

**SOPAC Member Countries  
National Capacity Assessments:  
Tsunami Warning and Mitigation Systems**

**Niue**



Niue



***SOPAC***

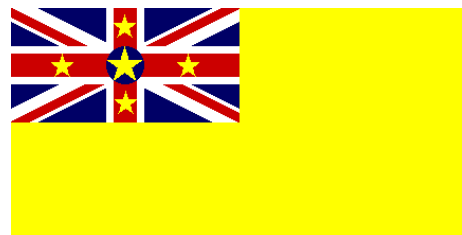




# SOPAC Member Countries National Capacity Assessments: Tsunami Warning and Mitigation Systems

Niue

Alofi, 25 – 28 May 2009



**SOPAC**



## Document Control

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## Acronyms

ATWS	Australian Tsunami Warning System
AusAID	Australian Agency for International Development
BCN	Broadcasting Corporation of Niue (also known as Niue Broadcasting Corporation) Operates Sunshine Radio and Niue TV
Bureau	Australian Bureau of Meteorology Bureau
D	Document (e.g. Document 39 = D39)
DFAT	Australian Department of Foreign Affairs and Trade
DJLS	Department of Justice, Lands & Survey (Niue)
DPMA	Disaster Preparedness & Mitigation Assessment (US army)
EEG	Emergency Executive Group, sub set of NDC (Niue)
EMA	Emergency Management Australia (now defunct)
EMWIN	Emergency Managers Weather Information Network
EOP	Emergency Operating Procedures (Niue)
FM	Frequency Modulated
GA	Geoscience Australia
GEMS	Global Environmental Modelling Systems Pty Ltd (Australia)
GMDSS	Global Maritime Distress and Safety System
GNS	GNS Science, Institute of Geological and Nuclear Sciences (NZ)
GTS	Global Telecommunications System
HF	High Frequency
ICG	Intergovernmental Coordination Group
IOC	Intergovernmental Oceanographic Commission
ISDR	International Strategy for Disaster Reduction
ISO	Information Systems Office (Niue)
ISOC	Internet Society
ITIC	International Tsunami Information Centre
ITSU	ICG for the Tsunami Warning System in the Pacific
IUSN	Internet Users Society Niue (Niue) – Local ISP refer ROCKET
JICA	Japan International Cooperation Agency
LEMA	Local Emergency Management Authority
LRIT	Long Range Identification and Tracking system
MCDEM	Ministry of Civil Defence and Emergency Management (NZ)
MoU	Memorandum of Understanding
NDC	National Disaster Council (Niue)
NDP	National Disaster Plan (Niue)
NGOs	Non-Government Organisations
NISP	Niue Island Strategic Plan
NNDP	Niue National Disaster Plan (Also NDP)
NZRAF	New Zealand Royal Air Force
PEMO	Police Emergency Management Officer (Niue)
PDC	Pacific Disaster Centre
PGSP	Pacific Governance Support Programme
PICs	Pacific Island Countries



## Acronyms (Continued)

PSC	Public Service Commission (Niue)
PTWC	Pacific Tsunami Warning Centre
PTWS	Pacific Tsunami Warning and Mitigation System
PWD	Public Works Department (Niue)
RANET	Radio and Internet for the Communication of Hydro-Meteorological Information for Rural Development
ROCKET	Niue Internet Service Provider
RSMC	Regional Specialised Meteorological Centre (Nadi Fiji)
SERMP	Suva Earthquake Risk Management Scenario Pilot Project
SMS	Short Message Service
SOPAC	Pacific Islands Applied Geoscience Commission
SOPs	Standard Operating Procedures
SPSLCMP	South Pacific Sea Level and Climate Monitoring Project
SWPWG	Southwest Pacific Working Group
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
USP	University of the South Pacific (Niue)
UTC	Coordinated Universal Time
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal
WMO	World Meteorological Organisation





# 1. Results Outline



# 1. Results Outline

## 1.1. Executive Summary

The National Capacity Assessment of Pacific Islands Applied Geoscience Commission (SOPAC) Member Countries: Tsunami Warning and Mitigation Systems project aims to work in collaboration with the member countries of SOPAC to assess their capacity to receive, communicate and respond effectively to tsunami warnings. The Tsunami Capacity Assessment of the ability of Niue to receive, communicate and effectively respond to tsunami warnings took place in a workshop held from 25 – 28 May 2009 in Alofi, Niue.

The workshop was facilitated by a team of visiting experts and attended by some 25 Niue Government agency representatives, Non-Government Organisations (NGOs), international organisations and the private sector to discuss key areas of tsunami warning and mitigation in Niue by completing a comprehensive questionnaire in session, presentations and site visits.

As well as outlining Niue's current status, strengths and opportunities for improvement with regard to tsunami warning and mitigation, a list of recommendations were formulated by the visiting assessment team in consultation with national participants. The aim of these recommendations is to guide further capacity development programs to target improvements in Niue's tsunami warning and mitigation system.

It has been noted that the 'initial impression would suggest that the 20-40 m cliffs provided a significant barrier to inundation by storm surge or tsunami. However, Tropical Cyclone (TC) Heta demonstrated that given the correct conditions storm surge could ramp up and overtop the cliffs. Substantial damage was caused to coastal property and infrastructure and the sea tracks on the coastal terraces' (Pearce 2007). 'Historical accounts show recorded effects of tsunami so far have been small with little recorded damage. The highest recorded event was 21 cm amplitude (42cm peak-to-trough) for the 4 May 2006 tsunami. This had an arrival time in Niue 33 minutes after the earthquake and 21 minutes after the first PTWC warning was issued. Travel times to Niue from a Tonga Trench event would be very short, providing minimal opportunity for formal warnings to be issued' (Pearce 2007). Warne (2009) however does note that the slightly more distant threats are the New Hebrides, South Solomon and Puysgur Trenches. There are a number of distant threats to the west and north of the Niue including the Kuril Islands, Russia, Alaska and South America can also impact these Islands from the Papua Trench.

Niue has a Public Emergency Act 1979 (D5) that makes a broad provision for formulation and implementation of disaster management policies and structures at a national level. There is also a National Disaster Management Plan 2008 (NNDP) (D1) that articulates the roles and responsibilities of the National Disaster Centre (NDC) as the central coordinator for all hazards. These all provide a sound foundation for the enhancement of the tsunami warning and disaster management system.

The visiting team and workshop participants concluded that the highest priority and a significant first step, towards enhancing the tsunami warning and disaster management system, is the clarification of the responsibilities and authorities for the receipt and dissemination of tsunami warnings through the legislative process. That is, inclusion in the Public Emergency Act 1979 and adoption and ratification of a proposed Meteorological Act.

The visiting team also noted that Niue should be congratulated on their proactive and committed approach to improving disaster management arrangements.

Participants in the workshop stated a number of urgent priority areas that need to be addressed and these are presented in Table 2 below.

The Niue workshop participants are encouraged to use this National Tsunami Capacity Assessment report to guide both national projects and aid funded projects to achieve targeted improvements on the Niue tsunami warning and mitigation system. In turn, this will assist in improving systems for other natural hazards such as earthquakes and cyclones. Contingent on the availability of human and financial resources, the Australian Bureau of Meteorology (Bureau) and project partners will aim to work with potential donors to bring the findings of this project to their attention on a country and regional scale. This will be done in the hope of further capacity development projects being undertaken.

## 1.2. Recommendations (including priority and resource intensity)

Table 2 outlines the priority and resource intensity for recommendations made to improve Niue’s tsunami warning and mitigation system. Both the priority and resource intensity are based on the consensus of the visiting Tsunami Capacity Assessment team after discussions held within the Tsunami Capacity Assessment Workshop. It is recognised that these rankings may not reflect the opinions of all individuals involved in the workshop as priorities vary depending on personal responsibilities and areas of interest. Each recommendation is important in its own right to achieve holistic improvements in Niue’s tsunami warning and mitigation system.

The priority ranking and resource intensity scale used as a basis for allocating a priority and resource intensity to each recommendation is explained in Table 1. The Very High priority recommendations should be seriously considered as requiring urgent completion. Low resource intensity recommendations are considered the ‘low-hanging fruit’ that are achievable with very few additional resources.

**Table 1: Priority ranking and resource intensity scale**

PRIORITY	RESOURCE INTENSITY
<b>Very High</b>	<b>Low</b> – Recommendation currently being progressed or could possibly be progressed within the capacity of existing in-country resources (funds and staff).
<b>High</b>	<b>Medium</b> – Recommendation could be progressed by existing staff or with a low to moderate number of additional staff and/or expertise and a moderate level of additional in-country funds. May or may not require external funding.
<b>Medium</b>	<b>High</b> – Recommendation would require a high level of additional staff and/or expertise and funds. External funding support is likely to be required.
<b>Low</b>	<b>Very High</b> – Recommendation would require a very high level of additional staff and funds. External funding support will be required.

**Table 2: Priority and anticipated resource intensity for completion of recommendations made for improving Niue’s tsunami warning and mitigation system.**

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
Very High	Ensure the distribution of the NNDP to all key stakeholders.	Low	Communications	Multi-hazard	13
Very High	Clarify the responsibilities and authorities for the receipt and dissemination of tsunami warnings through the legislative process. E.g: inclusion in the Public Emergency Act 1979 and adoption and ratification of a proposed Meteorological Act.	Low	Governance and Coordination	Tsunami	2
Very High	Formally endorse Telecom as a 24/7 back-up to emergency management operations and in particular, for the receipt of tsunami warnings and dissemination.	Low	Tsunami warnings	Multi-hazard	7
Very High	The provision of a satellite phone to the tsunami warning contact focal point or their delegate that will enable the 24/7 receipt of tsunami warnings from the PTWC via SMS.	Low	Tsunami warnings	Tsunami	9
Very High	In consultation with the village councils identify evacuation routes and procedures and where applicable develop signage, maps and conduct risk assessments.	Medium	Tsunami Emergency Response	Tsunami	19
Very High	Develop all-hazard village emergency plans as a sub-plan of the NNDP and conduct regular exercising and testing of the plan.	Medium	Tsunami Emergency Response	Tsunami	20
Very High	Schedule and conduct regular exercising/testing of the NNDP.	Medium	Tsunami Emergency Response	Multi-hazard	18
Very High	Development of appropriate educational/awareness programs focused on enhancing the community’s knowledge and awareness of multi-hazard events and in particular tsunami.	High	Public and Stakeholder Awareness and Education	Multi-hazard	24



Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
Very High	Provide staffing levels that will enable the Meteorological Service to provide an appropriate 24/7 tsunami and multi-hazard response, whilst enhancing the overall provision of Meteorological Services to the Niue community.	High	Tsunami warnings	Multi-hazard	6
Very High	Develop the capacity within the Government of Niue, including but not restricted to Police, Meteorology and Telecom, through the provision of emergency management education, training, planning and Standard Operating Procedures (SOPs).	High	Tsunami Emergency Response	Multi-hazard	17
Very High	Ensure the provision of an external reliable non-break mains power supply to all tsunami warning agencies.	High	Tsunami warnings	Multi-hazard	10
Very High	Establish an all hazard risk profile for all sectors of the community of Niue that identifies the risk to the population, critical infrastructure including lifelines (water, power, and communications) and in particular those elements at risk from wave impact.	High	Tsunami Hazard, Vulnerability, Risk and Mitigation	Multi-hazard	23
High	Ratify the Meteorological Service as the official receiver and disseminator of tsunami warnings underpinned by a Meteorological Act.	Low	Governance and Coordination	Tsunami	3
High	NDC to develop a procedure that ensures the community receives the correct and timely information during any emergency including tsunami events.	Low	Communications	Multi-hazard	16
High	The development of an alternative communications and or broadcasting system to provide redundancy in the event of failure during an emergency event.	Medium	Communications	Multi-hazard	14
High	The reinstatement of the Aeronautical Fixed Telecommunications Network (AFTN) system for all relevant stakeholders.	Medium	Communications	Multi-hazard	15

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
High	Review and complete the current Niue National Disaster Plan (NNDP) in line with recognised international concepts and standards and develop a tsunami specific contingency plan. Ensure the tsunami contingency plan articulates a comprehensive decision-making process (flow diagram) for the receipt and dissemination of a tsunami warning.	High	Governance and Coordination	Multi-hazard	1
High	The realisation of the draft Niue Integrated Strategic Plan (NISP) in reference to the full resourcing of the Meteorological Service to enable timely provision of weather services to the community.	High	Tsunami warnings	Multi-hazard	12
High	To provide comprehensive tsunami awareness training to Police, Telecom and Meteorological staff combined with the development of Standard Operating Procedures (SOPs) for tsunami information dissemination to the community.	High	Tsunami warnings	Tsunami	8
Medium	The installation of appropriately signed roadway barriers at the highest entry points to the Sir Roberts Wharf and other identified sea access points to restrict pedestrian and vehicular entry in times of emergency.	Low	Tsunami Emergency Response	Multi-hazard	21
Medium	Niue to seek membership of the International Oceanographic Commission (IOC) to actively participate in the Intergovernmental Coordination Group of the PTWS and the Southwest Pacific Tsunami Working Group (SWPWG).	Low	Regional and International Coordination	Tsunami	4
Medium	The ongoing participation in the international monitoring of tsunami instrumentation whilst ensuring data products are provided to Niue.	Low	Tsunami Monitoring Infrastructure	Tsunami	5
Medium	To pursue the provision of a graphical based tsunami warning product from the PTWC.	Low	Tsunami warnings	Tsunami	11

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
Medium	Recognise and promote the traditional knowledge of tsunami and multi-hazard events.	Low	Public and Stakeholder Awareness and Education	Multi-hazard	25
Medium	Conduct inundation modelling to identify the tsunami hazard and elements at risk for given extreme scenarios.	Very High	Tsunami Hazard, Vulnerability, Risk and Mitigation	Tsunami	22





## 2. Project Background



## 2. Project Background

### 2.1. About the Project

The National Capacity Assessment of SOPAC Member Countries: Tsunami Warning and Mitigation Systems project aims to work in collaboration with the member countries of SOPAC to assess their capacity to prepare for, receive, communicate and respond effectively to tsunami warnings. The Australian Bureau is the lead implementing agency, in partnership with the Australian Attorney-General's Department (AGD), (formerly Emergency Management Australia (EMA)), SOPAC, and with the assistance of the Intergovernmental Oceanographic Commission (IOC) a division of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The project is funded by the Australian Agency for International Development (AusAID) under the Pacific Governance Support Programme (PGSP). It is implemented under an agreement (Schedule 5 to the Record of Understanding 14304, June 2006) between AusAID and the Australian Bureau). The fourteen SOPAC member countries participating in the project are the Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu.

### 2.2. Broad Project Aim

By undertaking an assessment of the capacity of individual nations to manage tsunami events, the project aims to better guide donor funding towards achieving targeted improvements in the tsunami warning and mitigation systems in the respective countries.

### 2.3. Key Project Output

The key deliverable of the project is a comprehensive set of reports, including one National Report specific to each country, detailing the strengths and opportunities for improvement of the country with regard to tsunami warning and mitigation. The National Report for each country also includes recommendations to address priority issues. These reports will then feed into a consolidated Regional Report that will aim to identify common issues across the Region with regard to tsunami warnings and mitigation.

### 2.4. Project Methodology

National assessments in each SOPAC member country are conducted by visiting teams including experts in the fields of tsunami warnings, emergency management, disaster risk reduction and data and warning communications. The visiting team meets with in-country experts during a four-day workshop involving government agencies, the private sector, NGOs and regional and international organisations involved in tsunami and disaster risk management.

The workshop aims to complete a questionnaire covering all aspects of tsunami warning and mitigation and gather information to support questionnaire responses. This information then

feeds into the National Report. Consultation with individual countries before completion of the report is an integral part of the report writing process.

The questionnaire for the Pacific Island Countries (PICs) is a modified version of that used for the Indian Ocean equivalent project. The Indian Ocean questionnaire was jointly developed by UNESCO/IOC, SOPAC, the World Meteorological Organisation (WMO) and the International Strategy for Disaster Reduction (ISDR). Details of the Indian Ocean equivalent project can be found at <http://ioc3.unesco.org/indotsunami/nationalassessments.htm>

## 2.5. Underlying Policy Objectives of the Australian Tsunami Warning System Project

The Bureau in partnership with Geoscience Australia (GA) and AGD, has recently completed a four-year project to establish the Australian Tsunami Warning System (ATWS). One of the three policy objectives of the ATWS project was “To contribute to the facilitation of tsunami warnings for the South West Pacific” (DFAT, 2006). The Tsunami Capacity Assessment project and this report, contributes to the achievement of this policy objective. Also, as part of the implementation of the ATWS, Australia has and will continue to contribute to the facilitation of more effective tsunami advisory bulletins to PICs through the provision of seismic and sea level observations to the Pacific Tsunami Warning Centre (PTWC) in Hawaii.

## 2.6. Tsunami warnings in the Pacific

Tsunami messages for the Pacific Ocean are issued by the PTWC in Hawaii as the United States of America (USA) contribution to the Pacific Tsunami Warning and Mitigation System (PTWS). Individual countries are then responsible for using this advice to distribute national tsunami warnings to their communities. PTWC messages can be Tsunami Warnings, Tsunami Watches, Tsunami Advisories and Tsunami Information Bulletin/Statements. For the purpose of this report, products from the PTWC will be referred to generically as ‘tsunami messages’.

A full definition of each PTWC product can be found at: [http://www.prh.noaa.gov/ptwc/about\\_messages.php](http://www.prh.noaa.gov/ptwc/about_messages.php)

## 2.7. International Tsunami Forums

Under the auspices of the IOC, the ICG/PTWS (formerly known as ICG for the Tsunami Warning System in the Pacific (ITSU)) was first convened in 1968 (IOC, 2009). This is an international cooperative effort involving many IOC Member States of the Pacific Region. The ICG/PTWS meets regularly to review progress and coordinate activities resulting in improvements of the service (IOC, 2009).

The Working Group on Tsunami Warning and Mitigation in the Southwest Pacific Ocean was formed at the ICG/PTWS-XXI meeting in Melbourne in early May 2006 with the aim of enhancing tsunami warning and mitigation in the Southwest Pacific Ocean. The membership of the working group is composed of representatives from IOC Member States and other countries in the region (as members and observers). SOPAC provides secretariat support.



The Working Group is currently chaired by a representative of New Zealand, with vice-chairs from Fiji and Samoa.

The Working Group has a number of Terms of Reference and this project is directly relevant to the following Terms of Reference:

- To evaluate capabilities of countries in the Southwest Pacific Region for providing end-to-end tsunami warning and mitigation services;
- To ascertain requirements from countries in the Southwest Pacific Region for the tsunami warning and mitigation services;
- To facilitate capacity building and the sharing of tsunami information in the region;
- To support the further development of the virtual centre of expertise in a multi-hazards context within SOPAC in line with the Regional Early Warning Strategy; and
- To facilitate the inclusion of tsunami hazard and response information into curricula, and development and dissemination of education materials.





## 3. Country Background and the Tsunami Threat



## 3. Country Background and the Tsunami Threat

### 3.1. About Niue

Niue (Figure 1) is approximately 73km in circumference with two distinct terraces. The upper terrace, 60m high at its highest point, slopes steeply to a 0.5m coastal terrace ending with high cliffs, some over 20m above sea level. A rugged fringing reef, which in places is over 100m wide, surrounds the island.

Although Niue lies on the edge of the Southern Tropical Cyclone belt, there have been instances in its past when severe hurricanes have caused devastation to the island's physical landscape. Cyclone Heta, [a Category 5 cyclone] the most severe in living memory, struck Niue in January 5th 2004, with giant waves that reached the natural cliff fortress, caused two deaths, damaged private property and government infrastructures, including an entire western coastline for up to 200m inland from Tagavaka in Alofi South to Mutalau in the north.

In terms of climate the south easterlies predominate and together with the island's physical landscape are responsible for its rainfall and temperature differences. Generally there are two distinct seasons: the wet season with hot humid temperatures averaging 29 degrees from November to March, and the cooler dry period lasting through April to October averaging 23 degrees centigrade.

Niue's 14 villages are linked by a 76km ring road of which 90% is sealed while inner roads between Alofi and Liku, Lakepa and Hakupu are completely sealed. Alofi is the main centre where most private businesses and government services are located. The hospital and the industrial park which were completely destroyed by Cyclone Heta in 2004 have been rebuilt.

The Niue Constitution Act of 1974 allowed for a 20 member Legislative Assembly, 14 are elected to represent each village and the remaining six from the National Register called a Common Roll. A Premier, to lead the Government is elected by the Legislative Assembly who in turn selects three associates to form a four member Cabinet. A Speaker of the Assembly is selected from outside the ranks of the Legislative Assembly members. All local residents over 18 years and over are eligible to vote.

Niue was formerly a territory of New Zealand until October 1974 when it adopted self-rule, but continues to retain New Zealand citizenship, a contributing factor in the large presence of Niueans in Auckland. (Government of Niue 2009).



Figure 1: Niue (Source: [www.maps-google.com](http://www.maps-google.com))

### 3.2. Tsunami Threat Sources and Tsunami History in Niue

An overview of potential tsunami threat sources in Niue is outlined below. This information should be treated as general background and does not attempt to provide a comprehensive picture of tsunami hazard and vulnerability and associated risk for Niue. Such a study is outside the scope of this project.

Thomas, Burbidge and Cummings, 2007 completed *A Preliminary Study into the Tsunami Hazard faced by Southwest Pacific Nations*. Scenarios for an 8.5 moment magnitude (Mw) and 9.0 Mw earthquakes were used to investigate normalised offshore (to a notional depth of 50 metres) wave amplitudes for tsunami caused by earthquakes along subduction zones (Refer to Figures 2a & b). For Mw 8.5 events Niue was placed in Category 3 (normalised amplitude 75-150cm) and for Mw 9.0 events Niue was placed in Category 4 (normalised amplitude of 150-250cm). In this study, Niue's maximum amplitude for all tide gauges for all Mw 9 tsunami was 210cm with the most significant source region being Tonga (amplitude greater than 75cm at 50m depth or single most significant source region if no amplitude exceeds 75cm). For a Mw 8.5 tsunami Niue's maximum amplitude for all tide gauges was 110cm with the most significant source region being the Tonga Trench to the west.

A further study completed by Thomas and Burbidge (2009) attempts to answer the question "which Pacific nations might experience offshore amplitudes large enough to potential result in hazardous inundation, what are the probabilities of experiencing these amplitudes and from which subduction zones might these tsunami originate". The report notes that the maximum amplitudes for a 2000 year return period vary from 2.6 metres for model output points to the east of the island, to a considerable 4.8 metres to the west. At a return period of 100 years the maximum amplitudes are of the order of 0.4 to 0.5 metres at all model output points.

Investigation of the Bureau's deep ocean model-based tsunami prediction system conducted by Dr. Jane Warne in 2008 (ATWS Project Network Design Manager) demonstrated that the local threat source (Figure 2b) for Niue is the Tonga Trench to the west of Niue. Warne (2009) also notes that slightly more distant threats are the New Hebrides, South Solomon and Puysegur Trenches. There are a number of distant threats to the west and north of Niue including the Kiril Islands, Russia, Alaska and South America can also impact these Islands from the New Guinea Trench (0°S 132°E to 4°S 145°E). There are trenches in the Philippines Sea; the Mindinau or Philippines Trench (15°N 125°E to 3°N 129°E) and the Mariana Trench (27°N 143°E to 11°N 141°E) that may pose a threat.

Travel times for tsunami from these sources vary but are typically between

- 0.5 to 1 hours from the Tonga Trench
- 1.5 to 2 hours from the Kermadec Trench
- 3 to 4 hours from the New Hebrides Trench
- 5 to 6.5 hours from the South Solomon Trench
- 6 to 6.5 hours from Puysegur Trench
- 9 to 10 hours from the Kurils Trench
- 9 to 12 hours from the New Guinea Trench
- > X hours from Alaskan Trench
- >12 hours from the Chile/Peru Trench
- >12 hours from the Mariana Trench and
- >15 hours from the Ryuku - Nankai Trench

- >15 hours from the Philippines Trench.

The Tonga Trench is the most significant threat source of tsunami for Niue (See Figure 3). The energy is focused in the general direction of Niue and travel times to the island are relatively short 0.5 to 1 hour. Since 1950, according to the NDGC Tsunami database, there have been three events off this trench that have generated events detected at Niue. These were in April 1995 (Mw 7.4), May 2006 (Mw 7.8) and Nov 2006 (Mw 7.6). All produced small tsunami (less than 10cm amplitude) except the May event which registered a sea-level rise of 21cm.

The signal from the 2006 event is given in Figure 4, it registered an amplitude of approximately 4cm.

The SOPAC/GA Tsunami Hazard & Risk Assessment Project, Inventory of Geospatial Data and Options for Tsunami Inundation & Risk Modelling, Niue (Pearce 2007) notes that the 'initial impression would suggest that the 20-40m cliffs provided a significant barrier to inundation by storm surge or tsunami. However, Tropical Cyclone (TC) Heta (Howorth 2004) demonstrated that given the correct conditions storm surge could ramp up and overtop the cliffs. Substantial damage was caused to coastal property and infrastructure and the sea tracks on the coastal terraces' (Pearce 2007). Pearce 2007 further noted that 'historical accounts show recorded effects of tsunami so far have been small with little recorded damage. The highest recorded event was 21cm amplitude (42cm peak-to-trough) for the 4 May 2006 tsunami. This had an arrival time in Niue 33 minutes after the earthquake and 21 minutes after the first PTWC warning was issued.

The high cliffs and deep bathymetry of Niue suggest it may not be very susceptible to significant shoaling and inundation from a distant-source tsunami, with any effects of shoaling confined to inshore marine areas and facilities built in lower areas e.g. the harbour.

Pearce (2007) noted that Niue's vulnerability to any large tsunami event generated by the Tonga Trench and beamed directly at the west coast of Niue needs further investigation.

Pearce (2007) concluded that the potential exposure to tsunami generated within the Tonga Trench is an issue. Travel times would be very short and thus there would only be a minimal time for formal warnings to be issued.





Figure 2a: The subduction zones (in orange) of the Pacific Ocean



Figure 2b: The location of Niue and other Pacific Island Countries in relation to regional and local subduction zones (in orange)

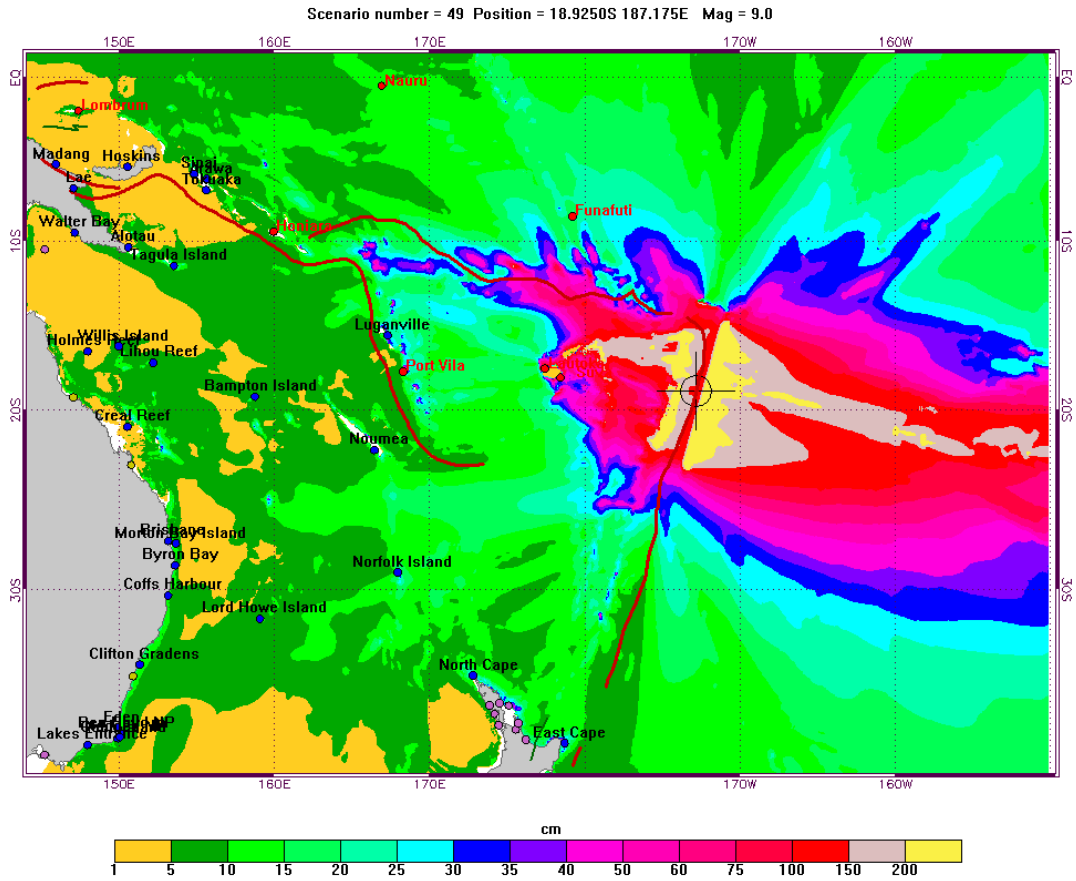


Figure 3: Threat to Niue from the Tonga Trench

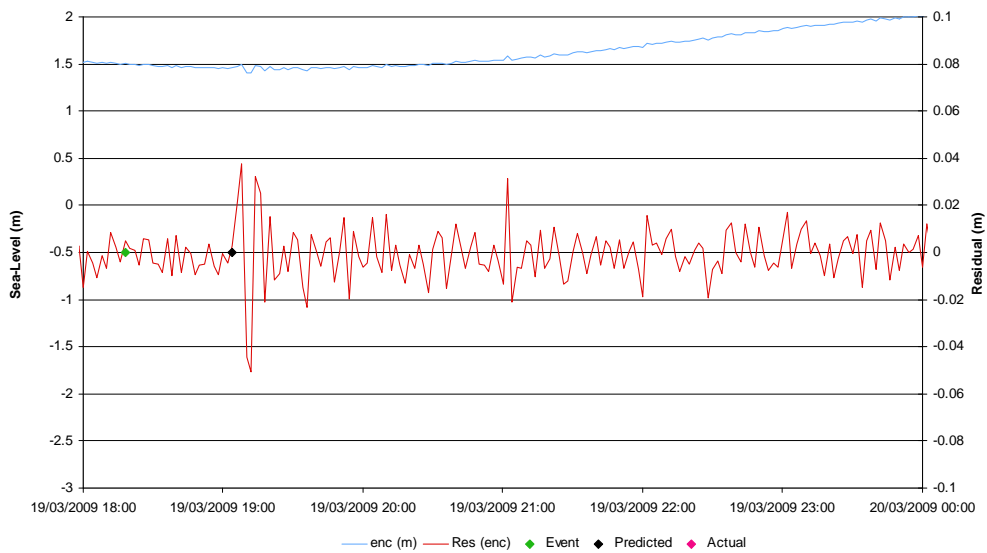


Figure 4: 19 March 2006, (Mw 7.6) event from the Tonga Trench as detected at Alofi, Niue by the NOAA gauge



## 4. The Niue Tsunami Capacity Assessment

## 4. The Niue Tsunami Capacity Assessment

### 4.1. Date and Location

The tsunami capacity assessment of the ability of Niue to receive, communicate and effectively respond to tsunami warnings took place from 25 – 28 May 2009 at the Matavai Resort, Alofi, Niue.

### 4.2. Visiting Assessment Team and Participants

The visiting assessment team was made up of those outlined in Annexure 2. The focal points in Niue for the completion of this project was Mr Sionetasi Pulehetoa, Director, Niue Meteorology and Climate Change Department. A full list of workshop participants can be found in Annexure 1.

### 4.3. Workshop Summary

For a copy of the full agenda for the workshop see Annexure 3.

#### 4.3.1. Day 1 (25 May 2009)

**09:00am – 12:00pm**

Opening Ceremony (Master of Ceremony – MC (Sionetasi Pulehetoa, Director of Meteorology and Climate Change)

Prayer – Reverend Niu Tauevihi

Welcome Address - MC: Sionetasi Pulehetoa, Director of Meteorology and Climate Change

Workshop Opening Speech: Hon. Kupa Magatogia Acting Minister for Meteorology and Climate Change, Police and Environment

Introduction of the Assessment Team - Sionetasi Pulehetoa, Director of Meteorology and Climate Change

Response - Visiting Assessment Team Leader Bryan Boase

Presentations:

Bryan Boase – Introduction to the tsunami capacity assessment project

Michael Bonte-Grapentin – Tsunami science and the tsunami hazard in relation to Niue

Sionetasi Pulehetoa - Tsunami warning and mitigation systems in Niue

**1:30pm – 2:30pm**

Focus groups were formed to look at Niue's priorities for implementing an effective tsunami warning and mitigation system.

**2:35pm – 3:00pm**

The capacity assessment questionnaire was commenced on Organisations, Committees and Legislation Section and good progress was made addressing the issues pertaining to the:

- Organisations involved in tsunami warning and mitigation in Niue.
- Tsunami warning and mitigation coordination committees at National, and village level in Niue
- Legislation relevant to tsunami warnings and emergency response

**3:30pm – 4:30pm**

The capacity assessment questionnaire was commenced on Strategy, International and Regional Cooperation and All-Hazards Approach and good progress was made addressing the issues pertaining to the:

- Disaster risk reduction strategy in Niue
- International and Regional cooperation for tsunami warning and mitigation in Niue
- All-hazards approach

A request came late in the day from one participant wanting a presentation from each of the main areas that would highlight exactly where the key government agencies were up to with their Tsunami Warning Systems. He appeared to feel that such presentation might save time and help clarify issues. Although it was agreed that there was perhaps some merit in the idea it was decided to wait to see what came out of the sessions.

**4.3.2. Day 2 (26 May 2009)**

**08:30am – 09:00am**

Peter Rowswell provided a presentation on Data Communications for Tsunami Warnings

**09:00am – 12:00pm**

Work on the capacity assessment questionnaire recommenced and the Section on Research, Monitoring, Warning and Emergency Response was addressed in terms of:

- Research and development expertise
- Tsunami monitoring including infrastructure (seismic network, sea-level network and utilisation of satellites for data communication)
- Case Study – 20 March 2009 Tonga Trench Event

- Tsunami warning system in Niue including, international communication cooperation, national tsunami warning centre, receipt of advisories from PTWS, procedures for dissemination of tsunami warnings Nationally, once received from PTWS, issuing warnings for marine vessels, harbours and ports
- Case Study – Receipt of international advisories and dissemination of warnings nationally for the 20 March 2009 Tonga Trench Event
- Strengths and weaknesses of tsunami warnings

**1:30pm – 4:00pm**

The assessment team were provided with a conducted tour of the following sites:

- Niue Meteorological Service
- Broadcasting Corporation of Niue
- Niue Police Department
- Posts & Telecommunications Department – Operations Centre

**4.3.3. Day 3 (27 May 2009)**

**08:30 – 09:00am**

Paul Davis provided a presentation on Emergency Coordination, Planning, Community Awareness

**09:00 – 12:00pm**

The capacity assessment questionnaire recommenced and the section on Emergency response to tsunami in Niue addressing the issues pertaining to:

- Assessing the capacity of the disaster management system in Niue and identifying training needs
- Emergency response and recovery plans
- Evacuation (including evacuation legislation)
- GIS use for emergency response
- Testing and exercising
- Consideration of critical infrastructure
- Tsunami mitigation efforts
- The role of NGOs in tsunami warning and mitigation
- Case Study – Preparedness and response for the 20 March 2009 Tonga Trench Event

**13:00 – 16:00**

The capacity assessment questionnaire recommenced and the Section on Capacity Assessment – Hazard, Vulnerability, Risk and Community Awareness addressing the issues pertaining to:

- Tsunami hazard, vulnerability and risk studies in Niue:
  - Post tsunami surveys
  - Tsunami hazard, vulnerability and numerical modelling studies
  - Community participation in assessing the tsunami risk
- Public and stakeholder awareness and education regarding tsunami in Niue including:
  - Assessment of public awareness
  - The role of public awareness in understanding warnings and taking action
  - Public awareness and education programs
  - Media education programs
  - Tsunami memorials and museums

**4.3.4. Day 4 (28 May 2009)**

**17:00 – 19:00**

Preliminary summary presentation was provided to the workshop participants by Bryan Boase on Niue's strengths, needs, preliminary recommendations, priority review and next steps. This was followed by questions and feedback from the participants.

The formal closing of the Workshop was performed by the Hon. Toke Talagi – Premier of Niue and Minister for Meteorology and Climate Change, Police and Environment and this was followed by a response from the Team Leader Bryan Boase and then a Prayer by the Reverend Hawea Jackson – President, Ekalesia Kerisiano Niue.

#### 4.4. Workshop Photos (Niue May 2009)



**Workshop Participants**







## 5. Assessment Results



## 5. Assessment Results

### 5.1. Status of Key System Components

The Tsunami Capacity Assessment Workshop results are summarised below in Table 3 in which the status of key components of Niue’s tsunami warning and mitigation system are outlined (as at the date the Tsunami Capacity Assessment Workshop was held in May 2009, updates between then and the publication of this report are as marked).

**Table 3: Summary of current status of key components of the Niue tsunami warning and mitigation system as at May 2009.**

#### Rating

Yes - fully realised
Partially realised
No - not realised

Key Component	Rating	Comment
<b>Authority, Coordination and NGO Role</b>		
Legislation in place for tsunami warnings and response	<b>Partially</b>	Legislative responsibility for issuing tsunami warnings is currently not formally defined. The Public Emergency Act 1979 (D5) makes a broad provision for formulation and implementation of disaster management policies and structures at a national level. The legislation does not specifically refer to the National Disaster Management Plan which outlines responsibilities across government for warnings, response and recovery for natural and man made hazards.
Tsunami coordination committee or effort at a National and local level	<b>Partially</b>	The NNDP (D1) 2008 articulates the roles and responsibilities of the NDC as the central coordinator for all hazards. (Refer NNDP Page A-5).
Agency responsibilities clearly defined	<b>No</b>	Although there is an outline of agency roles and responsibilities with the exception of the Police the lead agencies are not clearly defined. It is understood that a Meteorological Act has been proposed but as yet there is no draft available.

Key Component	Rating	Comment
NGOs have a defined role in tsunami warning dissemination, preparedness and awareness and emergency response	<b>NA</b>	NGOs do exist in Niue.
<b>International and Regional Cooperation</b>		
Country represented at an international and regional level to aid cooperation in tsunami warning and mitigation efforts	<b>Partially</b>	Through Niue's membership of WMO, SOPAC and IOC
<b>Priorities</b>		
Priorities established for implementation of tsunami warning and mitigation system at a National level	<b>No</b>	<p>The priorities under specific sub-headings identified by the workshop participants are as follows:</p> <p><b>Warnings:</b></p> <ul style="list-style-type: none"> <li>• Provide for 24/7 receipt of warnings from PTWC to the Meteorological Service.</li> <li>• Re-introduction of the receipt of AFTN traffic to the Meteorological Service</li> <li>• Warn duty hospital staff doctor/nursing of potential tsunami event.</li> <li>• Appropriate systems/technologies including a high quality system such as a direct VSAT link and satellite phone for the receipt of warnings.</li> <li>• Maintaining the operational capability of all equipment and instrumentation associated with warning systems</li> <li>• Identify key stakeholders involved in the dissemination and response to tsunami warnings</li> <li>• Enhance warning system</li> <li>• Introduce “town crier” and traditional means eg bell, drums,</li> <li>• Enhance electronic media eg radio, TV</li> <li>• Efficient and effective receipt of international warnings and local dissemination.</li> <li>• Improved risk assessment and management by using a multi sectoral approach.</li> <li>• Provision of pre recorded tsunami warnings</li> </ul> <p><b>Emergency Response:</b></p> <ul style="list-style-type: none"> <li>• Effectively communicate to all stakeholder agencies the current authorities and responsibilities within the legislation and the NNDP</li> <li>• Scheduled regular exercises of the NNDP</li> <li>• Review and assess the current evacuation centres in terms of adequacy</li> </ul>

Key Component	Rating	Comment
<p>Priorities established for implementation of tsunami warning and mitigation system at a National level cont</p>	<p><b>No</b></p>	<ul style="list-style-type: none"> <li>• Recognition and adoption of traditional knowledge pertaining to hazardous events and disseminate this information</li> <li>• Provision of counselling post disaster</li> <li>• Enhancing the capacity to undertake damage and needs assessment post event</li> </ul> <p><b>Community Awareness and Preparedness:</b></p> <ul style="list-style-type: none"> <li>• Community workshops on evacuation planning</li> <li>• Programmes in schools</li> <li>• Competitions based on community awareness and preparedness</li> <li>• Radio/TV programmes</li> <li>• Encourage self reliance/initiatives</li> </ul> <p><b>Capacity Building:</b></p> <ul style="list-style-type: none"> <li>• Provide focused operational disaster management training</li> <li>• Provide focused technical training</li> <li>• Provide appropriate education for the community eg school curriculum</li> <li>• Provide the appropriate resources in terms of personnel, infrastructure and funding</li> </ul> <p><b>Planning:</b></p> <ul style="list-style-type: none"> <li>• Undertake disaster mitigation planning at the national level</li> <li>• Undertake disaster mitigation planning at the local level</li> <li>• The Meteorological Service to review the current cyclone plan with the view to develop a companion for tsunami events</li> <li>• Clarify roles and responsibilities of key warning agencies under the NNDP and NDC</li> <li>• Introduce specific national tsunami plan</li> <li>• The provision of an inundation map to support evacuation and development planning</li> <li>• Compliance with the Building Codes</li> <li>• Develop evacuation plans for the Primary School</li> <li>• Establish evacuation routes for the community</li> </ul>
<p><b>Multi-hazard Approach</b></p>		
<p>Tsunami warning capabilities are being established within a multi-hazard framework</p>	<p><b>Partially</b></p>	<p>Although there is no specific mention of tsunami, tropical cyclone procedures are utilised in a modified form.</p>

Key Component	Rating	Comment
<b>Research Expertise</b>		
Active research is being undertaken within the country for seismology and tsunami to strengthen the tsunami warning and mitigation system	<b>No</b>	Not at this time.
<b>Tsunami monitoring infrastructure</b>		
Existence of seismograph stations and integration of real time data from these stations into the tsunami warning process	<b>Partially</b>	A GA seismographic station is located at the Meteorological Office. There is no real-time access to the data it provides. It was noted that a continuous GPS Station is located at the Meteorological Office operated by GNS Science New Zealand.
Existence of sea-level stations and integration of real time data from these stations into the tsunami warning process	<b>Partially</b>	There is a PTWC tide gauge at the Sir Roberts Wharf. There is no real-time access to the data it provides.
Sharing of seismic and sea-level data internationally to facilitate improvement of PTWC tsunami messages for the region	<b>Yes</b>	The data is accessible to PTWC.
<b>Warnings</b>		
Nation receives PTWC messages	<b>Yes</b>	The Meteorological Office is the primary recipient of the messages at this time.
24x7 operational staff at warning receipt and dissemination location	<b>No</b>	This is of significant concern and has been addressed in the recommendations.

Key Component	Rating	Comment
Disseminate national tsunami warnings as guided by a Standard Operating Procedure	<b>No</b>	Not at this time and this issue is addressed in the recommendations.
System redundancies in place for receipt of PTWC messages and dissemination of National warnings	<b>No</b>	It is understood that Telecom has the infrastructural capacity to receive PTWC messages. However, none have been received to-date and as such this process has never been tested.
Redundant 24x7 methods available for dissemination of warnings to community (e.g. public radio, sirens etc.)	<b>Partially</b>	Broadcasts by radio and TV are used once the warning has been received. As well, Police are despatched to identified remote villages and use their vehicle sirens and PA to alert the community. Church bells are not used.
Effective warning dissemination to remote communities	<b>Partially</b>	Refer above.
Communications coverage of whole country that is effectively utilised for the dissemination of tsunami warning messages	<b>Partially</b>	It is understood that there is not 100% communication coverage as some remote villages can not always receive radio and TV broadcasts. This is why Police are despatched to ensure they are appropriately warned.
Issue of marine tsunami warnings and guidance for vessels, harbours and ports	<b>Partially</b>	HF and VHF are provided by Telecom for marine. Also the Meteorological Office provides HF (Sailmail). This is an automated system and may not allow manual override at any particular time. This may limit its use during an emergency event.
<b>Emergency Response and Evacuation</b>		
Disaster preparedness and emergency response system has been reviewed and opportunities for improvement and training identified	<b>No</b>	An exercise was partially conducted some ago. However, areas of improvement were not identified and full testing of the plan was not achieved.



Key Component	Rating	Comment
Tsunami emergency response, evacuation and recovery plan exists	<b>Partially</b>	Covered in an all hazards approach context as contained within the NNDP.
The designated agency for evacuation is identified and have authority by law	<b>Yes</b>	The Niue Police.
Plans have been made for safe evacuation of population centres including aspects such as maps, routes and signage	<b>Partially</b>	There are currently no signage, maps and documented routes. There is also some debate over the suitability of identified evacuation centres/safe houses.
Procedures are tested and exercised to improve the response through better planning and preparedness	<b>No</b>	Refer above to comments of the partial conduct of an exercise.
Land use policies and building codes are in place to mitigate against the tsunami hazard	<b>Yes</b>	The Niue Sustainable Coastal Development Policy (D6) has just been formally ratified. As well, a National Building Code (D4) and a Home Building Manual (D3) are in use but have not been specifically developed for tsunami.
<b>Tsunami hazard, vulnerability and risk</b>		
Completion of studies to assess the tsunami hazard in the country or Region	<b>Partially</b>	Some work has been undertaken by GA and SOPAC to identify the overall threat to Pacific Islands Countries. However, no inundation modelling has been done.
Local risk assessments have been completed for at risk communities	<b>No</b>	Not at this time.
Adequate data exists and local inundation modelling has been completed for population centres	<b>No</b>	Not at this time.

Key Component	Rating	Comment
<b>Public and stakeholder awareness and education</b>		
Measures have been taken to ensure the public understand and take action in the event of a tsunami warning being issued	<b>Partially</b>	Some activities have been undertaken through both the primary and secondary school curriculums. However, there is not currently a specific program within the education curriculum.
Community level education and preparedness programs exist on tsunami	<b>Partially</b>	Some awareness activities within village communities are provided through BCN. It was noted that the use of BCN was significantly restricted due to their high fee for service costs.
Training programs for the National media exist for natural hazard and tsunami	<b>No</b>	However information is available to media outlets on request from the Meteorological Service.

## 5.2. Case Study – Response to the Tonga Trench Earthquake and Tsunami

Throughout the tsunami Capacity Assessment Questionnaire completed in Niue, the country's response to the Tonga Trench event that occurred on the 19 March 2009 was reviewed. The aim of this review was to gain an understanding of the operation of the system in a real time event.

The details of the event are as follows;

Origin Time	- 18:17:40 UTC, Thursday 19 March 2009
Local Time in Niue	- 7:15am, Thursday 19 March 2009
Coordinates	- 23.90.5. South, 74.668 West
Location	- Tonga Trench
Magnitude	- 7.6
Depth	- 34km (21.1 miles)

The PTWC bulletin for this event was received and a tsunami warning was disseminated via the Police and BCN to the community. The reaction of the community was as expected and people did not for example go near the sea. People “felt” the tremor and then turned on their radios. A “felt” event is the primary trigger to take the appropriate response. Police cars were also despatched in line with the NDDP procedures.

However, information suggests there may be radio blind spots and not all members of the community were able to receive warnings broadcast by BCN. BCN has information pertaining to these locations and it is to be investigated further. However, in the interim communities within these locations rely on telephone and advice from neighbours in nearby villages.

It is of note that the NDDP (D1) all hazards but not tsunami, was in place and is implemented in part for this event.

### 5.3. Strengths, Opportunities for Improvement and Recommendations to Progress the Tsunami Agenda in Niue

Based on the discussions during the workshop with in-country participants and the supporting documentation collected during the visit, the visiting team, in consultation with Tsunami Capacity Assessment workshop participants formulated the following strengths, opportunities for improvement and recommendations under key topics which they believe will progress the tsunami agenda in Niue. These are outlined in Table 4.

**Table 4 – Strengths, opportunities for improvement and recommendations under key topics**

<b>5.3.1. Governance and Coordination</b>	
<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>• The resolve of the government and the community to ensure they have a resilient multi-hazard warning system.</li> <li>• The relatively small population size that enables an enhanced degree of communication throughout the community.</li> </ul>	<ul style="list-style-type: none"> <li>• Review and complete the current Niue National Disaster Plan and develop a tsunami specific contingency plan.</li> <li>• Ensure the tsunami contingency plan articulates a comprehensive decision-making process (flow diagram) for the receipt and dissemination of a tsunami warning.</li> <li>• Clarify the responsibilities and authorities for the receipt and dissemination of tsunami warnings through the legislative process. E.g: inclusion in the Public Emergency Act 1979 (D5) and adoption and ratification of a Meteorological Act.</li> </ul>
<b>Recommendations:</b>	
<ol style="list-style-type: none"> <li>1. Review and complete the current NNDP (D1) in line with recognised international concepts and standards and develop a tsunami specific contingency plan. Ensure the tsunami contingency plan articulates a comprehensive decision-making process (flow diagram) for the receipt and dissemination of a tsunami warning.</li> <li>2. Clarify the responsibilities and authorities for the receipt and dissemination of tsunami warnings through the legislative process. E.g: inclusion in the Public Emergency Act 1979 (D5) and adoption and ratification of a proposed Meteorological Act.</li> <li>3. Ratify the Meteorological Service as the official receiver and disseminator of tsunami warnings underpinned by a Meteorological Act.</li> </ol>	

<b>5.3.2. Regional and International Coordination</b>	
<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>Niue is currently represented at an international level in terms of tsunami warnings and mitigation efforts through WMO and SOPAC.</li> </ul>	<ul style="list-style-type: none"> <li>Pursue membership of the International Oceanographic Commission (IOC) and the Pacific Tsunami Warning System (PTWS) – membership of the IOC is a prerequisite for eligibility.</li> </ul>
<b>Recommendations:</b>	
<ol style="list-style-type: none"> <li>Niue to seek membership of the International Oceanographic Commission (IOC) to actively participate in the Intergovernmental Coordination Group of the PTWS and the Southwest Pacific Tsunami Working Group (SWPWG).</li> </ol>	

<b>5.3.3. Research Expertise</b>	
<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>Willingness to participate in research activities with partners in the region.</li> </ul>	<ul style="list-style-type: none"> <li>To participate and assist in, research activities.</li> </ul>
<b>Recommendations:</b>	
None	

<b>5.3.4. Tsunami Monitoring Infrastructure</b>	
<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>Infrastructure is in existence to support GA and PTWC monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Encourage other international monitoring bodies to site instrumentation in Niue and gain access to data generated.</li> </ul>
<b>Recommendations:</b>	
<ol style="list-style-type: none"> <li>The ongoing participation in the international monitoring of tsunami instrumentation whilst ensuring data products are provided to Niue.</li> </ol>	

### 5.3.5. *Tsunami warnings*

<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>• The availability of Telecom as a 24/7 back-up for the receipt of tsunami warnings.</li> <li>• The willingness of the Meteorological Service to provide the 24/7 coverage required.</li> <li>• The draft NISP (D16) supports the maintenance of a fully resourced meteorological service that provides services to all residents in a timely manner.</li> </ul>	<ul style="list-style-type: none"> <li>• The provision of appropriate staffing levels to enable the Meteorological Service to provide 24/7 coverage.</li> <li>• Enhancement of current skill levels for Meteorological Office staff pertinent to all facets of emergency risk management but in particular those associated with tsunami warnings.</li> <li>• To formally designate Telecom Niue as the back-up recipient for tsunami warnings.</li> <li>• To provide comprehensive awareness training and develop SOPs for tsunami information dissemination to the community.</li> <li>• The nomination of out-of-hours contact details for the Meteorological Service to be provided to the PTWC.</li> <li>• Enhance the Meteorological Office SOP for tsunami warnings</li> </ul>
<b>Recommendations:</b>	
<ol style="list-style-type: none"> <li>6. Provide staffing levels that will enable the Meteorological Service to provide an appropriate 24/7 tsunami and multi-hazard response, whilst enhancing the overall provision of Meteorological Services to the Niue community.</li> <li>7. Formally endorse Telecom as a 24/7 back-up to emergency management operations and in particular, for the receipt of tsunami warnings and dissemination.</li> <li>8. To provide comprehensive tsunami awareness training to Police, Telecom and Meteorological staff combined with the development of Standard Operating Procedures (SOPs) for tsunami information dissemination to the community.</li> <li>9. The provision of a satellite phone to the tsunami warning contact focal point or their delegate that will enable the 24/7 receipt of tsunami warnings from the PTWC via SMS.</li> <li>10. Ensure the provision of an external reliable non-break mains power supply to all tsunami warning agencies.</li> <li>11. To pursue the provision of a graphical based tsunami warning product from the PTWC.</li> <li>12. The realisation of the draft NISP (D16) in reference to the full resourcing of the Meteorological Service to enable timely provision of weather services to the community.</li> </ol>	

**5.3.6. Communications**

<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>• The 24/7 staffing at Telecom</li> <li>• Telecom familiarity with, and desire to have the AFTN reinstalled and serviceable as a back-up for receipt of warning messages.</li> </ul>	<ul style="list-style-type: none"> <li>• To clearly identify appropriate recipients of the NNDP (D1) and ensure their receipt of the document.</li> <li>• The development of an alternative communications/broadcasting system to provide redundancy in the event of failure during an emergency event.</li> <li>• To develop a procedure that ensures the community receives the correct and timely information during any emergency including tsunami events.</li> </ul>

<b>Recommendations:</b>
<ol style="list-style-type: none"> <li>13. Ensure that the distribution of the NNDP (D1) to all key stakeholders.</li> <li>14. The development of an alternative communications/broadcasting system to provide redundancy in the event of failure during an emergency event.</li> <li>15. The reinstallation of the Aeronautical Fixed Telecommunications Network (AFTN) system for all relevant stakeholders.</li> <li>16. NDC to develop a procedure that ensures the community receives the correct and timely information during any emergency including tsunami events.</li> </ol>

**5.3.7. Tsunami Emergency Response (including evacuation)**

<b>Strengths:</b>	<b>Opportunities for Improvement:</b>
<ul style="list-style-type: none"> <li>• Current evacuation centres and emergency equipment that is centrally located and readily available for distribution.</li> <li>• The current operational procedures in place.</li> <li>• Current electronic communication systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Extra staff for the Meteorological Service will enable an appropriate 24/7 tsunami and multi-hazard response, whilst enhancing the overall provision of Meteorological Services to Niue.</li> <li>• Development of the capacity within the Government of Niue including but not restricted to Police, Meteorology and Telecom, through the provision of emergency management education, training, planning and Standard Operating Procedures (SOPs).</li> <li>• Scheduled regular exercising/testing of the national disaster plan.</li> <li>• There are currently no signage, maps and documented evacuation routes. There is also some debate over the suitability of identified evacuation centres/safe houses.</li> </ul>

**Recommendations:**

17. Develop the capacity within the Government of Niue, including but not restricted to Police, Meteorology and Telecom, through the provision of emergency management education, training, planning and Standard Operating Procedures (SOPs).
18. Schedule and conduct regular exercising/testing of the NNDP (D1).
19. In consultation with the village councils identify evacuation routes and procedures and where applicable develop signage, maps and conduct risk assessments.
20. Develop all-hazard village emergency plans as a sub-plan of the NNDP (D1) and conduct regular exercising and testing of the plan.
21. The installation of appropriately signed roadway barriers at the highest entry points to the Sir Roberts Wharf and other identified sea access points to restrict pedestrian and vehicular entry in times of emergency.



**5.3.8. Tsunami Hazard, Vulnerability, Risk and Mitigation**

**Strengths:**

- The geographical size of the island.
- A desire to enhance emergency risk management.

**Opportunities for Improvement:**

- Development of the capacity within the Government of Niue including but not restricted to Police, Meteorology and Telecom, through the provision of emergency management education, training, planning and Standard Operating Procedures (SOPs).
- Identify all hazard risk profiles for sectors of the community.

**Recommendations:**

22. Conduct inundation modelling to identify the tsunami hazard and elements at risk for given extreme scenarios.
23. Establish an all hazard risk profile for all sectors of the community of Niue that identifies the risk to the population, critical infrastructure including lifelines (water, power, and communications) and in particular those elements at risk from wave impact.

**5.3.9. Public and Stakeholder Awareness and Education**

**Strengths:**

- The recent events of TC Heta and the lessons learnt have raised awareness of the threats facing Niue.
- After TC Heta public education was included as part of the curriculum in schools.
- Positive community attitude.
- The presence and recognition of traditional knowledge.

**Opportunities for Improvement:**

- Leverage off current knowledge that a felt earth tremor may cause a Tsunami.
- Develop appropriate educational and awareness programs focused on enhancing the community's knowledge and awareness of multi-hazard events and in particular tsunami.

**Recommendations:**

24. Development of appropriate educational/awareness programs focused on enhancing the community's knowledge and awareness of multi-hazard events and in particular tsunami.
25. Recognise and promote the traditional knowledge of tsunami and multi-hazard events.

## 5.4. Additional Workshop Benefits

In addition to this report, additional benefits of the Tsunami Capacity Assessment Workshop in Niue were:

- Facilitation of working relationships between agencies and organisations involved in tsunami warning and mitigation within Niue;
- Exchange of information on National activities and capabilities within Niue;
- Enhanced working relationships between the Niue participants, the Australian Bureau, AGD and SOPAC; and
- Enhanced understanding and appreciation by the assessment team and Project of the challenges faced by the Niue communities.

## 5.5. Next Steps

Niue will receive three key material outcomes from the Tsunami Capacity Assessment project:

- 1) The completed questionnaire in electronic format with scanned copies of all supporting documentation collected in-country;
- 2) A comprehensive National Report in a standard format which aims to summaries information collected from the visits and is consumable for non-technically minded recipients (this document); and
- 3) A copy of the final Regional Report which will outline common themes across the region.

At the agreement of the country project results will be posted on websites such as the Australian Bureau, SOPAC and Pacific Disaster Net.

Once approved by the country the Bureau will facilitate dissemination of reports to regional and international donors and other stakeholders to ensure maximum exposure of results. Contingent on the availability of human and financial resources, the Bureau and project partners will aim to work with potential donors to bring the findings of this project to their attention on a country and regional scale. This will be done to facilitate further capacity development projects being undertaken based on the results of this project. .





## 6. Annexure



## 6. Annexure

### 6.1. Annexure 1: Record of Participants

Organisation	Position	Title	First Name	Last Name	Postal Address	Telephone	Fax	Mobile	E-mail
Meteorology & Climate Change Department	Director	Mr	Sionetasi	Pulehetoa	PO Box 82 Hannan Airport, Alofi, Niue	6834600	4834602		<a href="mailto:sionetasi.pulehetoa@mail.gov.nu">sionetasi.pulehetoa@mail.gov.nu</a>
Meteorology & Climate Change Department	Meteorology Officer	Miss	Mellisa	Talagi	PO Box 82 Hannan Airport, Alofi, Niue	6834600	4834602		<a href="mailto:t_lisa@mail.nu">t_lisa@mail.nu</a>
Meteorology & Climate Change Department	Meteorology Coordinator Niue, Climate Change Project	Miss	Rossy	Pulehetoa	PO Box 82 Hannan Airport, Alofi, Niue	6834600	4834602		<a href="mailto:rossy.climate@mail.gov.nu">rossy.climate@mail.gov.nu</a>
Meteorology & Climate Change Department	Scientific Officer	Mr	Sean	Tukutama	PO Box 82 Hannan Airport, Alofi, Niue	6834600	4834602		<a href="mailto:snail@mail.nu">snail@mail.nu</a>
Meteorology & Climate Change Department	Scientific Officer	Miss	Felicia	Pihigia	PO Box 82 Hannan Airport, Alofi, Niue	6834600	4834602		<a href="mailto:f_pihigia@mail.nu">f_pihigia@mail.nu</a>
Bulk Fuel Corporations	Office Manager	Mrs	Mokalita	Heka	PO Box 16, Alofi, Niue	6834326	6834326		<a href="mailto:accounts.bulkfuel@mail.gov.au">accounts.bulkfuel@mail.gov.au</a>
Niue Legislative Assembly	Speaker	Hon	Atapana	Siakimotu	Fale, Fona, Alofi, Niue	6834200	6834012		<a href="mailto:speaker.siakimotu@mail.gov.nu">speaker.siakimotu@mail.gov.nu</a>
Niue Legislative Assembly	MLA	Hon	Kupa	Magatogia	PO Box 211 Niue	6833429			<a href="mailto:kupa.magatogia@niue.nu">kupa.magatogia@niue.nu</a>

Organisation	Position	Title	First Name	Last Name	Postal Address	Telephone	Fax	Mobile	E-mail
Niue Legislative Assembly	MLA (AVATELE Village)	Hon	Billy	Talagi	PO Box 181 Niue	6834288			
Education	HOD Science (Niue High School)	Mr	Jone	Cagi	PO Box 35 Alofi	6834039			<a href="mailto:nhs.teacher.physics@niue.nu">nhs.teacher.physics@niue.nu</a>
The Information System Office	ICT Officer	Mrs	Heileen	Togiamaua	NPSB Fon Niue Kula, Alofi, Niue	6834073			<a href="mailto:neileen.iso@mail.gov.nu">neileen.iso@mail.gov.nu</a>
Environment Department & LIKU Village Council	Conservation Officer Chairman	Mr	Logo	Seumanu	PO Box 80, Alofi, Niue	6834021 6833519			<a href="mailto:niuiwp@niue.nu">niuiwp@niue.nu</a>
Treasury	Officer Manager	Mrs	Susana	St Clair	PO Box 36 Fonuakula Alofi, Niue	6834047	6834350		<a href="mailto:treasury@mail.gov.nu">treasury@mail.gov.nu</a>
Telecom Department	Operations Manager	Mrs	Lofa	Kulatea	PO Box 37 Alofi, Niue	6834001	6834010		<a href="mailto:misa@niue.nu">misa@niue.nu</a>
Private Sector	Self Employed	Ms	Paese	McMoore	PO Box 120 Alofi, Niue	6834012			<a href="mailto:katcoffhouse@niue">katcoffhouse@niue</a>
Police Department	Senior Sergeant PEMO	Mr	Robert	Tagiamana	PO Box 69 Alofi, Niue	6834333			<a href="mailto:robert.police@mail.gov.nu">robert.police@mail.gov.nu</a>
Premiers Department	Public Relations Officer	Mr	Niue	Tauevihi	Falefono, Alofi	6834200			<a href="mailto:niut@hotmail.com">niut@hotmail.com</a>
The Admin Department & Makefu Village Council	Training Coordinator Vice Chairman	Mr	Charlie	Tohovaka	Government Building, Fonuakula Alofi, Niue	6834018			<a href="mailto:ctohovakatraining@mail.gov.nu">ctohovakatraining@mail.gov.nu</a>
Niue Council of Women	Vice President	Mrs	Fakahula	Funaki	N.C.W Falefono	6834144			
Mutalau Ekalesia	Christian Education Coordinator	Mr	Vilkamu Pau	Vivian	Mutalau	6833309			
Vaisia Ekalesia		Mr		Tauevihi		6833718			<a href="mailto:n.tauevihi@yahoo.co.nz">n.tauevihi@yahoo.co.nz</a>

## 6.2. Annexure 2: The Visiting Assessment Team

Team Position	Name	Position within Organisation	Organisation	Contact Details
Natural Hazard Warning Expert and Team Leader	Bryan Boase	National Manager Weather Services Quality	Australian Bureau of Meteorology	<a href="mailto:b.boase@bom.gov.au">b.boase@bom.gov.au</a> Ph. +61 3 9669 4719 Fax. +61 3 9669 4695 Mobile. +61 4 0853 4234
Logistics Coordinator	Helen Tseros	Project Officer Weather Services Branch	Australian Bureau of Meteorology	<a href="mailto:h.tseros@bom.gov.au">h.tseros@bom.gov.au</a> Ph. +61 3 9669 4541 Fax. +61 3 9669 4695 Mobile +61 4 2584 7644
Emergency Management Expert	Paul Davis	Assistant Director Education and Training	Attorney-General's Department	<a href="mailto:paul.davis@ag.gov.au">paul.davis@ag.gov.au</a> Ph. +61 3 5421 5277 Fax. +61 3 5421 5272 Mob. +61 4 0840 7762
Advisor, Hazard Assessment	Michael Bonte-Graptin	Risk Assessment Specialist	Pacific Islands Applied Geoscience Commission	<a href="mailto:Michael@sopac.org">Michael@sopac.org</a> Ph. +679 (338) 1377 Fax. +679 (337) 0040 Mob. +679 9435936
Data Communications Expert	Peter Rowswell	Regional Engineering Services Manager, WA	Australian Bureau of Meteorology	<a href="mailto:p.rowswell@bom.gov.au">p.rowswell@bom.gov.au</a> Ph. +61 8 9263 2203 Mob. +61 4 0802 0564



### 6.3. Annexure 3: Agenda, Niue Tsunami Capacity Assessment Workshop

<b>DAY 1: Monday 25<sup>th</sup> May 2009</b>				
<b>SESSION 1: OPENING CEREMONY AND INTRODUCTORY PRESENTATIONS</b>				
<b>LOCATION: Matavai Resort</b>				
<b>Time</b>	<b>Item</b>	<b>Questionnaire Reference</b>	<b>Duration</b>	<b>Participation</b>
<b>9.00 – 9.30am</b>	<b>Welcome Address</b> <ul style="list-style-type: none"> <li>• <i>Sionetasi Pulehetoa – Director of Meteorology and Climate Change</i></li> <li>• <i>Prayer Niu Tauevihi</i></li> <li>• <i>Bryan Boase – Team Leader, Visiting Assessment Team</i></li> <li>• <i>Workshop opening speech: Hon. Kupa Magatogia Acting Minister for Meteorology and Climate Change, Police and Environment</i></li> <li>• <i>Introduction of the Assessment Team – Sionetasi Pulehetoa</i></li> </ul>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>
<b>10.00 – 10.30am</b>	<b>Workshop Group Photo and Opening Morning Tea</b>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>
<b>10.35 – 11.00am</b>	<b>CHAIR: Bryan Boase</b> <b>Housekeeping – Helen Tseros</b> <b>Presentation –</b> <ul style="list-style-type: none"> <li>• <i>Introduction to the tsunami capacity assessment project.</i></li> </ul> <b>Presenter: Bryan Boase – Team Leader, Visiting Assessment Team</b>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>
<b>11.00 – 11.30am</b>	<b>Presentation –</b> <ul style="list-style-type: none"> <li>• <i>Tsunami science and the tsunami hazard in relation to Niue</i></li> </ul> <b>Presenter: Michael Bonte-Grapentin - Risk Assessment Specialist, SOPAC</b>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>

Time	Item	Questionnaire Reference	Duration	Participation
11.30 – 12.00pm	<b>Presentations –</b> <ul style="list-style-type: none"> <li><i>Tsunami warning and mitigation systems in Niue (including questions from participants)</i></li> </ul> <b>Presenters:</b> Sionetasi Pulehetoa - Director of Meteorology and Climate Change and Ross Arden - Chief of Police.	NA	0.5hrs	Open
12.00 – 1.30pm	Lunch	NA	1.5hrs	Open
<b>SESSION 2: ORGANISATIONS, COMMITTEES, LEGISLATION, STRATEGY AND COOPERATION</b>				
<b>LOCATION: Matavai Resort</b>				
<b>CHAIR: Bryan Boase Team Leader, Visiting Assessment Team</b>				
1.30 – 2.30pm	<b>Focus Groups</b> <ul style="list-style-type: none"> <li><i>Niue's priorities for implementing an effective tsunami warning and mitigation system</i></li> </ul>	Section 4	1.0hrs	Open
2.30 – 3.00pm	<b>Capacity Assessment – Organisations, Committees and Legislation</b>			
	<ul style="list-style-type: none"> <li><i>Organisations involved in tsunami warning and mitigation in Niue</i></li> </ul>	Section 2, Part A	1.0hrs	Open
	<ul style="list-style-type: none"> <li><i>Tsunami warning and mitigation coordination committees at National, and village level in Niue</i></li> </ul>	Section 2, Part B		
	<ul style="list-style-type: none"> <li><i>Legislation relevant to tsunami warnings and emergency response</i></li> </ul>	Section 2, Part C		
3.00 – 3.30pm	Afternoon tea	NA	0.5hrs	Open
3.30 – 4.30pm	<b>Capacity Assessment – Strategy, International and Regional Cooperation, All Hazards Approach</b>			
	<ul style="list-style-type: none"> <li><i>Disaster risk reduction strategy in Niue</i></li> </ul>	Section 2, Part D	1.0hrs	Open
	<ul style="list-style-type: none"> <li><i>International and Regional cooperation for tsunami warning and mitigation in Niue</i></li> </ul>	Section 2, Part E & F		
	<ul style="list-style-type: none"> <li><i>All-hazards approach</i></li> </ul>	Section 2, Part E & F		
4.30pm	<b>CLOSE</b>	Section 3		

<b>DAY 2: Tuesday 26<sup>th</sup> May 2009</b>				
<b>SESSION 3: RESEARCH, MONITORING AND WARNING</b>				
<b>LOCATION: Matavai Resort</b>				
<b>CHAIR: Bryan Boase, Team Leader, Visiting Assessment Team</b>				
<b>Time</b>	<b>Item</b>	<b>Questionnaire Reference</b>	<b>Duration</b>	<b>Participation</b>
8.30 – 9.00am	<b>Opening Presentation:</b> <ul style="list-style-type: none"> <li><i>Data Communications for Tsunami Warnings (including questions from the participants)</i></li> </ul> <b>Presenters:</b> Peter Rowswell	NA	0.5hrs	Open
09:00 – 09:30am	<b>Capacity Assessment – Research, Monitoring, Warning and Emergency Response</b>			
09:30 – 10:00am	<b>Research and development expertise</b>	Section 5	0.5hrs	Open
10.00 - 10.30am	<b>Morning Tea</b>	NA	0.5hrs	Open
10:30 – 11.00am	<b>Tsunami monitoring including:</b> <ul style="list-style-type: none"> <li><i>Tsunami monitoring infrastructure (seismic network, sea-level network and utilisation of satellites for data communication)</i></li> <li><i>Case Study – 20 March 2009 Tonga Trench Event</i></li> </ul>	Section 6, Part A, B, C & Case Study – Monitoring Systems	0.5hrs	Open
11.00 – 12:00pm	<b>Tsunami warning system in Niue including:</b> <ul style="list-style-type: none"> <li><i>International communication cooperation</i></li> <li><i>National tsunami warning centre</i></li> <li><i>Receipt of advisories from PTWS</i></li> <li><i>Procedures for dissemination of tsunami warnings Nationally, once received from PTWS</i></li> </ul>	Section 7, Part A, B, C, D, E, F, G, Case Study – Tsunami Advisory Messages and Warnings & Part H	1.0hrs	Open

Time	Item	Questionnaire Reference	Duration	Participation
	<p><b><i>Tsunami warning system in Niue <u>continued</u> including:</i></b></p> <ul style="list-style-type: none"> <li><i>Issuing warnings for marine vessels, harbours and ports</i></li> <li><i>Case Study – Receipt of international advisories and dissemination of warnings nationally for the 20 March 2009 Tonga Trench Event</i></li> <li><i>CONCLUSION – Strengths and weaknesses of tsunami warnings</i></li> </ul>	As above	As above	As above
12.00 – 1.00pm	Lunch	NA	1.0hr	Open
<b>SESSION 4: SITE TOURS</b>				
<b>LOCATION: Niue Meteorological Service, Broadcasting Corporation of Niue, Niue Police Department, Posts &amp; Telecommunications Department – Operations Center</b>				
1:30 – 4.00pm	<ul style="list-style-type: none"> <li><i>Niue Meteorological Service</i></li> <li><i>Broadcasting Corporation of Niue</i></li> <li><i>Niue Police Department</i></li> <li><i>Posts &amp; Telecommunications Department – Operations Center</i></li> </ul>	NA	2.5hrs	Relevant Agencies & Assessment Team

<b>DAY 3: Wednesday 27<sup>th</sup> May 2009</b>				
<b>SESSION 5: TSUNAMI EMERGENCY RESPONSE, MITIGATION AND PREPAREDNESS</b>				
<b>LOCATION: Matavai Resort</b>				
<b>CHAIR: Bryan Boase, Team Leader, Visiting Assessment Team</b>				
<b>Time</b>	<b>Item</b>	<b>Questionnaire Reference</b>	<b>Duration</b>	<b>Participation</b>
<b>8.30 – 9.00am</b>	<p><b>Opening Presentation:</b></p> <ul style="list-style-type: none"> <li>Emergency Coordination, Planning, Community Awareness (including questions from participants)</li> </ul> <p><b>Presenter:</b> Paul Davis, Australian Attorney-General's Department</p>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>
<b>9.00 – 10.00am</b>	<p><b>Emergency response to tsunami in NIUE</b></p> <ul style="list-style-type: none"> <li>Assessing the capacity of the disaster management system in Niue and identifying training needs</li> <li>Emergency response and recovery plans</li> <li>Evacuation (including evacuation legislation)</li> </ul>	Section 8, Part A, B & C	<b>1hr</b>	<b>Open</b>
<b>10.00 – 10:30am</b>	<b>Morning Tea</b>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>
<b>10:30 – 12.00pm</b>	<p><b>Emergency response to tsunami in Niue <u>continued</u> including:</b></p> <ul style="list-style-type: none"> <li>GIS use for emergency response</li> <li>Testing and exercising</li> <li>Consideration of critical infrastructure</li> <li>Tsunami mitigation efforts</li> <li>The role of NGOs in tsunami warning and mitigation</li> <li>Case Study – Preparedness and response for the 20 March 2009 Tonga Trench Event</li> </ul>	Section 8, Part D, E, F, G, H & Case Study – Preparedness and Response	<b>1.5hrs</b>	<b>Open</b>
<b>12.00 – 1.00pm</b>	<b>Lunch</b>	<b>NA</b>	<b>1hr</b>	<b>Open</b>

Time	Item	Questionnaire Reference	Duration	Participation
<b>SESSION 6: TSUNAMI HAZARD, VULNERABILITY, RISK AND COMMUNITY AWARENESS</b>				
<b>1.00 – 4:30pm</b>	<b>Capacity Assessment – Hazard, Vulnerability, Risk and Community Awareness</b>			
<b>1.00 – 2.00pm</b>	<p><b><i>Tsunami hazard, vulnerability and risk studies in Niue:</i></b></p> <ul style="list-style-type: none"> <li>• <i>Post tsunami surveys</i></li> <li>• <i>Tsunami hazard, vulnerability and numerical modelling studies</i></li> <li>• <i>Community participation in assessing the tsunami risk</i></li> </ul>	<p><i>Section 9, Part A, B, C, D, E, F</i></p>	<b>1hr</b>	<b>Open</b>
<b>2.00 – 3.00pm</b>	<p><b><i>Public and stakeholder awareness and education regarding tsunami in Niue including:</i></b></p> <ul style="list-style-type: none"> <li>• <i>Assessment of public awareness</i></li> <li>• <i>The role of public awareness in understanding warnings and taking action</i></li> <li>• <i>Public awareness and education programs</i></li> <li>• <i>Media education programs</i></li> <li>• <i>Tsunami memorials and museums</i></li> </ul>	<p><i>Section 10, Part A, B, C, D</i></p>	<b>1hrs</b>	<b>Open</b>
<b>2.30 – 3.00pm</b>	<b>Afternoon Tea</b>	<b>NA</b>	<b>0.5hrs</b>	<b>Open</b>
<b>3:30 – 4.00pm</b>	<p><b><i>Public and stakeholder awareness and education regarding tsunami in Niue including:</i></b></p> <ul style="list-style-type: none"> <li>• <i>Assessment of public awareness</i></li> <li>• <i>The role of public awareness in understanding warnings and taking action</i></li> <li>• <i>Public awareness and education programs</i></li> <li>• <i>Media education programs</i></li> <li>• <i>Tsunami memorials and museums</i></li> </ul>	<p><i>Section 10, Part A, B, C, D</i></p>	<b>1hrs</b>	<b>Open</b>
<b>4.00pm</b>	<b>CLOSE</b>			

**DAY 4: Thursday 28<sup>th</sup> May 2009**

**SESSION 6: PRESENTATION OF PRELIMINARY ASSESSMENT FINDINGS**

**LOCATION:** Matavai Resort

**CHAIR:** Bryan Boase, Team Leader, Visiting Assessment Team

Time	Item	Questionnaire Reference	Duration	Participation
17:00 – 19:00	<b>MORNING TEA</b>			
	<p><b>Preliminary summary presentation</b></p> <ul style="list-style-type: none"> <li><i>Niue's strengths, needs, preliminary recommendations, priority review and next steps</i></li> </ul> <p><b>Presenter:</b> Bryan Boase – Team Leader</p> <p><b>Questions and Feedback</b></p> <p><i>From Niue participants on preliminary summary presentation and the assessment process in general</i></p>	NA	1hr	Open
	<p><b>ACKNOWLEDGEMENTS AND CLOSE</b></p> <ul style="list-style-type: none"> <li><i>Close Workshop: Hon. Toke Talagi – Premier of Niue and Minister for Meteorology and Climate Change, Police and Environment</i></li> <li><i>Bryan Boase – Team Leader, Visiting Assessment Team</i></li> </ul> <p><i>Prayer Reverend Hawea Jackson – President, Ekalesia Kerisiano Niue</i></p>	NA	0.25hrs	Open
	<b>Refreshments</b>			





## 6.4. Annexure 4: Supporting Documents Log

Ref.	Document Name	Copy Obtained (Y/N)	Format (H = Hard Copy) (E = Electronic)
D1	Niue National Disaster Plan 2008	Y	H & E
D2	Partial Commentary on the National Building Code	N	H
D3	Home Building Manual	N	H
D4	National Building Code	N	H
D5	Public Emergency Act 1979 (Police)	N	H
D6	Niue Sustainable Coastal Development Policy	Y	E
D7	Cyclone Emergency Plan 2005-2006 (Obsolete)	Y	E
D8	ICT Damage Assessment and Recovery Plan after Cyclone Heta in Niue Islands	Y	E
D9	National Disaster Relief Fund Act 1980	N	H
D10	PTWC Tsunami Bulletin 03May 2006	Y	E
D11	Niue Meteorological Service Emergency Plan	N	H
D12	Inventory of Geospatial Data Available and Options for Tsunami inundation & risk modelling - Niue	Y	E
D13	EU-SOPAC (EDF9) Project Report 45Reducing Vulnerability of Pacific ACP States – Niue June 2005	Y	E
D14	MOU Between Niue and Australia Relating to Tsunami Warning Systems and Climate Monitoring Networks	Y	E
D15	Corporate Plan 2009 - 2013	N	H
D16	Niue Integrated Strategic Plan (NISP)	N	H
D17	Niue Police, Immigration and Corrections Service 2009 – 2013 Corporate Plan	N	H
D18	Alofi South Village Disaster Plan	Y	E

**Note:** Hard copies not obtained (N), were cited and if required the in-country representative should be contacted.

## 6.5. Annexure 5: Definitions

### Used in reports for SOPAC Member Countries National Capacity Assessment: Tsunami Warning and Mitigation Systems

**Source: United Nations, International Strategy for Disaster Reduction, 2009**

#### **Capacity**

A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster.

*Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.*

#### **Capacity building**

Efforts aimed to develop human skills or societal infrastructures within a community or organization needed to reduce the level of risk.

*In extended understanding, capacity building also includes development of institutional, financial, political and other resources, such as technology at different levels and sectors of the society.*

#### **Disaster**

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

*A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.*

#### **Disaster risk management**

The systematic process of using administrative decisions, organization, operational skills and capacities to implement policies, strategies and coping capacities of the society and communities to lessen the impacts of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) adverse effects of hazards.

#### **Disaster risk reduction (disaster reduction)**

The reduction of disaster risks and adverse impacts of natural hazards, through systematic efforts to analyse and manage the causes of disasters, including through avoidance of hazards, reduced social and economic vulnerability to hazards, and improved preparedness for adverse events.

## Early warning

The provision of timely and effective information, through identified institutions, that allow individuals exposed to a hazard, to take action to avoid or reduce their risk and prepare for effective response.

*Early warning systems include of three primary elements: (i) forecasting of impending events; (ii) processing and dissemination of warnings to political authorities and population; and (iii) undertaking appropriate and timely actions.*

## Emergency management

The organization and management of resources and responsibilities for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation.

*Emergency management involves plans, structures and arrangements established to engage the normal endeavours of government, voluntary and private agencies in a comprehensive and coordinated way to respond to the whole spectrum of emergency needs. This is also known as disaster management.*

## Geographic information systems (GIS)

Analysis that combine relational databases with spatial interpretation and outputs often in form of maps. A more elaborate definition is that of computer programmes for capturing, storing, checking, integrating, analysing and displaying data about the earth that is spatially referenced.

*Geographical information systems are increasingly being utilised for hazard and vulnerability mapping and analysis, as well as for the application of disaster risk management measures.*

## Hazard

A potentially damaging physical event, phenomenon and/or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

*Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) and/or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability.*

## Land-use planning

Branch of physical and socio-economic planning that determines the means and assesses the values or limitations of various options in which land is to be utilized, with the corresponding effects on different segments of the population or interests of a community taken into account in resulting decisions.

*Land-use planning involves studies and mapping, analysis of environmental and hazard data, formulation of alternative land-use decisions and design of a long-range plan for different geographical and administrative scales.*

*Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion, and in the siting of service routes for transport, power, water, sewage and other critical facilities.*

## **Mitigation**

Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

## **Natural hazards**

Natural processes or phenomena occurring in the biosphere that may constitute a damaging event.

*Natural hazards can be classified by origin namely: geological, hydrometeorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing.*

## **Preparedness**

Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location.

## **Prevention**

Activities to provide outright avoidance of the adverse impact of hazards and means to minimize related environmental, technological and biological disasters.

*Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disasters. In the context of public awareness and education, related to disaster risk reduction changing attitudes and behaviour contribute to promoting a "culture of prevention".*

## **Public awareness**

The processes of informing the general population, increasing levels of consciousness about risks and how people can act to reduce their exposure to hazards. This is particularly important for public officials in fulfilling their responsibilities to save lives and property in the event of a disaster.

*Public awareness activities support changes in behaviour leading towards a culture of prevention. This involves public information, dissemination, education, radio or television broadcasts and the use of printed media, as well as, the establishment of information centres and networks and community and participation actions.*

## **Recovery**

Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

*Recovery (rehabilitation and reconstruction) affords an opportunity to develop and apply disaster risk reduction measures.*

### **Relief / response**

The provision of assistance or intervention during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

### **Resilience / resilient**

The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase its capacity for learning from past disasters for better future protection and to improve risk reduction measures.

### **Risk**

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human induced hazards and vulnerable conditions.

*Conventionally risk is expressed by the notation*

*Risk = Hazards x Vulnerability*

*Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.*

*Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.*

### **Risk assessment/analysis**

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, property, livelihoods and the environment on which they depend.

*The process of conducting a risk assessment is based on a review of both the technical features of hazards such as their location, intensity, frequency and probability; and also the analysis of the physical, social, economic and environmental dimensions of vulnerability and exposure, while taking particular account of the coping capabilities pertinent to the risk scenarios.*

### **Structural / non-structural measures**

Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure.

*Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory*

*mechanisms and the provision of information, which can reduce risk and related impacts.*

**Vulnerability**

A set of conditions and processes resulting from physical, social, economic, and environmental factors, which increase the susceptibility of a community to the impact of hazards.

## 6.6. Annexure 6: References

- Australian Agency for International Development (AusAID) and Australian Bureau of Meteorology 2006, *Schedule 5 to the Record of Understanding 14304 in relation to cooperation between the Australian Bureau of Meteorology and AusAID for SOPAC Member Countries National Capacity Assessment: Tsunami Warning and Mitigation Systems*, AusAID, Canberra.
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## 7. CD Attachment



## 7. CD Attachment - Supporting Documents

- a. Assessment Questionnaire
- b. Supporting Documents
- c. Presentations