Pacific Damage and Loss (PDaLo) Regional Disaster Impact Report

Samantha Cook

SPC SOPAC PUBLISHED REPORT (PR180)

July 2013

Our Mission

The mission of the SPC is "to help Pacific island people position themselves to respond effectively to the challenges they face and make informed decisions about their future and the future they wish to leave for the generations that follow.

Our Goal

The goal of the Applied Geoscience and Technology Division is to apply geoscience and technology to realise new opportunities for improving the livelihoods of Pacific communities.

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Important Notice

This report has been produced with the financial assistance of the European Union. The views expressed herein do not necessarily reflect the official opinion of the European Union.

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Acronyms and Abbreviations

AC	Accident
ASM	American Samoa
AUD	Australian Dollar
CC	Climate Change
CCA	Climate Change Adaptation
CCM	Climate Change Mitigation
CE	Complex Disaster
COK	Cook Islands
CW	Cold Wave
DR	Drought
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EM-DAT	International Disaster Database
EP	Epidemic
ETM	East Timor
EQ	Earthquake
FJD	Fiji Dollar
FJI	Fiji
FL	Flood
FR	Fire
FSM	Federated States of Micronesia
GDP	Gross Domestic Product
GUM	Guam
HFA	Hyogo Framework for Action
IP	Internet Protocol
KIR	Kiribati
LA RED	Network of Social Studies in Disaster Prevention in Latin America
LS	Landslide
MHL	Marshall Islands
NCL	New Caledonia
NGDC	National Geophysical Data Center
NIU	Niue
NOAA	National Oceanic and Atmospheric Association
NZD	New Zealand Dollar
OSSO	Corporacion Observatorio Sismológico del Sur Occidente
PCRAFI	Pacific Catastrophe Risk Assessment and Financing Initiative
PDaLo	Pacific Damage and Loss information system
PIC	Pacific Island Country
PDNA	Post Disaster Needs Assessment
PGK	Papua New Guinea Kina
PIFACC	Pacific Islands Framework for Action on Climate Change
PLW	Palau
PNG	Papua New Guinea
PYF	French Polynesia
RFA	Regional Framework for Action
SLB	Solomon Islands
SOPAC	Secretariat of the Pacific Community's Applied Geoscience and Technology Division
SPC	Secretariat of the Pacific Community
SS	Storm Surge
ST	Severe Storm
TC	Tropical Cyclone
TD	Technical Disaster
TKL	Tokelau
TON	Tonga
TOP	Tongan Pa'anga
TS	Tsunami
TUV	Tuvalu
TVD	Tuvalu Dollar
UN	United Nations
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations International Strategy for Disaster Risk Reduction
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USD	United States Dollar
VO	Volcano
VUT	Vanuatu
VUV	Vanuatu Vatu
VVAL	Vanuatu Volcano Alert Level
WLF	Wallis and Futuna
WSM	Western Samoa
WST	West Samoa Ta'la
XPF	South Pacific Franc

Currency Equivalents

CURRENCY UNIT	EXCHANGE RATE TO USD
Fiji – Fiji Dollar (FJD)	FJD1=USD 0.5564
French Polynesia – South Pacific Franc (XPF)	XPF100= USD 0.91
Kiribati – Australian Dollar (AUD)	AUD1= USD 1.0364
Nauru – Australian Dollar (AUD)	AUD1= USD 1.0364
New Caledonia – South Pacific Franc (XPF)	XPF100= USD 0.91
Niue – New Zealand Dollar (NZD)	NZD1= USD 0.847
Papua New Guinea – PNG Kina (PGK)	PGK1= USD 0.461
Samoa – Samoa Ta'la (WST)	WST1= USD 0.495
Solomon Islands – Solomon Islands Dollar (SBD)	SBD1= USD 0.1362
Tokelau – New Zealand Dollar (NZD)	NZD1= USD 0.847
Tonga – Tonga Pa'anga (TOP)	TOP1= USD 0.573
Tuvalu – Tuvalu Dollar (TVD)	TVD1= USD 1.03
Vanuatu – Vanuatu Vatu (VUV)	VT100= USD 0.91

Source: Mid-market rates from XE.com used on 16/04/13 these are indicative only.

Note: RMI, Guam, Palau and Federated States of Micronesia all use USD.

EXECUTIVE SUMMARY

The Pacific Damage and Loss (PDaLo) information system holds 1183 records on events with damage and losses, which have occurred between 1567 and 2013. During this time, 11.8 million people have been affected by disasters causing over 19,000 fatalities.

Those events that have been recorded most frequently are tropical cyclones, earthquakes, tsunamis and floods. Together, these events account for 78 per cent of all events reported.

The highest levels of loss are attributable to tropical cyclones, floods and earthquakes. The total loss of these events is recorded at USD 2.8 billion with tropical cyclones accounting for 86 per cent of the total loss. Volcanic hazards and droughts account for a much smaller proportion of total loss at 9 and 5 per cent, respectively.

It is interesting to note that the events that incur the highest levels of economic loss are not necessarily the events that affect the greatest number of people. Although tropical cyclones have the highest level of recorded loss, droughts have affected greater numbers of people, some 4.6 million, whereas tropical cyclones have affected 4.2 million.

The area of the Pacific that is most susceptible to earthquakes is Melanesia (Papua New Guinea, Solomon Islands, Vanuatu and Fiji), which accounts for 83 per cent of the earthquakes recorded. PNG accounts for 40 per cent of the total number of earthquakes, recorded as 83 earthquakes in total.

The estimated loss from floods is USD 310 million with the majority of floods, 79 per cent, recorded in Fiji and Papua New Guinea. In contrast, droughts have affected 4.6 million people, more than double the amount of people affected by floods. Droughts carry an estimated total loss of USD 155 million with an average loss of USD 38.7 million.

A total of 78 volcanic incidents were captured within the database, these events affecting approximately 388,000 people causing 4,109 fatalities. The events captured required the evacuation of around 106,000 people with 53,000 requiring relocation. The estimated total loss from these events was USD 170 million coming from just three events, creating an average loss of USD 58 million per event. All three of these events occurred in Papua New Guinea in the areas of Manam in the Madang Province and Rabaul in East New Britain.

While there is limited information currently available on disaster impacts across sectors, it is expected that this will improve with consistent reporting going forward. This is a necessary prerequisite for comprehensive disaster assessments from the initial damage assessments to the post disaster needs assessments that develop long-term rehabilitation and recovery plans.

About the Pacific Damage and Loss (PDaLo) information system (DesInventar)

Driven by the lack of systematic, homogeneous and compatible records of disaster typologies and their associated affects, the Network of Social Studies in Disaster Prevention in Latin America (LA RED) initiated the program that is now commonly known as DesInventar. Additional support was received from the United Nations International Strategy for Disaster Risk Reduction (UNISDR), United Nations Development Program (UNDP), Corporacion Observatorio Sismológico del Sur Occidente (OSSO), RobotSearch Software and Apache to further develop software for the two core components, the administration and data entry module and the analysis module.

Two modules have been designed to build capacity to analyse and represent hazards, vulnerabilities, and risks in terms of space and time, both retrospectively and prospectively. The purpose of this capability is the application in risk management, based on activities that go from mitigation to post-disaster attention and recovery.

Qualitative and quantitative evaluation of vulnerability and risk requires a sound base of documents and records, including past, present and future (forecasted) disasters. The basic criteria guiding the system are cited on the website as:

- inventories must use the same variables to measure the effects and a homogeneous and basic classification of events;
- information compiled and processed must be entered in a scale of time and at a geo-referenced spatial level; and
- inventories must be analysed (with computer tools, in this case), which is a basic requirement in comparative research to support decision-making processes related to mitigation actions and risk management as a whole.

The Pacific Damage and Loss information system is also an instrument that allows the user to visualize, in space and time, the hazards that have been compiled, using the Analysis Module or “DesConsultar”.

Note: At present, all figures relating to economic loss are presented in nominal terms based on the time of the reported events and have not been altered to take inflation in to account. Consequently, the real value (the one that takes inflation in to account) is likely to be far higher. Please note that for the purposes of DesInventar, loss is the reported figure of damage from an event. It does not look at losses to economic flows over time. Consequently, the DesInventar terminology differs from that used in post disaster needs assessments (PDNA).

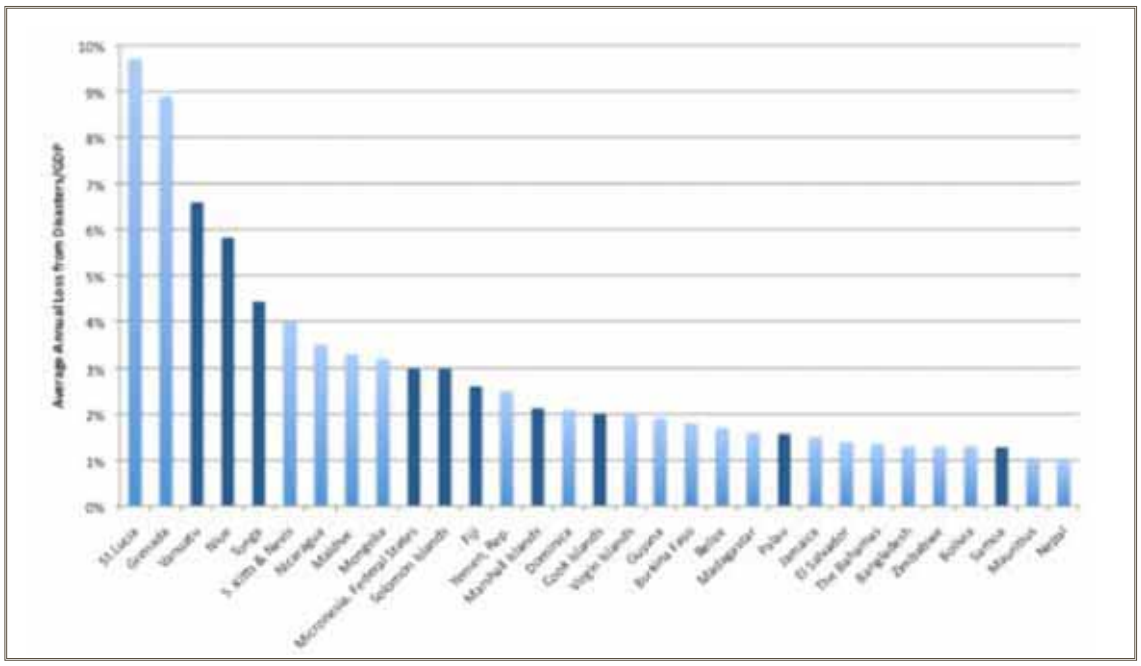
Please also note that the analysis module is a living database and will evolve gradually over time as additional reports from current or past events are added. This means that subsequent reports run by the system may generate different results as additional information is included in the system. Consequently, the figures provided reflect the status of the database at a point in time.

INTRODUCTION

Pacific Islands are highly exposed to adverse natural events (including tropical cyclones, earthquakes, volcanic eruptions, and tsunamis), which can result in disasters affecting their entire economic, human, and physical environment. In turn, this has an adverse impact on their long-term development agenda.

During 2012 to 2013, the Pacific region has experienced several disasters, two severe floods in Fiji, Tropical Cyclone Evan that affected both Samoa and Fiji and the magnitude 8.0 earthquake and subsequent tsunami in the Solomon Islands. Ten Pacific Island Countries (PICs) are in the top 31 list of countries most vulnerable to natural disasters, ranked according to annual expected disaster losses scaled by Gross Domestic Product (GDP). Vanuatu, Niue and Tonga experience the largest average annual losses in terms of GDP with 6.6, 5.8 and 4.4 per cent, respectively. See Figure 1.

Figure 1: Average Annual Loss as a Percentage of GDP



Source: PCRAFI

The Pacific Damage and Loss (PDaLo) information system holds information on 1183 hazardous events that have occurred and caused damage and losses in the Pacific between 1567 and 2013. These events have affected 11.8 million people and resulted in over 19,527 fatalities. The estimated economic cost of these events amounts to USD 3.3 billion[1].

Objective

The objective of this report is to provide analysis of past events held in the PDaLo information system to establish the impacts by hazard that catastrophic events have had on Pacific Island countries.

[1] Please note that all figures cited in this report are the nominal figures stored within the DesInventar system. This means that the real cost of events (i.e. that which takes inflation in to account) is likely to be far higher.

REGIONAL CONTEXT

To address the challenges posed to sustainable national development by the range of natural hazards the region is susceptible to, Pacific leaders approved the Pacific Disaster Risk Reduction and Disaster Management Framework for Action 2005 – 2015 (commonly referred to as the Regional Framework for Action or RFA) and the Pacific Islands Framework for Action on Climate Change 2006 – 2015 (PIFACC) in October 2005. These regional instruments propose a range of activities/investments that aim to strengthen the resilience to disasters and climate change at regional, national and sub-national levels within all PICs. The RFA is the Pacific adaptation of the Hyogo Framework for Action (HFA) 2005 – 2015 that was adopted by 168 governments at the Second World Conference on Disaster Reduction in January 2005. The PIFACC is aligned to the UN Framework Convention on Climate Change (UNFCCC). In addition, the Pacific Plan, which is the overarching strategic development policy document for the Pacific region, emphasizes the need for improved disaster risk management practices and policies to enhance sustainable development.

Increasingly, PICs have recognized the threat of increased disasters posed by the variability stemming from climate-related and geological hazards and have taken initial steps to address disaster and climate risks in an integrated manner. In July 2010, Tonga became the first PIC to finalise a National Action Plan for Climate Change (CC) and Disaster Risk Management (DRM). Since then, a number of other countries have followed suit. 'Joint National Action Plans', as they have come to be known, have since been developed for the Cook Islands and Tuvalu with drafts under development for the Republic of the Marshall Islands, Kiribati and Niue. Fiji, the Federated States of Micronesia, Palau and the Solomon Islands are also considering such an integrated initiative.

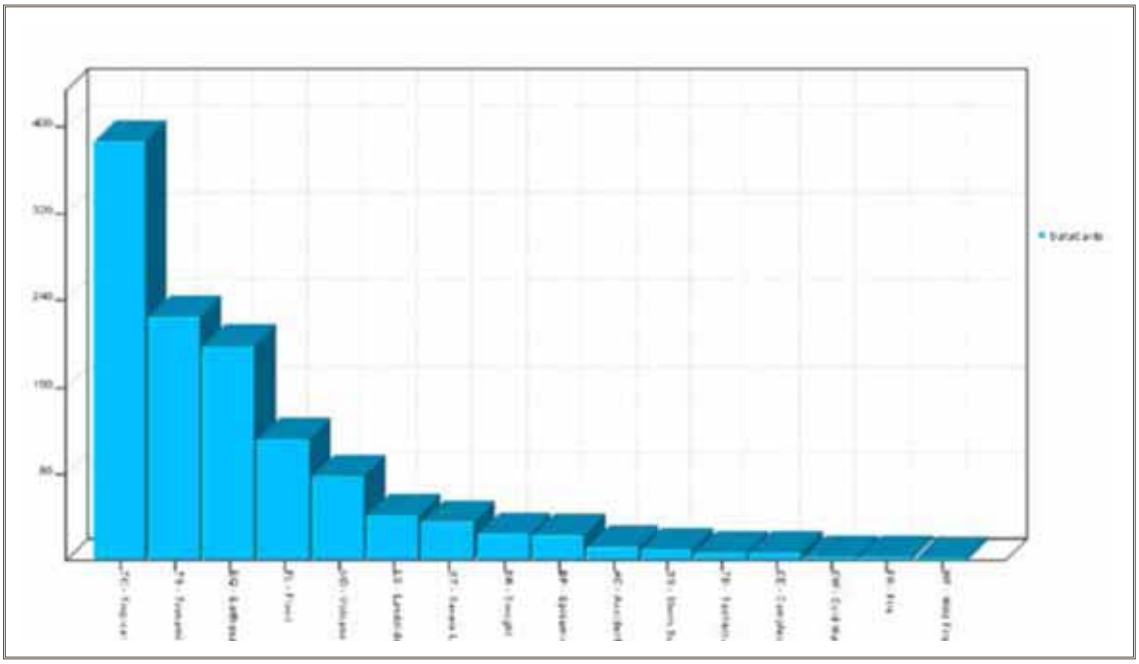
Following the interest shown by countries to have a single national action plan to address the issues of climate change and disaster risk management, a regional approach/process termed the 'Roadmap' has been pursued to develop an integrated Pacific regional strategy for DRM and CC. The Roadmap recognises that a significant body of work has already been undertaken in relation to integration at national level (and is on-going). In addition, it recognizes that there currently are separate regional fora and regional organisations that exist to guide DRM and CC and these are to be respected and maintained to help build capacity and commitment beyond the integration of the frameworks (SPC, 2013). The overall outcome of the Roadmap is that an approved integrated regional framework for DRM, Climate Change Adaptation (CCA) and Climate Change Mitigation (CCM) commences implementation from 2016.

REGIONAL HAZARD PROFILE

The Pacific region is comprised of approximately 20,000 islands spread across an expanse of ocean that accounts for one quarter of the earth's surface water. The geography of the Pacific region is diverse, ranging from small coral atolls only a few metres above sea level to large mountain ranges that can reach 5,642 m above sea level, as in the case of Mount Wilheim in Papua New Guinea.

The Pacific region's geographic composition and location in the "Pacific ring of fire" makes it susceptible to a variety of hazards. Events reported most frequently include 386 Tropical Cyclones (TC), 229 Tsunamis (TS), 198 Earthquakes (EQ), and 112 Floods (FL) (see Figure 2). This equates to 78 per cent of the total events reported.

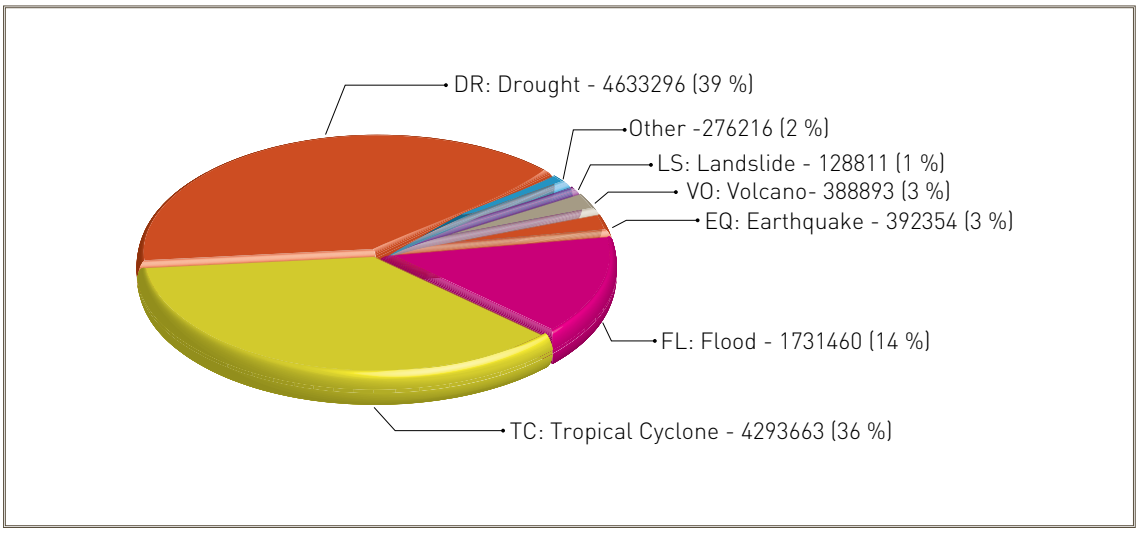
Figure 2: Number of events 1567-2012



Source: DesInventar

The event 'Tropical Cyclone' accounts for the highest proportion of recorded events and, not surprisingly, indicates a significantly high number for 'Affected', which accounts for 43 per cent of the population affected. Over the recorded years, Tropical Cyclones in the Pacific region have affected over 6.7 million people (see Figure 3) and have caused almost 2,000 deaths.

Figure 3: Affected Population by Event 1567-2012

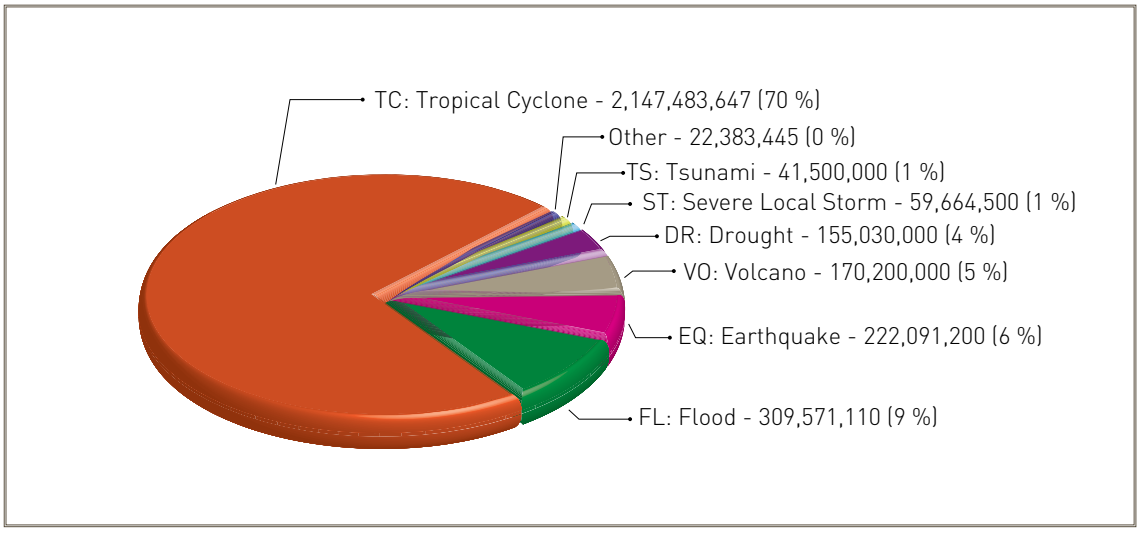


Source: DesInventar

In contrast, droughts have been reported infrequently yet the affected population from these events is 4.6 million people. This accounts for 29 per cent of the total population affected and was the result of only 25 events, demonstrating just how far reaching the effects of slow onset disasters can be.

In terms of economic loss[2], tropical cyclones have cost USD 2.1 billion over the period accounting for 70 per cent of total economic loss. Whereas, droughts have caused losses of USD 155 million, earthquakes and floods have cost approximately USD 222 million and USD 309 million, respectively. These three events equate to 32 per cent of the cost of tropical cyclones and account for 21 per cent of total economic loss (see Figure 4).

Figure 4: Economic Loss by Event 1567-2012



Source: DesInventar

[2] Please note that for the purposes of DesInventar, loss is the reported figure of damage from an event. It does not look at losses to economic flows over time.

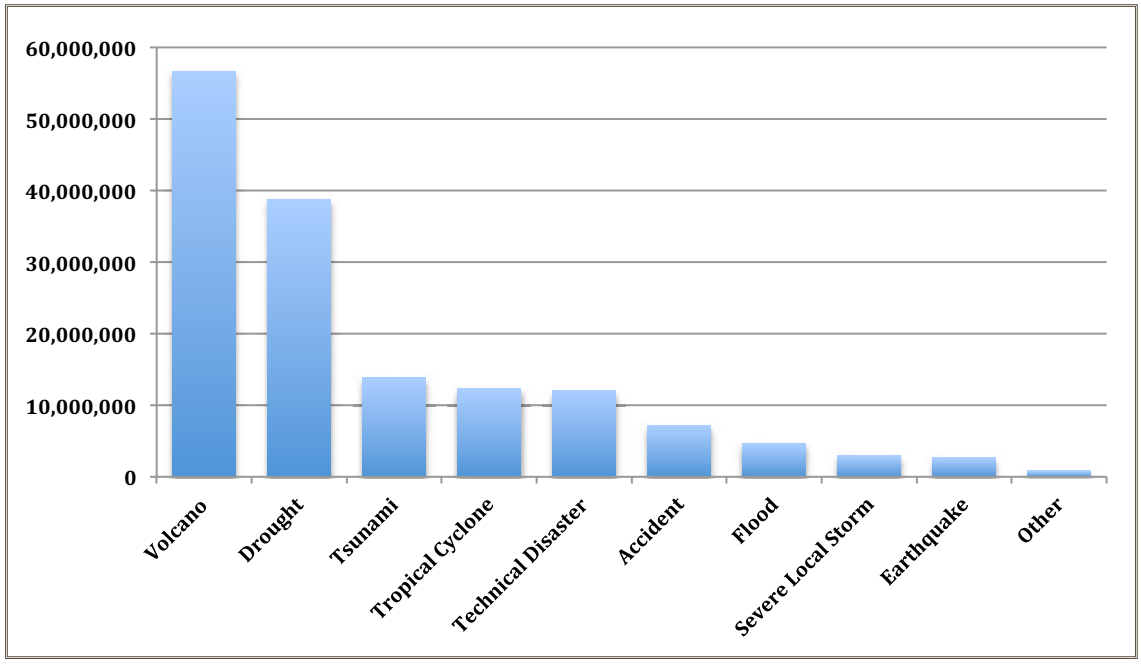
Total economic loss recorded over the period amounts to USD3.3 billion, which generates an average per event loss of USD2.7 million. However, not all of the events captured in the database have economic loss attributed. Only 388 of the 1183 (33 per cent) events recorded provide details on the value of economic loss. This increases the average economic loss to USD8.4 million.

If only 33 per cent of events report an associated cost this means that 67 per cent of events are not valued in any economic way, consequently, it is unlikely that governments will hold enough information to develop effective disaster risk management strategies. If the cost of an event/s is unknown and in which sectors e.g. agriculture or infrastructure it makes it incredibly difficult to build resilience through adequate and appropriate interventions in the future.

Although the effects of disasters may not always be captured quantitatively when looking at events in this way you can begin to estimate the impacts that events may pose to economic development. The economic losses recorded will need to be addressed through a comprehensive recovery and rehabilitation plan and the records of loss provide indicative costs for the development of such plans. Given the limited revenue streams in small islands this can impact on the future economic development of a country. Knowing the cost of past events can help countries establish what they can afford to hold in reserve to respond to future events.

The event which recorded the highest average per event level of economic loss was the volcano which has an average loss of USD56.7 million, demonstrating just how destructive volcanoes can be. In comparison, tropical cyclones had an average economic loss of USD 12.3 million. Droughts have an estimated average economic loss of USD 38.7 million, illustrating the need to better prepare for slow onset disasters. Figure 5 depicts events by the average economic loss of an event with the average ranging from a high of USD 56.7 million for volcano to USD 2.6 million for earthquakes. The category 'other' contains values for storm surge, wild fires, landslides, cold waves and epidemics. No economic losses were recorded for complex emergencies and fires.

Figure 5: Average cost of Event USD



Source: DesInventar

HAZARD IMPACTS

Given the different preparatory and response requirements of the different hazards, the discussion below looks at the most frequent hazards and those that incur the highest level of loss within the Pacific region to try and inform any future strategies for disaster preparedness, response and recovery. A full breakdown of impacts by hazard can be found in Annex 1.

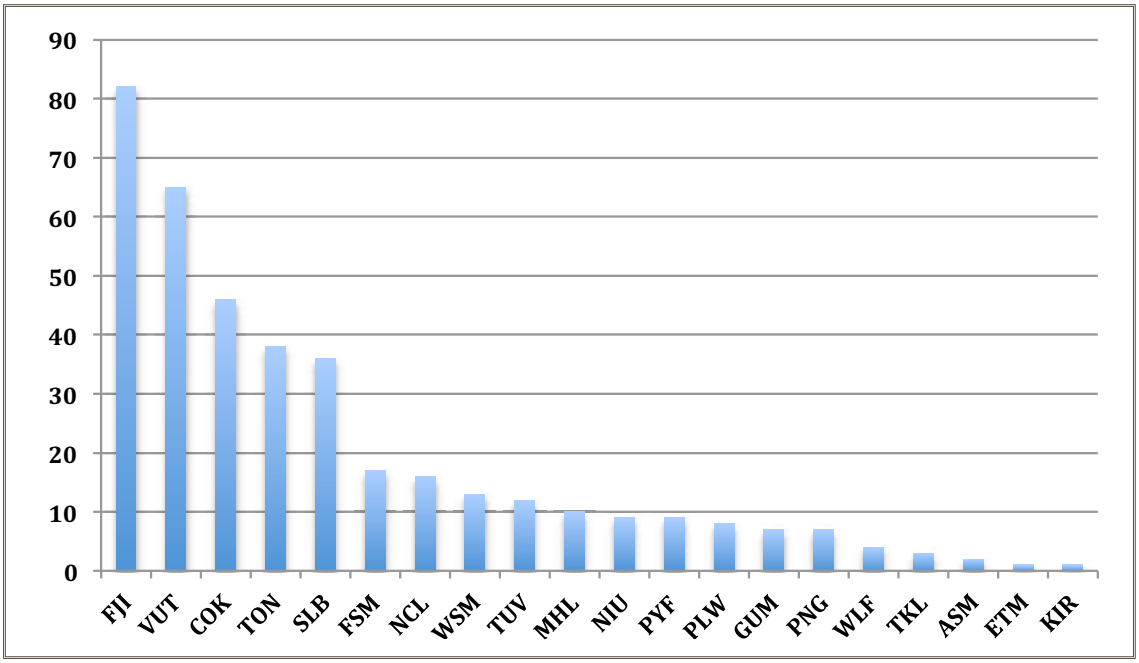
Tropical Cyclones

The Pacific region has experienced 386 cyclones, affecting 4.3 million people and causing 1,873 deaths. Tropical cyclones have a total estimated loss of USD 2.3 billion from 186 events, giving an average loss of USD 12.3 million.

Over the years, cyclones have caused the relocation of 600,000[3] people and evacuations of 41,957 people. These cyclones affected approximately 139,000 homes, which includes 56,997 homes that were completely destroyed.

Fiji and Vanuatu have recorded the highest number of cyclones with 82 and 65 cyclones, respectively. The Cook Islands, Tonga, and the Solomon Islands also recorded high levels of cyclones with 46, 38 and 36 incidents, respectively (see Figure 6).

Figure 6: Number of Tropical Cyclones by Country



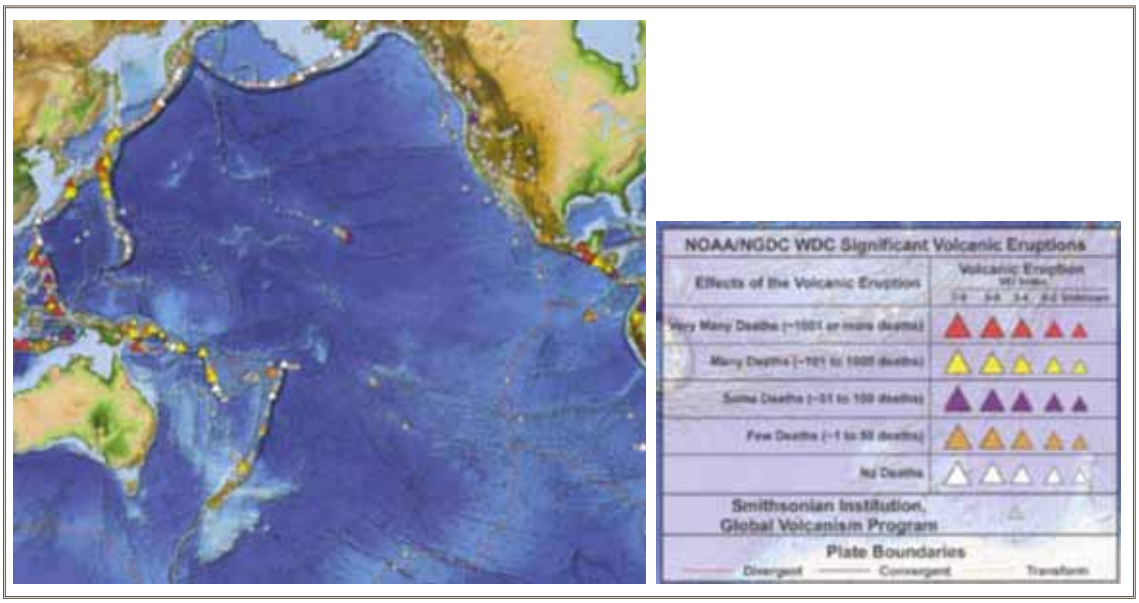
Source: DesInventar

[3] Please note that, at the time of writing numbers for evacuation, it did not include those that were relocated. This is a priority to be modified and will be updated in due course.

Earthquakes and Tsunamis

The Pacific region is located in one of the most seismically active regions in the world, the "Pacific ring of fire" (see Figure 7). The Pacific is located in the Southern section of the "ring of fire" where five smaller tectonic plates collide, sliding underneath or above one another, creating tremors.

Figure 7: Map of the Pacific Ring of Fire depicting significant Volcanic Eruptions (4360-2010)



Source: NOAA/NGDC and SPC-SOPAC

The Pacific Damage and Loss (PDaLo) information system contains information on 199 earthquakes and 229 tsunamis. Although economic losses from both earthquakes and tsunamis can be substantially less, less than half of the earthquakes (83) reported have recorded economic losses. The total loss for these 83 earthquakes is USD 222 million while only three tsunamis have attributed economic losses, amounting to USD41.5 million. This suggests an average per event loss of USD 2.7 million and USD 13.8 million for earthquakes and tsunamis, respectively.

The countries in the Pacific that are most susceptible to earthquakes are Papua New Guinea, Solomon Islands, Vanuatu and Fiji, which accounts for 83 per cent of the earthquakes recorded. PNG accounts for 40 per cent of the total number of earthquakes, recording 83 earthquakes in total.

Earthquakes and tsunamis have affected approximately 450,000 people in the region, damaging approximately 13,600 homes, completely destroying almost 7,000 of them. In addition, these events resulted in the relocation of around 72,600 people.

In September 2009, a magnitude 8.0 earthquake affected Samoa with its epicenter 190 km south of the Samoan capital of Apia. This was followed 20 minutes later by two tsunami waves that impacted American Samoa, The Independent State of Samoa, and the small northern island of Niuatoputapu in the Kingdom of Tonga. The total value of the disaster effects caused by the tsunami in Samoa is estimated at USD 124.04 million, equivalent to 22 per cent of Samoa's GDP.

More recently in February 2013, a magnitude 8.0 earthquake and subsequent tsunami were experienced in Santa Cruz, Solomon Islands, affecting 37 per cent of its residing population. The subsequent Humanitarian Action Plan developed by national stakeholders with the support of United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) and other humanitarian partners estimated the response and recovery costs to be in the region of USD 9.4 million. The Santa Cruz earthquake drained the annual budget for the National Disaster Management Office and used the majority of the national contingency budget.

These two events demonstrate how sudden, devastating and costly these events can be to the residing population.

Floods

The Pacific has experienced 112 floods, affecting 1.7 million people across the region and causing 685 fatalities. These floods have damaged approximately 24,000 homes completely destroying 6,000 of them. It is estimated that 289,000 people have been relocated following floods.

The estimated loss from floods is USD 310 million with an average event cost of USD 2.8 million however, only 67 flood records have an attributed cost which increases the average cost of a flood to USD 4.6 million. The majority of floods, 79 per cent, occurred in Fiji and Papua New Guinea. This is particularly distressing for Fiji given the economy's heavy agriculture base driven by sugar production, where the quality of sugar produced is particularly susceptible to water inundation.

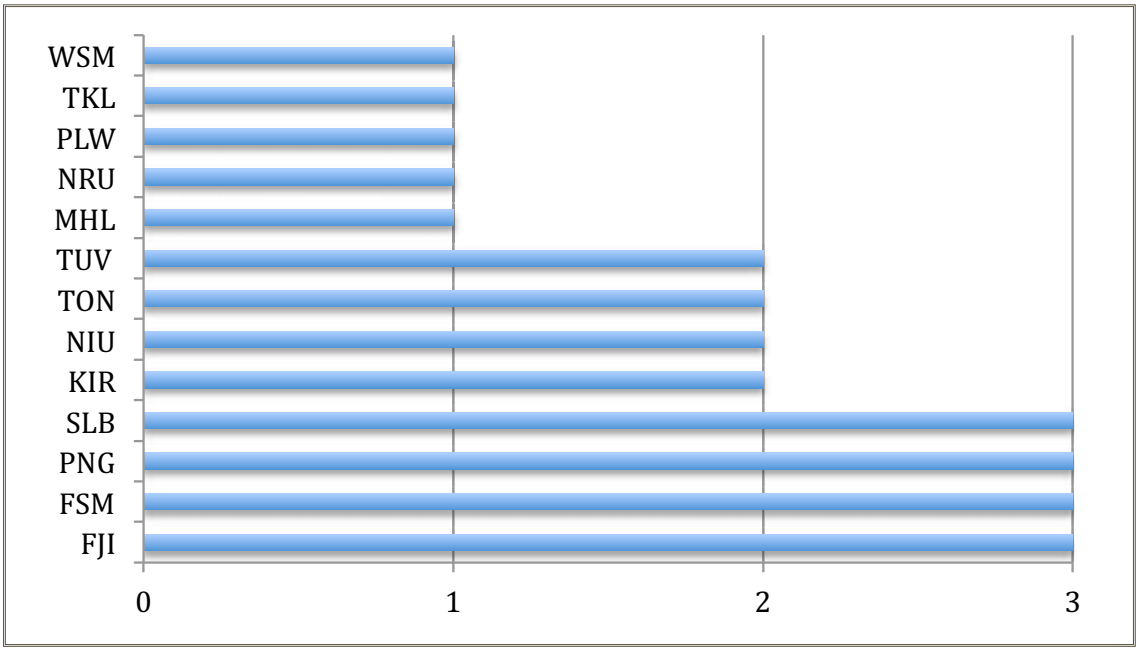
Floods can have many indirect impacts on agricultural production such as soil degradation that will reduce future production levels, impacting on rural communities whose livelihoods are dependent on small-scale crop production. In addition, flooding has several sub-hazards such as landslides which can be increased by changes to the land use planning activities, such as deforestation which will increase the likelihood of these events.

In 2012, Fiji experienced two severe floods, affecting the areas of Ra, Tavua, Ba, Lautoka, Nadi, Nadroga, Sigatoka, and Rewa. These events caused five fatalities and affected around 14,000 people, with approximately 12,000 people staying in evacuation centres at some point during the floods. The Government of Fiji estimated that the damage from the 2012 floods was USD 36 million. All of the costs that were calculated by Government will be borne by the Government, which will result in a reallocation of the national budget and delays to previously planned development projects until the following fiscal year or later. It is possible that these costs could have been even higher had the Government not allocated USD 24 million from the national budget for investment in drainage during the 2010 fiscal year.

Droughts

Although a relatively low number, 25 drought events recorded have carried high losses with a total estimated 4.6 million people affected, more than double the amount of people affected by floods. Droughts carry an estimated total loss of USD 155 million, however, only four droughts recorded losses, raising the average cost of droughts to USD 39 million.

Figure 8: Number of Droughts by Country



Source: DesInventar

The impact of droughts can be more severe because of factors such as social vulnerability. Poor management of water resources can result in a drought, even in times where there has been no deviation from normal rainfall levels.

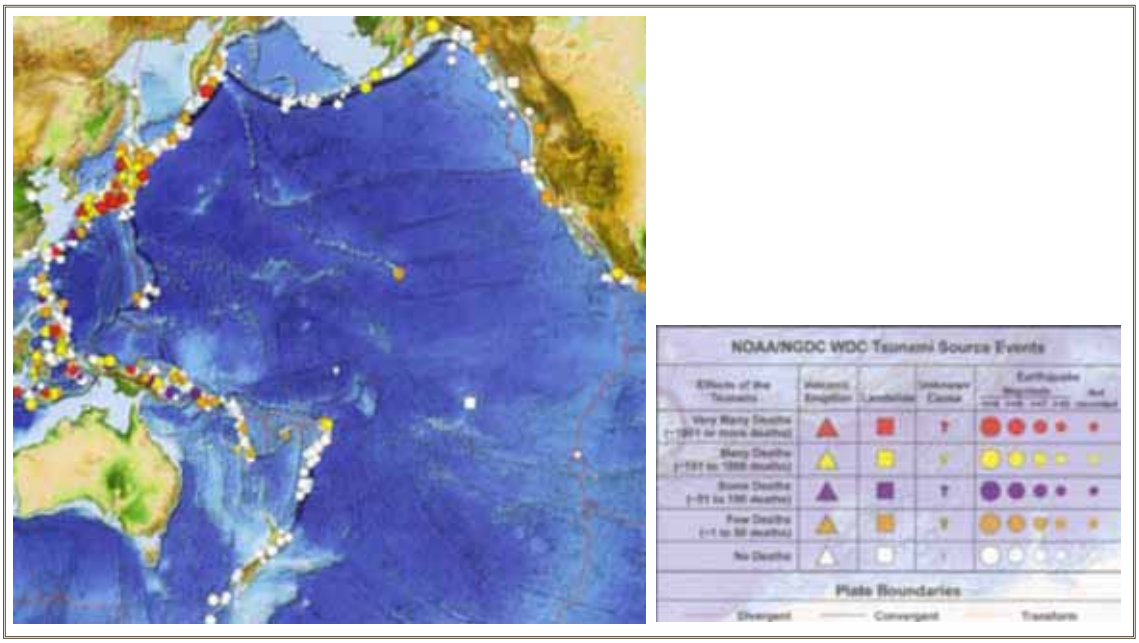
Droughts have affected the majority of countries in the region at least once (see Figure 8). However, the slow onset nature of these events means that the economic impacts of these events can be difficult to quantify.

In 2011, there was a severe drought in Tuvalu caused by a prolonged period of dry weather, primarily affecting the residents of Nukulaelae and Funafuti. The residents of Nukulaelae were subject to water rationing of 40 litres a day. The main crop pulaka, or swamp taro, was heavily affected by the drought. Combined with the adverse health effects experienced, this event was detrimental to the inhabitants of both atolls.

Volcanoes

Volcanoes produce a long subset of secondary hazards such as, molten lava, large quantities of ash, noxious gases, which can create acid rain and sometimes result in landslides. Five countries (American Samoa, Tonga, Papua New Guinea, Solomon Islands and Vanuatu) have reported volcanic activity, either in the form of an eruption or significant levels of ash that has resulted in the relocation of villages and towns. The Pacific ring of fire contains over 450 volcanoes; approximately 75 per cent of the world's volcanoes. Figure 9 depicts volcanic events in the Pacific ring of fire from 1650-2010.

Figure 9: Earthquakes, Volcanic Eruptions, Landslides and other causes in the Pacific (1650 – 2010)



Source: NOAA/NGDC and SPC-SOPAC

A total of 78 volcanic incidents were captured within the database, these events affecting approximately 388,000 people causing 4,109 fatalities. The events captured required the evacuation of around 106,000 people with 53,000 requiring relocation. The estimated total loss from these events was USD 170 million, resulting from just three events, creating an average loss of USD 58 million per event. All three of these events occurred in Papua New Guinea in the areas of Manam in the Madang province and Rabaul in East New Britain. The two events in East New Britain accounted for almost all of the total loss recorded with estimated loss of USD110 million and USD60 million. These two events essentially buried the town of

Rabaul beneath a carpet of ash which destroyed 80 per cent of the building stock. These events resulted in the relocation of the provincial capital from Rabaul (which is built on the caldera of the volcano) to Kokopo.

Although volcanic events are relatively low in number, the effects can be drastically life-changing for those living around the volcano. Given the variety of hazards that a volcano can produce, there is a need for constant monitoring and the provision of timely information to ensure adequate response. Response activities for volcanoes need to be executed quickly with little advance warning and can be costly. For example, a contingency plan has been developed for Gaua Island, Vanuatu with associated costs of USD 5.9 million. This island in the north of Vanuatu has been experiencing increasingly high levels of volcanic activity and, as a result, a contingency plan has been put in place should the Vanuatu Volcano Alert Level (VVAL) increase to level 3. This would warrant the whole island of 2,700 people relocating to pick-up points for evacuation at level 4. It is assumed that there is quick progression between levels 3 and 4 since there are no safe areas on the island. This emphasises the importance of quick and easy access to funds (SOPAC 2010).

DISASTER IMPACTS BY SECTOR

There is no doubt that the Pacific Damage and Loss (PDaLo) information system contains a wealth of information on past events in the Pacific. Unfortunately, it is not yet possible to look at the detailed impacts on different sectors caused by the different types of hazard. Given that disasters have been reported in a periodic nature, it seems that the region is dependent on one or two people with a real interest in the subject area providing information, which when they leave their position and/or country behind, the reporting stops. The reports have also had an inconsistent format over time, which creates difficulty when trying to compare events over; however, there has been a great deal of improvement that has happened in recent years, although further work is still required. For example, to align initial damage assessments to the data requirements of the Post Disaster Needs Assessment (PDNA) and to continue work on national level with damage and loss databases using the same (DesInventar) system. This would help to strengthen the understanding of disaster impacts and trends over time and inform preparedness and prevention.

GROWING DEMAND FOR INFORMATION ON DISASTERS

Growing Demand for Information on Disasters

In line with the rest of the world, the Pacific is experiencing an increase in demand for information on disasters. This interest is partly driven by the expected increase in catastrophic events as a result of climate change and also the desire to better understand the impacts of past events.

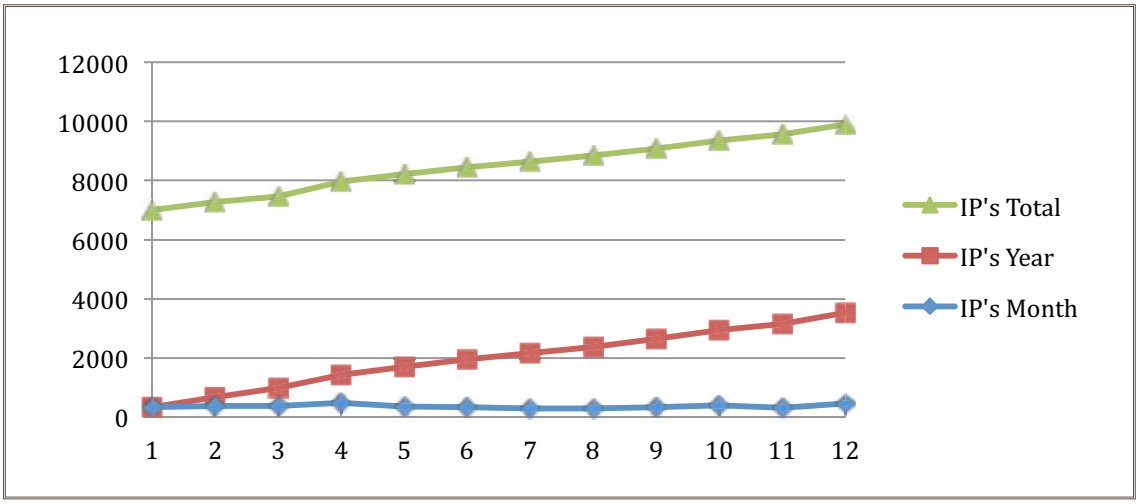
To date, the Pacific has conducted three Post Disaster Needs Assessments (PDNAs), which generate thorough assessments of the impacts of a disaster by sector to develop an informed plan for recovery. In the future, it is expected that more PDNAs will be conducted which will require access to good baseline data in a timely fashion to aid the assessment process.

There is a two-way relationship between PDNA and DesInventar. First, the PDaLo information system will allow those parties involved in a PDNA to quickly access and generate reports to establish impacts from similar hazardous events in the past and to develop the necessary baseline required. Second, the new information collected from the PDNA which provides details of economic impacts by sector can be fed in to the PDaLo system, ensuring that the system contains the latest available information and reflects the breadth of effects from the latest hazardous events experienced in the Pacific region.

The most comprehensive and extensive source of information on past disasters is contained in Pacific Disaster Net (PDN). The Pacific Damage and Loss (PDaLo) information system utilizes the information contained within PDN and further draws the focus of this information in, aggregating the regional details of unique disasters, highlighting the damages and losses for over 1,100 individual events. The analysis tool or DesConsultar gives the user the ability to analyse and assess the damages and losses of these events to produce real data that can inform precautionary polices and measures for Pacific nations in the hopes of saving lives and economies.

PDN is an established online information portal, which hosts situation reports, real time updates, articles and reports on disaster risk management in the Pacific region. Since its inception in 2006, it has seen a marked increase in its use, averaging 262 new unique IP (Internet Protocol) addresses each month and in 2012 it received an average of 366 unique IP addresses per month (See Figure 10). For many people, it is the first port of call for information on disasters in the Pacific and its increased use demonstrates that this is a subject area which people are becoming increasingly interested in.

Figure 10: PDN Unique IP Addresses Access - Total 2012



FUTURE CONSIDERATIONS

There are many assessments of hazardous events past, present and increasingly attempts are being made to model the impacts from hazardous events that may occur in the future. In light of this the following, three simple considerations have been included in order that the Pacific can continue to progress in aligning these assessments, enabling users to analyse the information in a consistent fashion.

- **Development of real time comparison.** This relates to the economic cost of an event. When looking at a series of events over time, it is important that inflation is taken in to account in order to be able to establish the impact of a disaster in today's terms. This removes any difference in pricing over time, allowing for a more accurate comparison and, in this case, better-informed planning for response and rehabilitation.
- **Encourage use of existing post disaster assessment methodologies.** This will help to create consistency and provide information to build resilience through adequate and appropriate interventions in the future. Given that only 33 per cent of past events have been assessed in economic terms, suggests that countries will require various degrees of support from development partners with expertise in these areas.
- **Create a feedback loop between assessments and the Pacific Damage and Loss (PDaLo) information system.** The establishment of national DesInventar systems provides an opportunity to standardise the collection of post event impact information, according to the needs of the various assessment methodologies. These national systems should feed in to the regional system and any other systems like PCRAFI which create future impact assessments for selected hazards. This will ensure that governments have access to consistent and up-to-date information to inform their disaster risk management strategies.

CONCLUSION

The Pacific Damage and Loss (PDaLo) information system provides details on 1183 events with damage and losses, which have occurred in the Pacific Islands region between 1567 and 2013. During this time 11.8 million people have been affected by disasters, causing over 19,000 fatalities.

Those events that have been recorded most frequently are: tropical cyclones, earthquakes, tsunamis and floods. Together, these events account for 78 per cent of all events reported.

The events that have recorded the highest levels of loss are tropical cyclones, floods and earthquakes. The total loss of these events is recorded at USD 2.8 billion with tropical cyclones accounting for 86 per cent of the total loss. Volcanic hazards and droughts account for a much smaller proportion of total loss at 9 and 5 per cent, respectively.

The events that incur the highest levels of economic loss are not necessarily the events that affect the greatest number of people. Although tropical cyclones have the highest level of recorded loss, droughts have affected greater numbers of people, some 4.6 million, whereas tropical cyclones have affected 4.2 million.

This paper analysed the information available in the PDaLo information system to provide analysis of past events and to establish the impacts by hazard that catastrophic events have had on Pacific Island countries. Following the analysis, it is clear that, although we cannot predict when the next hazardous event will occur, this does not lessen the need for continued investment in DRM, in particular investing in systems and people to manage the information. At present, the Pacific region is constrained by the lack of information professionals to manage content, information and knowledge.

In order for concrete economic arguments to be developed in support of investment in Disaster Risk Reduction (DRR) DRM data must be available in a consistent format to sustain this analysis. Currently, there are several sources of disaster information, containing limited information and there are often discrepancies between them. It will be important, for the sake of sustainable development and effective disaster risk reduction and response, to obtain more uniform and consistent data.

It is important that investment in sustainable development in disaster risk reduction is made now before the next event occurs and therefore, preventing any unnecessary loss of life or livelihoods.

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ANNEX 1: DISASTER IMPACTS BY HAZARD

EVENT	DATACARDS	DEATHS	INJURED	MISSING	HOUSES DESTROYED	HOUSES DAMAGED	VICTIMS	AFFECTED	RELOCATED	EVACUATED	LOSSES USD
AC - Accident	13	179						12,004			
TD - Technical Disaster	8	332						463			19,200,000
CE - Complex Emergency	8	64					184	60,350			
CW - Cold Wave	4	22						12,580			560,000
DR - Drought	25	441						4,633,296			155,030,000
EP - Epidemic	24	479						29,240			91,796
EQ - Earthquake	199	6,599	1,988		5,170	2,792	183,720	392,354	54,360	10	222,091,200
FL - Flood	112	627	15	8	6,327	17,268	846,106	1,731,460	289,677	5,619	309,962,110
FR - Fire	4							16			
LS - Landslide	42	776	57	65	650	24	43,080	128,811	27,000	100	1,400,000
SS - Storm Surge	12	1			4,417	4,424	68,185	80,485	65,100		1,050,000
ST - Severe Local Storm	36	515	1			1,011	13,571	23,701	9,200		59,664,500
TC - Tropical Cyclone	386	1,873	875	4	56,997	82,370	2,480,247	4,293,663	600,763	41,957	2,289,433,535
TS - Tsunami	229	3,510	1,020	528	1,826	3,813	1,600	56,186	18,308	6,500	41,500,000
VO - Volcano	78	4,109						388,893	53,070	105,621	170,200,000
WF - Wild Fires	3							1,100			31,650
TOTAL	**1,183**	**19,527**	**3,956**	**605**	**75,387**	**111,702**	**3,636,693**	**11,844,602**	**1,117,478**	**159,807**	**3,270,214,791**

Source: Pacific Damage and Loss (PDaLo) information system