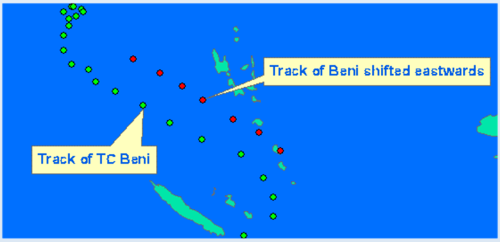


Recurrence Interval (Years)	Cyclone Damage (%) Current	Cyclone Damage (%) Upgraded
10	< 0.1	< 0.1
25	1.1	0.7
50	8.2	5.9
75	18	15
100	28.5	21.6
450	65	55
1000	81.8	72.5

Storm Surge & Storm Waves

Cyclone Beni, a Category 4 event with central pressure down to 920 hPa, struck Port Vila a glancing blow in January 2003, causing damage to buildings and installations on the Port Vila foreshore. The damage was widely attributed to storm surge although studies by SOPAC showed the surge effect was minimal compared to the impact of waves generated by the tracking of the storm eastward towards Port Vila. An extreme scenario, developed from Cyclone Beni, but shifted eastwards to pass closer to the city was used to examine the potential of surge and wave damage. Storm surge was found to have minimal effect partly because of the steep island margins. Storm waves however are predicted to cause overtopping of sea walls, flooding and damage to harbour-side hotels, restaurants and buildings as foreshadowed in Beni. This finding highlights the need for better urban planning and setback provisions in the city. Minimal flooding is expected in the peri-urban settlements at the head of Mele Bay during extreme wave events generated by tropical cyclones. Losses to infrastructure, particularly in the wharf area, have been estimated at close to USD$1 M.



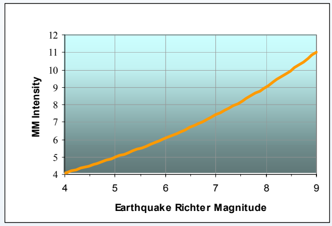


Infrastructure Class	Cyclonic Winds	Earthquake	Severe Rainstorm	Storm Surge	Tsunami	Total Values in USD$k
Airport	202	1,625	130	-	-	1,957
Bridges	-	813	774	26	20	1,632
Communications	130	9,783	-	-	-	9,913
Oil & Gas	91	2,405	-	-	65	2,561
Power	78	78	-	-	-	156
Roads	59	208	98	26	13	403
Seawalls	689	449	33	33	156	1,359
Sewerage	-	-	-	-	-	0
Water	13	683	442	-	-	1,138
Wharf	871	4,687	-	871	20	6,448
Grand Total	**2,132**	**20,729**	**1,476**	**956**	**273**	**25,565**

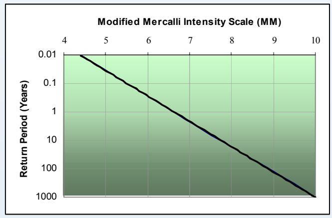
GEOLOGICAL HAZARDS

Earthquake

The maximum anticipated earthquake for the Vanuatu archipelago is M_w 8.1 and shocks of this size occur in the wider Vanuatu region - usually along the New Hebrides Trench to the west of the Group - with a return period of less than 100 years. Closer to home, a series of uplifted coral terraces on the western side of Mele Bay indicates that there has been a Richter magnitude 7.5 to 8 event in the near vicinity of Port Vila every 1,000 years on average, lifting the area by 1-2 m each time. The 1,000-year event has about a 5% probability of occurring within a 50-year time-frame.



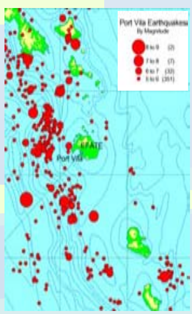
The magnitudes of earthquakes in the area between Efate and the New Hebrides Trench are related to their return periods. The characteristics of historical earthquakes in the plate subduction zone can be compared to the past record of intensities felt in Port Vila. From this, it is possible to predict that, in the long term, the city can expect to experience earthquake intensities up to MM 9-10 on the Modified Mercalli scale at which stage there would be general destruction of masonry structures and even some well-constructed wooden buildings. Lessons from the 2002 earthquake show that buildings on thick alluvial deposits, reclaimed land or high ridges and plateaus will experience even higher intensities than on sites with rock foundations.

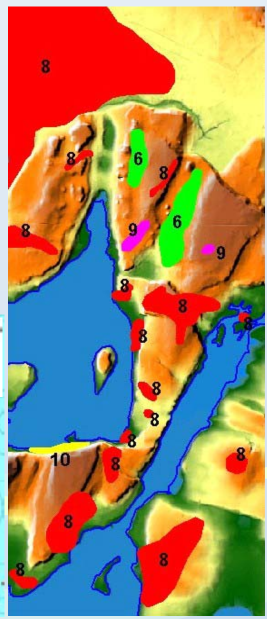


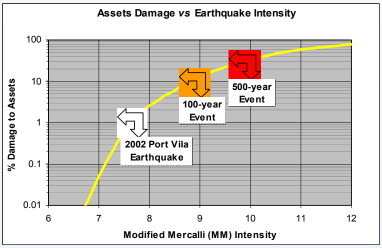
The M_w 7.1 earthquake that hit Port Vila on 2nd January 2002 was the largest here since 1927, causing around USD$10 M in losses to the city. Damage included widespread minor structural damage and the destruction of a 3-storey secondary school, a Government building, and a vital highway bridge, as well as blocking the port access road by major landslides for several weeks.

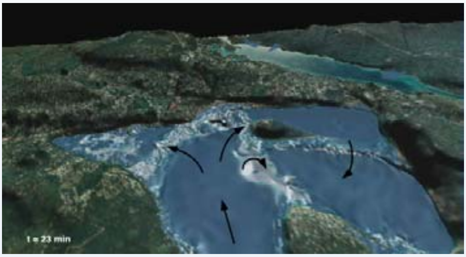
The loss curve predicts that the 100-year earthquake would cause some USD$76 M damage to buildings in Port Vila and its peri-urban settlements, while infrastructure losses would add another USD$21 M, for a total of USD$98 M losses. The 500-year event (10% probability in 50 years) might result in damage of USD$215 M. On this scale, it's obvious that the 2002 Port Vila earthquake - causing losses of only 1.3% of all assets - was a relatively small event that can be expected to recur frequently.

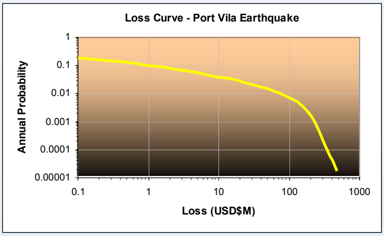
The uplifted coral terraces around Port Vila are clear indicators of a long history of large prehistoric earthquakes. Taken together with historical records of seismicity, seismic microzoning studies, and the lessons of the January 2002 Port Vila earthquake, they can all be used to estimate probable future damage from earthquake. The worst-case earthquake might cause losses of USD$215 M. Modelling of the worst-case tsunami hazard suggests a scenario 6-7 m wave impacting more than 200 buildings in the central business district of Port Vila to cause USD$26 M damage, as well as totally destroying some 1,500 buildings in peri-urban coastal settlements on Mele Bay.











Tsunami

Fifteen minutes after the January 2002 earthquake, Port Vila was struck by a tsunami of significant size. The observed effect at the shoreline varied across the harbour, reaching a maximum peak-trough height of 3 m. The tsunami fortunately occurred coincident with a low spring tide, narrowly averting the flooding of the central business district with over 1 m of water.

A tsunami scenario for Port Vila was generated from a hypothetical M_w 8.1 earthquake located 50 km west of the capital, in the same location as the 2002 earthquake, and equivalent in magnitude to the largest earthquake recorded in the region to date. The return period of such an event has not been calculated but is assumed to be an order of magnitude longer than that of the M_w 8.1 earthquake. The location of the hypocentre of the tsunamigenic earthquake and its proximity to Port Vila, the actual mechanism, orientation and rupture area of the fault, and the tsunami travel path are all critical variables that introduce uncertainty.

In this worst-case scenario, it's anticipated that 212 buildings would be inundated around Port Vila Harbour as well as several entire peri-urban villages and settlements at the head of Mele Bay. Flood states representing the level of flooding have been defined for each building within the inundation zone.

The maximum tsunami run-up would extend up to 200 m beyond the shoreline. Water height is predicted to rise up to 6 m above mean sea level. Altogether, some 28,000 m^2 of floor space in the central business district would be inundated, causing anticipated losses of more than USD$24 M, including losses to infrastructure.

Building Class	Building Count	Tsunami Losses Port Vila USD$M
A	34	4.4
B	103	12.5
C	68	6.6
D	7	0.2
Total	**212**	**23.8**

More than 1,500 buildings in the peri-urban area fringing Mele Bay are also at risk from the worst-case tsunami. The predicted maximum tsunami run-up extends up to 2,000 m beyond the Mele Bay shoreline. Water height here would rise up to 7 m above mean sea level. Replacement values are not necessarily in line with the averages for the city area and losses are difficult to calculate but could reach USD$50-65 M in real terms.

EXISTING COVER

Government Risk Management System: Development of the Vanuatu Government Risk Management Scheme (GRMS) occurred in the period 1991-4 in response to a conviction that such a mechanism is an essential prerequisite for risk transfer – be it on a large or small scale, for either conventional or catastrophe insurance. In the interim, the concept has largely fallen by the wayside. It is, however, just as relevant today and, in fact, critical to the mind-set needed to develop and institute any national catastrophe insurance scheme. The model adopted at that time envisaged that the Government should have complete knowledge of its own assets and fully understand the risks facing them. The GRMS is home-grown and based on first principles, including a grass-roots approach to understanding and managing risk in all its forms. It has the potential to succeed with good leadership, more baseline data, and the funding for an independent arbiter to keep the project and leadership focussed. The success of a scheme of this nature would provide the underpinning for a catastrophe insurance scheme in Vanuatu, and the region.

Infrastructure, Utilities and Services Insurance: The lessons of Cyclone Uma in 1987, and more recently the January 2002 earthquake, provide a glimpse of a possibly devastating outcome for Vanuatu in the future. Uma had a destructive effect on agricultural crops, while in Port Vila the Government infrastructure and tourism sectors suffered major physical and business interruption loss. While it can be assumed that insurance will make a major contribution there are uninsured losses to be taken into account. For some 12 months after Uma, tourist arrivals were down, while activity in other sectors such as construction and some professional areas increased significantly. Uma had a severe impact on the Government's finances in the form of lower revenue and higher expenditure. Real economic growth in the 1987/88 period stagnated. However, in terms of GDP, the economy in Vanuatu did not show a decline but, on the contrary, grew moderately.

The companies managing privatised utilities and services generally have impressive contingency plans and high levels of insurance, but there are some apparent shortcomings, undisclosed detail, and evidence of high retained risks. One of the main concerns is that the quality and reliability of insurance carried by the privatised critical utilities like UNELCO (water and power), Telecom Vanuatu Ltd (TVL), or Airports Vanuatu Limited (APVL) is sufficient to cover Port Vila and its inhabitants in the event of a catastrophe. Essential services may need to undergo an "insurance audit" to identify any gaps in post-loss risk financing in order to decide whether a catastrophe insurance fund should be made available to critical organisations if shortcomings cannot be solved by conventional insurance. There is an imperative to develop a matrix, describing all insured and uninsured losses through the various sectors, that a Government Risk Management Committee can use to coordinate a meaningful response.

Business and Householders Insurance: Losses in Port Vila due to Cyclone Uma in February 1987 were poorly recorded and much information held by the insurance industry is treated as proprietary. Records indicate that a minimum of USD$35 M of insured and uninsured losses (including uninsured Government losses of USD$16 M) were experienced in Port Vila although other estimates put the figure over USD$65 M. While the insurance market coped with this event, there was significant loss of cyclone insurance capacity immediately following the cyclone when the two largest, and many of the smaller, insurance companies withdrew from the market. Within 12 months, though, local insurers regrouped and, subject to new cyclone criteria, agreed to insure buildings, contents and business interruption against cyclone.

Recently, the Vanuatu Government introduced a draft building code, which deals with cyclone and earthquake issues based on Australian and New Zealand standards. For commercial-occupation risk, insurers require the issuing of a cyclone compliance certificate by a local engineer/architect. This procedure has evolved through the insurance market and has worked very well since. New legislation was to take the draft code into law, although, in reality, the insurance market has policed the cyclone construction standards since Cyclone Uma. For private residential properties and rented premises in domestic occupation, local insurers have, as an interim procedure, adopted a questionnaire specifying construction methods. Vanuatu domestic property owners will eventually have to comply through an independent Engineers Report.

Estimates show that 80% of CBD businesses carry property insurance, and of those, about 40% would carry business interruption insurance. Major business houses are well insured. Currently, building owners in Port Vila are insuring business premises for loss of rental revenue as well as for building losses. The business tenants are insuring for loss of contents, commercial stock and business interruption to revenues at an average level slightly greater than the actual building property values. The typical small business and 200 m^2 premise has a total insured value around USD$0.33 M, while an average, larger commercial business and 500 m^2 premise would be insured for around USD$1.82 M. A sample of almost 100 Port Vila businesses carrying over USD$48 M against loss of buildings, contents, stock and business interruption, at an average cover of USD$494,000, indicates that self-insurance provisions are generally adequate. A recent sample of 220 residential insurers in Port Vila carried over USD$23 M in home and contents (with cyclone provisions) for an average value of USD$104,000. A further sample of 34 residential insurers - but with no cyclone provisions - carried over USD$2 M in home and contents insured for an average value of USD$59,000. While such samples are available to give an indication of the levels of insurance, it is difficult to grasp the full picture of private insurance due to client confidentiality in the insurance industry.

RISK MANAGEMENT OPTIONS

- Provide **wide coverage**: Cover uninsurable perils for dwellings and infrastructure
- Provide **adequate funds** for reconstruction and repair of damaged structures: Social service to make significant contribution to the reduction of hardship
- Be **affordable**: Level of cover to fit the premiums; address social equity issues
- Have an **efficient** administrative system including response to claims: Use insurance industry or Government body; premiums cover cost of claims-handling, monitoring and managing the risk
- Be free of **moral hazard**: Controls on claims-handling; large reserves
- Be technically and **financially sound**: Income must balance expenditure; build a pool or fund as protection
- Be politically **acceptable**: Fundamental to establishment and sustainability of scheme; acceptability depends mainly on the level of cover to be provided and how the premium is to be levied
- Be linked with **mitigation** activities: Incorporate incentives or regulations that will over time reduce the overall vulnerability eg. building standards, land planning; funding of public education and research activities in relation to disaster mitigation

Ideally any national or regional system for disaster insurance scheme should meet a set of criteria such as these

Catastrophe Insurance is one of a number of option
charities, and insurance are the main mechanisms by which h

Insurance is a proactive form of mitigation whereby an individu

Before launching into a regional scheme, a conceptual framev

Important considerations include setting limits to premiums (a

The risks to a disaster insurance scheme are generally covered by a combination of:

- Pool funds
- Risk transfer, *eg*. re-insurance
- Risk financing, *eg*. contingency loans
- Government guarantee
- Insurance industry contributions

Costs of setting these up may include:

- Costs of risk transfer
- Costs of risk financing
- Cost of government guarantee

Other costs, apart from irregular major claims, include:

- Costs of administering the scheme, including managing claims
- Costs of attrition losses – *ie* regular small claims
- Taxation
- Costs of measures to mitigate risks

Regular annual income to cover these costs comes from a combination of:

- Premiums
- Investment income
- Industry levies
- Government grants

To provide protection from the fluctuations of the market, many schemes aim to build up a pool or fund. The financial risks to a disaster insurance scheme are generally c

FRAMEWORK FOR THE DEVELOPMENT OF A REGIONAL SYSTEM	
1	**What is the current level of disaster insurance in the region?**
	In the less wealthy countries of the Pacific region, the average householder and small business is not covered because of expense or conditions applied. Need to determine which sections of the community towards which a national disaster scheme will be directed
2	**What will it cover?**
	Dwellings only, for damage from natural hazards: extreme weather events and geological hazards - Government assets should be insured as part of a general insurance program of Government property and not part of a special disaster scheme
3	**What is the maximum limit to premiums in terms of affordability?**
	Premiums will be determined by affordability – these are likely to be low or provided through specific Government taxation. The risk will then determine not the premiums, but the level of cover that will be provided
4	**What is the affordable risk?**
	Need to develop Risk-Loss modelling specifically for the Pacific Islands Region using the SOPAC community of expertise (hazard and property databases well underway) to determine policy conditions and the level of cover that can be provided – Need to develop priorities for different countries and institute the scheme sequentially
5	**How will the system be structured?**
	Need to develop a specific Financial Risk-Management model to define a common Regional scheme or pool arrangement
6	**How will it be managed and administered?**
	Need to consider how premiums will be collected, how claims will be assessed and paid, how will board members be appointed, and who will administer the scheme
7	**What about loss-control?**
	Need a firm control on claims-handing, and a clear link to building and planning regulations

SCHEME DESIGN

In deciding on the details of a scheme, a series of choices might be considered which would involve decisions on the hazards and classes of assets to be covered, what ties would be developed with other forms of pro-active and reactive disaster mitigation, and whether Government would take advantage of the skills inherent in the private insurance industry. These skills might be especially important in questions of how to best administer the scheme, how to cover claims-handing in the event of a disaster, and in deciding what proportion of premiums might be used for either buying re-insurance or attempting to develop a regional pool over time.

CATASTROPHE INSURANCE SCHEME - DESIGN OPTIONS			
1	**Classes to be Covered**		
	a	Dwelling - Building, Contents	√
	b	Small Business - Building, Contents, Business Interruption	
	c	Medium and Large Business - Building, Contents, Business Interruption	
	d	Agriculture - Crops, Livestock	
	e	Government Owned Risks - Buildings, Utilities, Infrastructure, Emergency Services	√
	f	Health - Death, Accident Cover, Worker's Compensation	
2	**Hazards to be Covered**		
	a	Earthquake - Shaking, Fire, Landslide, Tsunami, Subsidence, Liquefaction	√
	b	Tropical Cyclone - Wind, Rain, Flash Flood, Stream Flood, Landslide, Storm Surge	√
	c	Thunderstorm - Wind, Hail, Rain, Flash Flood, Lightning	
	d	Other Weather Events - Rain, Flash Flood, Riverine Flood, Bush Fire, Wind	
	e	Volcanic Eruption - Shaking, Debris Flow, Ash Fall, Lava Flow, Fire	√
	f	Human-Induced Hazards - Explosion, Major Fire, War, Terrorism, Riot	
	g	Other - Pestilence, Disease	
3	**Type of Scheme**		
	a	Industry only, either as part of normal insurance, or collaboratively through an Industry Pool	
	b	Government Fund, providing either insurance direct to consumers, or providing reinsurance to insurance companies enabling them to provide disaster insurance cover	
	c	Joint Industry/Government Pool, through which industry provides the insurance, but which is protected in part by a Government guarantee and /or a co-insurance arrangement between the government and Industry	√
4	**Universality of Cover**		
	a	Voluntary, either as an addition to a normal policy, or as a separate policy	
	b	Compulsory, either in conjunction with normal insurance, or as a separate universal policy	√
5	**Extent of Cover**		
	a	Replacement value generally in conjunction with a deductible or franchise, and possibly a level of coinsurance or first loss limit	
	b	Indemnity value generally in conjunction with a deductible or franchise, and possibly a level of coinsurance or first loss limit	
	c	Limited amount of cover in conjunction with claim conditions such as a specified minimum amount of damage	√
6	**Form of Premiums**		
	a	Fixed Premiums	√
	b	Fixed Premium Rate	
	c	Variable Premium Rate	
7	**Upper Limit**		
	a	No upper limits and no Government guarantee	
	b	No upper limits with a Government guarantee	
	c	A fixed upper limit with proportional cover above this	√
8	**Claims Handling**		
	a	Insurance Industry	√
	b	Government	√
	c	Offshore Assessors	
9	**Financial Risk Management**		
	a	No reinsurance, and Government absorbs risk above level of accumulated funds	
	b	Risk Completely reinsured up to a specific probable maximum loss (PML) apart from a small retention for small attrition losses	
	c	risks above this level	√
	d	Reinsure gap between level of accumulated funds and PML	
10	**Fund Management**		
	a	Industry board of participating companies	
	b	Joint Industry/Government scheme	√
	c	Government organisation and appointed board	
11	**Fund Administration**		
	a	Outsourcing to an insurance or reinsurance company	
	b	Creating a separate unit	√
	c	Administering within a Government department	
	d	Government reinsurance company	
12	**Mitigation**		
	a	Indirect - specified funds for public education, development of appropriate building codes and land-use guidelines	√
	b	Direct - certification that building design meets a certain level or has been upgraded to this level	√
	c	Incentive – incentives offered to the owners of non-complying buildings to upgrade	√

*Catastrophe insurance is only one part of the broader issue of **comprehensive risk management** in the Pacific. SOPAC is working in many areas to demonstrate a comprehensive approach to risk management within Vanuatu as well as other Pacific Island Countries.*

This approach includes practical steps to reduce vulnerability through the Pacific Cities project, upgrading of building standards for urban preparedness and response initiatives, and efforts to carry the issues to the highest levels of government through advocacy. SOPAC has developed concrete risk-treatment solutions, working with the Vanuatu Red Cross Society in participatory community projects in peri-urban Port Vila, demonstrating that civil society organisations have a critical complementary part to play.

Three significant international projects are closely related to the catastrophe insurance initiative and need to be considered as associated or complementary mechanisms:

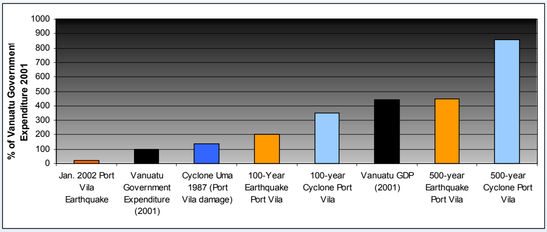
•Initiatives by the Association of Small Island States (AOSIS) to develop through the United Nations Framework Convention on Climate Change (UNFCCC), very similar risk transfer and financing options.

•Caribbean Disaster Mitigation Project (CDMP) which set out, with World Bank support, to establish sustainable public/private disaster mitigation mechanisms, and promote natural hazard damage mitigation and the use of loss-reduction incentives in the Caribbean property insurance industry.

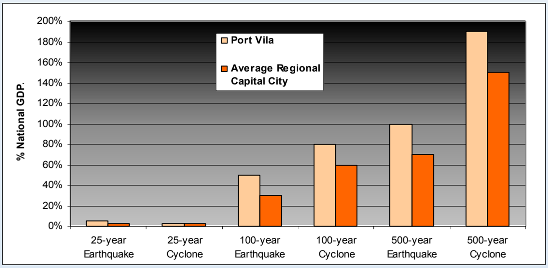
•The Small States Insurance Scheme is a debt-servicing scheme, designed to provide financial support for small states after a natural disaster of a size or magnitude defined by a loss trigger.

REGIONAL PERSPECTIVE

Extrapolation to the region of anticipated losses from the pilot area is not an exact science given the paucity of good historical information on hazards and their recurrence periods, and the lack of up-to-date census figures and building data. It is based on a number of assumptions, the primary one being that the most likely grouping of island nations in any catastrophe insurance scheme would be Fiji Islands, Solomon Islands, Vanuatu, Samoa and Tonga. These five largest, and most at-risk, countries are taken in this context to represent the Pacific region. At the beginning of the new millennium, this regional grouping had a total population and assets at risk which exceeded 1.6 million people and 320,000 buildings, with an asset value estimated at over USD$34 B; figures which are 40-50 times larger than those of the pilot area. In the interim there has been over 5% growth in the region, most of it in the urban areas. The countries all face comparable levels of hazard to the pilot area.



Losses to Port Vila (relative to the national expenditure of Vanuatu in 2001) from some of the largest recorded past disasters (2002 Port Vila Earthquake and Cyclone Uma in 1987) seem small when compared with the potential losses predicted from the 100-year and 500-year events.



Hazard Event	Pilot Area Port Vila Predicted Losses USD$ M	Pilot Area Port Vila Predicted Losses % Vanuatu GDP	Pacific Region Average National Capital City Predicted Losses % National GDP
25-Year Return-Period (86% probability in 50 years)			
Earthquake:	10	5%	3%
Cyclone:	7	3%	3%
100-Year Return-Period (40% probability in 50 years)			
Earthquake:	98	46%	30%
Cyclone:	169	79%	60%
500-Year Return-Period (10% probability in 50 years)			
Earthquake:	215	101%	70%
Cyclone:	413	194%	150%

The combined population of the capital cities of those five nations at almost 326,000 people is almost 10 times that of the pilot area. Given assumptions of hazard levels relative to Port Vila, the combined, equivalent values of assets at comparable risk in the regional capitals approaches USD$5 B, which is about 7 times that of Port Vila alone.

Port Vila stands to experience losses in the 100-year event (40% probability in 50 years) of USD$98 M from earthquake and tsunami and USD$170 M from cyclone. The 500-year event (10% probability in 50 years) threatens Port Vila with losses of USD$215 M from earthquake and tsunami and USD$413 M from cyclone.

Given the GDP in 2002 for Vanuatu was USD$212 M, these levels of loss in the pilot area equate in the 100-year event to about 50% of the national GDP from earthquake, and 80% of GDP from cyclone. In the less-likely 500-year event, the predicted losses from earthquake are approximately equal to the national GDP, and from cyclone are almost twice the GDP. This level of predicted loss in Port Vila is largely reflected throughout the region.

Assuming that more than one of the capitals might be affected by high-level earthquake or cyclone events in the same period, anticipated regional losses might be several times those calculated for the Port Vila pilot area.

Historical events like Cyclone Bebe in 1972 which struck Tuvalu, Fiji and Tonga in turn, clearly demonstrate that multi-country events are possible, and that more than one country might be affected by disaster in a given period.

CONCLUSIONS

The major risk facing the pilot city of Port Vila is from earthquake and cyclone catastrophes. The 100-year events have a 50:50 chance of happening within the span of a human lifetime, so these catastrophes are not remote events to be ignored. Their financial impacts can be measured in terms of at least several times the annual gross national expenditure, imposing severe financial burdens on already weak national systems. Meanwhile, lower-level disasters and damaging events continually undermine efforts at sustainable development.

The Vanuatu case is representative of at least the five largest countries in the Pacific region, and has proved a valid starting point for analysing the regional risk situation. The portfolio at risk in the region as a whole, and the extent of those risks, is significant. It is clear that the risk-transfer and risk-financing measures presently being undertaken by most of the Pacific Island Countries are completely insufficient to deal with the long-term threat of disasters. Under the current circumstances, and in the event of the first truly catastrophic event in the region, risk-transfer to aid donors looms as a major issue.

Urgent action is required to ensure economic and social stability in the face of catastrophe. The first step in developing a regional catastrophe insurance scheme is for the countries involved to demonstrate the political will to establish comprehensive national risk-management regimes, as well as organising on the regional level to realise economies of scale. There will be a need to gain financial backing, establish the detailed knowledge of the assets portfolio at risk, employ scientific hazard and risk-loss analysis, and perform economic and financial-risk analysis to finally develop a scheme that complements other mitigation efforts.

Any moves towards a regional catastrophe insurance scheme should be closely integrated with the broader issue of risk management in the Pacific context. In this regard, attempts should be made to coordinate closely with the ongoing work through UNFCCC to develop risk-transfer and financing options for climate-related disasters, the Small Island States Insurance Scheme, and the World Bank catastrophe risk-management initiatives in the Caribbean.

On the regional scale, SOPAC, in its coordinating role in disaster risk management for all the Pacific Islands Forum Countries, has already successfully demonstrated a comprehensive approach to developing practical solutions to treating risk which should be incorporated in any regional insurance mechanism.

Pacific Island Governments urgently need to recognise the fact that all forms of risk management are linked, and that the issue and its solutions rest with the highest levels of government, along with the support of the grass-roots level of community.

Many important decisions must be taken, but a number of the questions to be answered are dependent upon the others: One cannot answer how much capital is required until one knows what coverage will be offered, the premium volume, the overall insurance exposure risks, and how the assets will be invested and the associated risks. Similarly, one cannot determine the optimal asset mix until one knows the premium volume, its volatility and the amount of capital available. Moreover, the premium depends as much on the policy conditions and the insured risk, as well as being restrained by affordability. Determining the system variables in a rational way, with the object being to establish the appropriate combination of values, has only become possible with very recent developments.

It will be important for a Pacific scheme to build a pool of reserves as early as possible. In the interim, any risk in the early years of a scheme might need to be carried by an independent body in order to avoid re-insurance provisions taking most of the profit. In view of the experience of attempts at national pooling arrangements elsewhere, one of the most significant challenges in developing a disaster insurance pool might be in arriving at a common agreement over the contributions to be made by each country.

A major problem with disaster insurance schemes is that they are concerned with risks for which the level of loss is very high and the associated risk of occurrence is low. As a consequence it is very difficult to derive reliable information on the risks by extrapolation of past losses. Whatever the scheme chosen, there is general agreement on one point: Without a firm baseline of detailed knowledge of the hazards and the elements at risk together with their vulnerabilities, the nature of the risks facing the Pacific is purely speculative, and any financial analysis, and therefore the scheme itself, would be fundamentally flawed.

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