SOPAC Member Countries National Capacity Assessments:

Tsunami Warning and Mitigation Systems

Nauru

Nauru

AUSTRALIA

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1. Results Outline

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1.1. Executive Summary

The Island Republic of Nauru (hereafter referred to as Nauru) is a country comprised of a single coral atoll of 21 square kilometres located approximately 47 kilometres south of the equator. The country's population of approximately 10,000 people reside primarily along the coastal fringes (D16). The country's National Disaster Risk Management Plan (NDRM Plan, D12) identifies the tsunami hazard in Nauru as being a high level of risk. This risk rating reflects Nauru's own perception of the tsunami risk probably based on verbal history of wave inundation events (thought to most frequently due to atmospheric elevation of sea level) as well as the high level of community response when a tsunami warning is received in Nauru.

Nauru is located further from major subduction trenches capable of generating tsunami than many other Pacific Island Countries (PICs). The country generally has a greater lead time (typical tsunami travel times from the South Solomon's and New Hebrides trenches are between 2.5 to 3 hours) for warnings and appears in a lower hazard category (Pearce, 2008). Thomas and Burbidge (2009) supports this and states that the tsunami hazard for Nauru (for a 2000 year return period) "originates predominately from the Solomon's, New Hebrides and Kurils trenches, with smaller contributions from the Mariana, Philippines and Peru trenches". Atolls can also be somewhat protected as they often have steep drop-offs in which ocean depths increase very rapidly with distance from the fringing reef therefore minimising tsunami shoaling (the process by which tsunami wave heights increase as they approach the shore) and subsequent inundation (Thomas, Burbidge, Cummins, 2007).

However, even relatively small tsunami, when timed with high tides may have a significant impact on communities on low lying atolls (Pearce, 2008). Tsunami wave heights, less than 10cm on most occasions, have been recorded in Nauru in recent times. Even these seemingly small changes in sea-level due to tsunami could adversely impact on day-to-day activities in Nauru, such as unloading of fuel. Nauru has also historically experienced wave inundation from storm surge (1994, refer to D22). Further understanding of Nauru's tsunami risk would be beneficial to ensure appropriate National planning for response to this hazard.

It is important that Nauru takes steps now to improve their agency and community response to tsunami warning messages received from the Pacific Tsunami Warning Center (PTWC). 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 Nauru to receive, communicate and effectively respond to tsunami warnings took place in a workshop held from 24 – 26 February 2009 in Nauru.

The workshop was facilitated by a team of visiting experts and attended by some forty Nauru Government agency representatives, Community groups and the private sector to discuss key areas of tsunami warning and mitigation in Nauru by completing a comprehensive questionnaire in session and via presentations, site visits and meetings.

As well as outlining Nauru'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 Nauru's tsunami warning and mitigation system and Disaster Risk Management (DRM) in the country more generally.

Nauru has developed a sound framework for DRM in recent times by adoption of their 2009 Disaster Risk Management Act (DRM Act, D11). The 2009 NDRM Plan (D12) is also in place and provides an overarching framework for the development of specific disaster risk reduction and disaster management plans. Although the NDRM Plan (D12) outlines lead and support agencies for emergency response, further sub plans are required to address warning and response to specific hazards, including tsunami.

Currently, the Nauru Flight Services (NFS, Department of Civil Aviation) unofficially receive PTWC and Japan Meteorological Agency (JMA) tsunami advisory information 24x7 via the Aeronautical Fixed Telecommunications Network (AFTN) from Brisbane Flight Service (Air Services Australia). It was also unclear between Nauru Tsunami Capacity Assessment Workshop participants who the official PTWC in-country contact is. This needs to be clarified by the Nauru Government with PTWC. In addition, processes for communicating warnings between national agencies and dissemination of warnings to the community need to be formalised. The Tsunami Capacity Assessment process in Nauru therefore identified the need for a National Tsunami Emergency Sub-Plan and tsunami warning and response Standard Operating Procedures (SOPs).

Nauru participants in workshop identified development and testing of DRM plans at an organisation, community and national level (including planning coordination between agencies), communication systems and education programs as priorities for enhancing their nations tsunami warning and mitigation system. The workshop's resulting recommendations reflected these priorities. In brief, high and very high priority recommendations made include:

- Advocacy to garner support and commitment of government agencies and non government entities, including the private sector, to support the NDRM Plan (D12)
- Identify and assess regulatory instruments for disaster risk reduction and disaster management, seek agency input into prioritisation and development of DRM sub-plans, including a tsunami sub-plan.
- Enhance the Mitigation and Preparedness Advisory Committee to include consideration of preparedness for the tsunami hazard.
- Develop, approve, share and maintain national tsunami warning and response SOPs for each agency involved in the tsunami warning and response process in Nauru.
- Complete a National Tsunami Emergency Sub-Plan using Prevention, Preparedness, Response, Recovery (PPRR) methodology.
- Utilise available information to develop tsunami evacuation plans, including the production of evacuation maps in consultation with local communities and authorities, to be included within the National Tsunami Emergency Sub-Plan.
- Exercise plans and arrangements at least on an annual basis.
- Perform debriefs after every disaster event, including exercises, to capture lessons learned and update plans (including training plans).
- Develop a tsunami risk profile for Nauru based on tsunami hazard studies completed for the Southwest Pacific Nations to date, tsunami numerical deep ocean modelling carried out by international agencies, research of previous inundation events and Geographic Information Systems (GIS) data (existing bathymetry and topography).
- Adapt existing PIC tsunami (and other hazard) awareness information packages for development and delivery of a comprehensive risk based tsunami public awareness program in Nauru using existing school and community communication methods.
- Completion of a training needs analysis and development of a national training framework for DRM in Nauru that includes tsunami in a multi-hazard context (including a training database to track progress).

Nauru 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 in

Nauru's tsunami warning and mitigation system. In turn, this will assist in improving systems for other natural hazards. Contingent on the availability of human and financial resources, the Australian Bureau of Meteorology (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 in the hope of further capacity development projects being undertaken.

Recommendations (including priority and resource intensity)

Table 2 outlines the priority and resource intensity for recommendations made to improve Nauru'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 Table 2 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 Nauru'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
Very High	**Low –** Recommendation currently being progressed or could possibly be progressed within the capacity of existing in-country resources (funds and staff).
High	**Medium –** 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.
Medium	**High –** Recommendation would require a high level of additional staff and/or expertise and funds. External funding support is likely to be required.
Low	**Very High –** 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 Nauru's tsunami warning and mitigation system.

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
Very High	Develop, approve, share and maintain national tsunami warning and response SOPs for each agency involved in the tsunami warning and response process in Nauru. In particular, these procedures should: **a.** Clearly identify 24x7 hazard information contact in Nauru for receipt of international warnings and ensure this is communicated to international warning agencies. **b.** Identify in country decision makers, information flow to the key response agency (Nauru Police Force) and identified responsibilities of other agencies and organisations. **c.** Investigate using NFS as primary official contact for PTWC with Commissioner of Police as primary recipient for Tsunami Advice from NFS (No Threat, Watch and Warning). **d.** Identification of an official back-up agency for NFS to receive and disseminate tsunami information. Possibilities include Nauru Fire Services (are on call 24x7) or the Department of Health (emergency response role as part of their pandemic response plan, based out of hospital). **e.** Formalise methods for passing warnings onto the community.	Medium	Tsunami Warnings	Tsunami Specific	10

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
High	Advocacy to garner support and commitment of government agencies and non government entities, including the private sector, to support the NDRM Plan (D12).	Low	Governance & Coordination	Multi-hazard	1
High	Enhance the Mitigation and Preparedness Advisory Committee to include consideration of preparedness for the tsunami hazard.	Low	Governance & Coordination	Multi-hazard	3
High	Identify and assess regulatory instruments for disaster risk reduction and disaster management, seek agency input into prioritisation and development of DRM sub-plans, including a tsunami sub-plan.	Medium	Governance & Coordination	Multi-hazard	2
High	In the proposed National Tsunami Emergency Sub-Plan, formalise the use of existing communication mechanisms to disseminate tsunami warnings to the community. In particular, the use of Nauru Police Force using vehicles driving around the island issuing verbal warnings.	Low	Communications	Multi-hazard	14
High	NFS to provide an interpretation of the international tsunami warning to localise the threat to Nauru using available scientific information (deep ocean tsunami models, sea level data, travel time software etc) to support a matrix for community warning and evacuation action based on possible scenarios.	Medium	Tsunami Warnings	Tsunami Specific	11
High	Develop a National Tsunami Emergency Sub-Plan using PPRR methodology combined with clear governance and planning templates and guidelines for Emergency Management sub-plans (including at the agency and community level) to ensure consistency.	Medium	Tsunami Emergency Response (including evacuation)	Multi-hazard	15

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
High	Utilise available information to develop tsunami evacuation plans, including the production of evacuation maps in consultation with local communities and authorities, to be included within the National Tsunami Emergency Sub-Plan. Identify alternative evacuation areas and routes to topside and install appropriate signage.	Medium	Tsunami Emergency Response (including evacuation)	Tsunami Specific	16
High	Exercise plans and arrangements at least on an annual basis.	Medium	Tsunami Emergency Response (including evacuation)	Multi-hazard	19
High	Perform debriefs after every disaster event, including exercises, to capture lessons learned and update plans (including training plans) as required for continuous improvement of warning system and response.	Medium	Tsunami Emergency Response (including evacuation)	Multi-hazard	20
High	Adapt existing PIC tsunami (and other hazard) awareness information packages for development and delivery of a comprehensive risk based tsunami public awareness program in Nauru using existing school and community communication methods. The program should include: **a.** An understanding of the topography and bathymetry of Nauru, as well as Nauru's tsunami risk profile; **b.** Raise awareness of Nauru's NDRM Plan (D12) and each sub-plan to promote community response and recovery responsibilities. This includes awareness of warning systems.	Medium	Knowledge, Information, Public & Stakeholder Awareness & Education	Tsunami Specific (but should be done in an all-hazards context)	24

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
High	Develop and deliver a tsunami competency based training program to staff responsible for issuing tsunami warnings for Nauru. This training should be developed based on operational SOPs.	Medium	Knowledge, Information, Public & Stakeholder Awareness & Education	Tsunami Specific	27
High	Implement a training needs analysis and development of a national training framework for DRM in Nauru (including a training database to track progress). Develop appropriate training for all levels and across the various sectors to match roles and responsibilities as identified in the NDRM Plan (D12) and sub-plans. Tsunami should be included in this multi-hazard training approach.	Medium	Knowledge, Information, Public & Stakeholder Awareness & Education	Multi-hazard	28
High	Develop a tsunami risk profile for Nauru based on tsunami hazard studies completed for the Southwest Pacific Nations to date, tsunami numerical deep ocean modelling carried out by international agencies, research of previous inundation events and GIS data (existing bathymetry and topography). This will inform development and building codes.	High	Tsunami Hazard, Vulnerability, Risk & Mitigation	Tsunami Specific	21
Medium	Conduct regular meetings of the National Disaster Risk Management Council (NDRM Council).	Low	Governance & Coordination	Multi-hazard	4
Medium	Identify emergency management resources and capabilities in a Disaster Response Register.	Low	Tsunami Emergency Response (including evacuation)	Multi-hazard	18
Medium	Consider vulnerability of critical facilities and infrastructure, particularly when considering new construction and unloading of fuel during tsunami events.	Low	Tsunami Hazard, Vulnerability, Risk & Mitigation	Multi-hazard	22

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
Medium	Introduce DRM into schools using current resources and personnel. Integrate topics relevant to PIC hazards into school curricula, in particular geography studies.	Low	Knowledge, Information, Public & Stakeholder Awareness & Education	Multi-hazard	25
Medium	Educate media to understand the tsunami hazard and warning procedures. Training program should take an all hazards approach, including other hazards relevant to Nauru.	Low	Knowledge, Information, Public & Stakeholder Awareness & Education	Multi-hazard	26
Medium	Plan for use of possible new mobile network as one mode for warning dissemination.	Medium	Communications	Multi-hazard	13
Medium	Continue participation in the Southwest Pacific Tsunami Working Group of the Intergovernmental Coordination Group (ICG) Pacific Tsunami Warning and Mitigation System (PTWS).	High	Regional & International Coordination	Tsunami Specific	5
Medium	Develop access to regional sea level data (and a data access and analysis tool such as Tide Tool) in real-time and gain access to an output from a deep ocean tsunami model to assist in interpreting PTWC messages for national use. Consider NFS for the technical role of ongoing sea level monitoring given they already practise monitoring of environmental meteorological data on a 24x7 basis. Nauru Port Authority or similar agency would operate as a key client for a routine sea level service, in order to build client relationship with NFS.	High	Tsunami Monitoring Infrastructure	Multi-hazard	9
Medium	Prevent unnecessary public concern and reduce the possibility of false alarms through issuance of “No Threat” advice to the public and media for tsunami that will not impact on Nauru.	High	Tsunami Warnings	Tsunami Specific	12

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 4
Low	Become a member of the Intergovernmental Oceanographic Commission (IOC) to ensure Nauru has a voice in determining IOC programmes and activities of benefit nationally as well as benefiting from IOC capacity building in marine science.	Low	Regional & International Coordination	Multi-hazard	6
Low	Conduct (in partnership with regional organisations or universities if needed) research into inundation events where waves have crossed the Government Offices and the airport runway. Document these past events on the Nauru MapServer and Pacific Disaster Net.	Medium	Research Expertise	Multi-hazard	7
Low	Conduct a project to collect and document (on the Nauru MapServer and Pacific Disaster Net) traditional knowledge on early warning signs and coping mechanisms, including recovery. The study should include capturing disaster stories.	Medium	Research Expertise	Multi-hazard	8
Low	Further develop and enforce building codes. This includes assessing current building stock.	Medium	Tsunami Hazard, Vulnerability, Risk & Mitigation	Multi-hazard	23
Low	Establish a volunteer disaster task force, trained and exercised by Nauru Police Force to international competency standards.	High	Tsunami Emergency Response (including evacuation)	Multi-hazard	17