



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

Republic of Kiribati



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SOPAC



1. Results Outline

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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 the Republic of Kiribati (hereafter referred to as “Kiribati”) to receive, communicate and effectively respond to tsunami warnings took place in a workshop held from 8 – 10 September 2008 in Tarawa, Kiribati.

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

As well as outlining Kiribati’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 ongoing improvements in Kiribati’s tsunami warning and mitigation system.

The distributed nature of the Kiribati Islands and the features of the sea-bed within the archipelago means that exposure to tsunami and possible tsunami impacts are likely to be variable from island to island. Tsunami risk modelling and very few historical records of tsunami events would suggest Kiribati has a lower tsunami risk relative to other Pacific Islands Countries (PICs) closer to subduction trenches on which earthquakes with the potential to generate tsunami can occur. Although the Kiribati population and government have had no direct experience with tsunami impacts, there is an awareness of the susceptibility of low-lying atolls to rising sea levels associated with climate change and the potential for tsunami impact. Kiribati’s National Disaster Act 1993 (D1) lists tsunami as a potential disaster that may impact upon Kiribati.

Various studies highlight the main tsunami threat source for Kiribati as the Kurils Trench. There have, since 1994, been two small events detected at the Tarawa sea level gauge from this trench. These events were both Moment Magnitude (M_w) = 8.3 events on 4 October 1994 and the 15 November 2006. Both events resulted in small (less than 10cm height) tsunami waves at Tarawa. For the November 2006 event, Kiribati was placed under a “tsunami watch” by the Pacific Tsunami Warning Centre (PTWC). The only other tsunami recorded on the Tarawa sea level gauge in recent times is from West Papua (Indonesia) in February 1996. A magnitude M_w = 8.2 local event resulted in a small tsunami of less than 10cm height in Tarawa.

Most recently, Kiribati has been placed under a “tsunami warning” by the PTWC for the 2 April 2007 Solomon Islands earthquake and tsunami generated by a magnitude M_w = 8.1 earthquake on the South Solomons Trench. No visible sign of this tsunami was recorded on the Tarawa sea level gauge. Kiribati’s national response to the Solomon Islands tsunami was reviewed during the workshop to enable the Visiting Assessment Team to gain an understanding of how Kiribati’s system operates in a real event.

Kiribati’s National Disaster Act 1993 (D1) establishes command and control arrangements for managing a range of disasters from tsunami, other natural and man made disasters. At the time of the workshop, much of the content of this legislation was yet to be implemented. Kiribati did not have a National Disaster Management Plan or tsunami sub-plan. Tsunami warnings were received by the Kiribati Meteorological Service (KMS) however, the key communications system

for receiving tsunami warnings from the PTWC was not operational. Currently, after receiving the PTWC messages, KMS passes these onto the Office of the President (Te Beretitenti) (OB). This office is not staffed 24/7. No system currently exists for dissemination of tsunami warnings to the Kiribati community nationally.

Participants in the workshop identified a number of areas for improvement. Recurring themes included improved emergency response planning, enhancement of community tsunami awareness, enhancement of communications systems and interagency cooperation. The workshop's recommendations reflected this and the very high priority included the following:

Formalisation of Disaster Risk Management (DRM) structures and strategies at the national and local levels including the National Disaster Council, Local Government Disaster Committees, National Disaster Management Plan and Council, Village, NGO and private sector Disaster Risk Management Plans;

That full authority and responsibility for analysing and interpreting tsunami messages and data and issuing tsunami warnings for Kiribati be formally delegated to KMS under a set of developed and agreed Standard Operating Procedures (SOPs);

Effective resourcing of KMS and the National Disaster Management Office (NDMO) to effectively carry out their legislated tasks;

Expansion of the current tsunami education initiatives to include a multi-government and NGO approach and incorporate tsunami education into a multi-hazard education framework (including enhancement of school curricula);

Use the tsunami hazard studies completed for the Southwest Pacific Nations to date, historical records, Geographic Information System (GIS) data and deep ocean models to identify low-lying communities potentially at tsunami risk. Commence tsunami mitigation planning using this and local knowledge;

Investigate available practical and sustainable technology solutions, such as the RANET (Radio and Internet for the Communication of Hydro-Meteorological Information for Rural Development) Chatty Beetle to aid in dissemination of warning messages to remote communities, particularly outside of waking hours;

Establish a Central Operations Group to oversee the effective allocation of operational tasks and resources during an operational event as well as an appropriately located and resourced National Emergency Operations Centre (NEOC); and

That a tsunami capacity development / training program be developed, including training and exercising for emergency managers, NGOs and KMS staff and that this be done in a competency-based framework.

Participants at the workshop expressed that there is an intention to establish a National Tsunami Warning Centre operating under the OB. KMS would then forward tsunami messages to this office for action. This National Tsunami Capacity Assessment report suggests that Kiribati need to consider whether this is the most efficient use of resources. This approach would involve replication of resources on a level equal to KMS, including communications systems and a 24/7 roster. The National Tsunami Capacity Assessment report suggests a more viable option may be to give KMS full authority to issue tsunami warnings nationally for Kiribati, based on a warning matrix and format pre-agreed with OB.

Kiribati 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 Kiribati's tsunami warning and mitigation system. In turn, this will assist in improving systems for other high priority natural hazards.

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 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 the recommendations made to improve Kiribati'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 Kiribati'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 Kiribati's tsunami warning and mitigation system.

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 5
Very High	Formalise establishment of the National Disaster Council in accordance with the provisions of the National Disaster Act 1993 (D1).	Low	Governance & Coordination	Multi-hazard	1
Very High	That full authority and responsibility for analysing and interpreting tsunami messages and data and issuing tsunami warnings for Kiribati be formally delegated to KMS.	Low	Tsunami Warning	Tsunami specific	10
Very High	Expansion of earthquake and tsunami school curriculum to include tsunami preparedness (warning process and action to take).	Low	Public and Stakeholder Awareness, Education & Training	Tsunami specific	27
Very High	Commence discussions with Local Government Councils throughout Kiribati to establish Disaster Committees to ensure comprehensive and community integrated DRM including the development of Council and Village DRM Plans (supporting a National DRM Plan).	Medium	Governance & Coordination	Multi-hazard	3
Very High	Require government agencies, NGOs and key private sector organisations to develop their own Disaster Risk Management Plans for their areas of responsibility. If required, enhance legislation to make this a requirement.	Medium	Governance & Coordination	Multi-hazard	4

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 5
Very High	KMS, in consultation with OB and other key stakeholders, develop SOPs for the operation of Kiribati's tsunami warning service. This should include a pre-agreed warning decision making matrix outlining what action will be taken by key agencies for each PTWC message and what public advice will be issued.	Medium	Tsunami Warning	Tsunami specific	11
Very high	Use the tsunami hazard studies completed for the Southwest Pacific Nations to date, historical records, GIS data and deep ocean models to identify low-lying communities potentially at tsunami risk. Commence tsunami mitigation planning using this and local (and traditional) knowledge.	Medium	Tsunami Hazard, Vulnerability, Risk & Mitigation	Tsunami specific	24
Very high	Ensure KMS staffing levels are maintained at levels sufficient to effectively run 24/7 operations as well as being adequately resourced to operate all communications systems available to KMS to ensure redundant capability.	High	Tsunami Warning	Multi-hazard	12
Very High	Complete and implement a strategic National DRM Plan including prevention (mitigation), preparedness (planning and training), response (plan activation) and recovery (immediate and long term). Commence development of sub-plans relevant to each hazard with the potential to affect Kiribati (including tsunami).	High	Governance & Coordination	Multi-hazard	2
Very high	Investigate available practical and sustainable technology solutions, such as the RANET Chatty Beetle to aid in dissemination of warning messages to remote communities, particularly outside of waking hours.	High	Communications	Multi-hazard	19

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 5
Very High	Resource the NDMO to effectively carry out DRM (including Disaster Risk Reduction and Disaster Management Coordination roles).	High	Tsunami Emergency Response (including evacuation)	Multi-hazard	21
Very High	That a tsunami capacity development / training program be developed, including training and exercising for emergency managers, NGOs and KMS staff and that this be done in a competency-based framework.	High	Public & Stakeholder Awareness, Education & Training	Tsunami specific and multi-hazard (depending on training conducted)	29
Very high	Establish a Central Operations Group to oversee the effective allocation of operational tasks and resources during an operational event as well as an appropriately located and resourced NEOC.	Low (establish group), High (resource NEOC)	Tsunami Emergency Response (including evacuation)	Multi-hazard	20
Very High	Expansion of the current tsunami education initiatives to include a multi-government and NGO approach and incorporate tsunami education into a multi-hazard education framework. Include expansion of tsunami awareness kit distribution, incorporation of education into the monthly meetings of Island Councils and consideration of media multi-hazard education.	Medium to High (depending on action taken)	Public and Stakeholder Awareness, Education & Training	Tsunami specific	28
High	Investigate the feasibility of activating radio stations to disseminate information outside normal hours of operation.	Medium	Communications	Multi-hazard	14
High	Coordinate government agencies, churches, NGO radio networks to assist in spreading information to public.	Medium	Communications	Multi-hazard	15
High	Coordinate use of police and ambulance sirens, church bells to alert public.	Medium	Communications	Multi-hazard	16

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 5
High	Incorporate into the tsunami sub-plans a regime for the regular multi-stakeholder test of the tsunami warning and response arrangements including a post event debrief.	Medium	Tsunami Emergency Response (including evacuation)	Tsunami specific	22
High	Nominate, resource and ensure procedures are in place for a second 24/7 agency to receive PTWC messages as a backup to KMS.	High	Tsunami Warning	Tsunami specific	13
High	In consideration of Kiribati's low lying nature, consider and make plans for the safe evacuation of at risk communities. Options may include moving inland and vertical evacuation. Include consideration of evacuation shelters, maps, signage and drills.	High	Tsunami Emergency Response (including evacuation)	Tsunami specific	23
High	Capitalise on climate change studies to acquire the necessary high resolution topography and bathymetry data for centres at risk of tsunami as part of a multi-hazard mapping activity. This data can then feed into hazard assessments, modelling and mapping for hazards including climate change, tsunami and storm surge.	Very High	Tsunami Hazard, Vulnerability, Risk & Mitigation	Multi-hazard	25
Medium	Build on existing climate change adaptation relationships with international and regional bodies to incorporate DRM initiatives where appropriate.	Low	Regional & International Coordination	Multi-hazard	6
Medium	Become a member of the Intergovernmental Oceanographic Commission (IOC) to ensure Kiribati 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	7

Priority	Recommendation	Resource Intensity	Topic	Multi-hazard or tsunami specific	Recommendation Number In Table 5
Medium	Participate in the Pacific Tsunami Warning and Mitigation System (PTWS) Southwest Pacific Working Group by nominating a representative of Kiribati to be on this working group. Use this group to learn about regional initiatives and initiatives of other PICs with regard to tsunami warning and mitigation systems in remote and low lying islands.	Medium	Regional & International Coordination	Tsunami specific	5
Medium	Proactively encourage and actively cooperate with regional and international organisations that can assist with conducting scientific research and building technical capacity building in Kiribati. Ensure this research and capacity building is conducted in line with Kiribati's national sustainable development priorities and that a protocol is developed to ensure copies of scientific research reports and data are provided to Kiribati.	Medium	Research Expertise	Multi-hazard	8
Medium	Investigate access to and training in the interpretation of Pacific sea level data at KMS via the Global Telecommunications System (GTS) or the Bureau Registered User Website to assist in tsunami verification and early warning.	Medium	Tsunami Monitoring Infrastructure	Tsunami specific	9
Medium	Review television licensing arrangements to allow warnings.	Medium	Communications	Multi-hazard	17
Medium	Review satellite and radio telecommunication licensing fees to facilitate development of better communications systems.	Medium	Communications	Multi-hazard	18
Medium	Investigate future, long term options for completing tsunami inundation modelling in partnership with regional and international bodies, particularly for population and infrastructure centres.	Very High	Tsunami Hazard, Vulnerability, Risk & Mitigation	Tsunami specific	26