



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

Samoa



Samoa



SOPAC

5.1 Status of Key System Components

The Tsunami Capacity Assessment Workshop results are summarised below in Table 4 in which the status of key components of the Samoa tsunami warning and mitigation system are outlined (as at the date the Tsunami Capacity Assessment Workshop was held in April 2008, updates between then and the publication of this report are as marked).

Table 4: Summary of current status of key components of Samoa's tsunami warning and mitigation system as at April 2008.

Rating

Yes - fully realised
Partially realised
No - not realised

Key Component	Rating	Comment
Authority, Coordination and NGO Role		
Legislation in place for tsunami warnings and response	Yes	<p>The Disaster and Emergency Management Act (D3) provides for the management of disasters and emergencies in Samoa by effective planning and risk reduction, response and recovery procedures and the promotion of coordination amongst the response agencies. The Act allows for the establishment of the NDC, DAC and DMO. On advice of the DAC, the NDC may endorse one or more facilities to be a NEOC.</p> <p>The Act legislates response agencies. Each agency must prepare a response agency plan under the Act and be responsible for its implementation. For response there are specific recovery provisions and these are coordinated by the DAC in accordance with any directions from the NDC and subject to controls by the Ministry of Finance (international aid assistance funds).</p>

Key Component	Rating	Comment
Authority, Coordination and NGO Role (Continued)		
<p><i>Continued:</i></p> <p>Legislation in place for tsunami warnings and response</p>	Yes	<p>The Act also requires the development of a NDMP for Samoa. The NDMP details disaster risk management arrangements to ensure the sustainable mitigation of, preparedness for, response to and recovery from the impact of hazards. It also includes response agency plans which outline the specific roles of each agency. Tsunami is rated as a high risk hazard under this plan. The NDMP makes provision for any agency, organisation or person to exercise powers provided under the plan for the period of the emergency. The DAC is responsible for review of this plan every three years and after each disaster.</p> <p>The National Tsunami Plan also forms a part of the policy framework. This specifies agency roles and includes SOPs for 24/7 Meteorology Division for warning dissemination (specific to the tsunami hazard).</p> <p>Note - There is no Meteorology Act. This is in the process of being developed, however the Disaster and Emergency Management Act would override the provisions in any Meteorology legislation developed.</p>
<p>Tsunami coordination committee or effort at a National and local level</p>	Yes	<p>At a National level, an informal Tsunami Working Group exists, working under the DAC (who can appoint working groups) and the NDC. This group was formed to facilitate the development of the tsunami warning system and exercise in 2007.</p> <p>At the local level, disaster management teams in the villages are led by the Village Mayor. The Village Mayor and Women Representatives are required to report annually on status of preparedness in each village through the Ministry of Women, Community and Social Development (MWCSD). These reports are coordinated with the DMO and the DAC and are then fed to the NDC.</p>
<p>Agency responsibilities clearly defined</p>	Yes	<p>Agency responsibilities are clearly defined in the NDMP, Tsunami Plan and the various agency response plans that exist.</p>

Key Component	Rating	Comment
Authority, Coordination and NGO Role (Continued)		
NGOs and Red Cross Society have a defined role in tsunami warning dissemination, preparedness and awareness and emergency response	Yes, depending on which NGO	<p>The role played by each NGO differs between organisations. NGOs are involved in community preparedness and awareness through the running of community based workshops in collaboration with the DMO. NGOs are also included on the DAC. Some NGOs are included on the warning distribution list and therefore have a responsibility to pass this information on. NGOs have a role in emergency response through supporting agencies, assisting with evacuation, disaster victim recovery etc. Again, this depends on the NGO in question.</p> <p>Involvement of the Samoa Red Cross Society is covered by a Memorandum of Understanding (MoU) with the Samoa Government as well as the Geneva Convention. The Red Cross Response Plan (D14) outlines response functions such as using the International Red Cross Tracing Program to manage enquiries about affected people. The plan also includes provisions for training and public awareness as well as locations of resource and disaster relief depots.</p>
International and Regional Cooperation		
Country represented at an international and regional level to aid cooperation in tsunami warning and mitigation efforts	Yes	<p>Samoa is involved in a number of international forums and partnerships. Samoa became an IOC Member in 1978. Samoa is actively involved in the PTWS and Southwest Pacific Working Group. United Nations and regional organisations that are based in Samoa are included on the DAC. Samoa also has MoUs with both Australia (for the South Pacific Sea Level Climate Monitoring Project (SPSLCMP)/ATWS) and China (for seismic monitoring cooperation) that will assist to enhance Samoa's capabilities.</p>

Key Component	Rating	Comment
Priorities		
<p>Priorities established for implementation of tsunami warning and mitigation system at a National level</p>	<p>Yes</p>	<p>In an all hazards context, Samoa's NDMP outlines specific agency responsibilities when it comes to disaster risk reduction. Under this plan, a five year implementation plan (D40) was developed by each agency to implement the NDMP and associated plans. There has been significant work completed in-country on tsunami and, through activities such as exercises (D11), priorities have been established.</p> <p>Priorities were also discussed in the Tsunami Capacity Assessment Workshop. Some of the priorities expressed by participants included:</p> <ul style="list-style-type: none"> • More funding for public awareness and education of communities (awareness programs in schools); • More monitoring equipment (in particular the upgrade and installation of the seismic network); • More technical training regarding operation of equipment; • Strengthening of collaboration between DAC members; • Increased awareness of roles of different agencies and industries; • DAC need to analyse different scenarios before, during and after events; • Needs to be a mobile or second emergency centre established because current centre is within area at risk; and • Need to identify the most vulnerable areas and hold community workshops focused on these areas.
Multi-hazard Approach		
<p>Tsunami warning capabilities are being established within a multi-hazard framework</p>	<p>Yes</p>	<p>The National Tsunami Plan is a sub-plan of the NDMP which is multi-hazard. Plans exist for other hazards such as Tropical Cyclones (D24).</p>
Research Expertise		
<p>Active research is being undertaken within the country for seismology and tsunami to strengthen the tsunami warning and mitigation system</p>	<p>Partially</p>	<p>Samoa also has two temporary research seismic stations deployed on the island of Savaii. The instruments were installed under the Samoa Lithospheric Integrated Seismic Experiment (SLISE). Data has to be taken off the Seismometer (not real time). Other research on tsunami and seismology in Samoa is limited.</p>

Key Component	Rating	Comment
Tsunami monitoring infrastructure		
Existence of seismograph stations and integration of real time data from these stations into the tsunami warning process	Yes	<p>Samoa hosts one International Monitoring Station (IMS) / Global Seismic Network (GSN) auxiliary seismic station (AFI AS095) linked to Vienna via satellite phone and a local dial-up option. This information is available to United States Geological Survey (USGS) and will be used by PTWC for generation of warnings. Samoa has no direct access to this data in real time, except via a web interface. The data can be downloaded directly from the station however, there is a limited ability to interpret this data. The data is not integrated into Samoa's tsunami warning process. For earthquakes below the PTWC threshold, Samoa uses the Modified Mercalli Intensity (MMI) and Japan Meteorological Agency (JMA) Scale to determine whether a watch or warning will be issued. Samoa currently does not issue a no-threat bulletin.</p> <p>Samoa Government (MNRE) has signed an MoU with the China Earthquake Administration (D17). The MoU is to jointly establish four broadband seismic stations and two portable short period seismic stations. All data derived from the network will be processed, analysed and stored in the Data Management Centre in Apia. The MoU states that the "Parties jointly share the data produced by the seismic system for the purpose of research and disaster management". (Update May 2009 – Samoa is in the process of completing the final detailed proposal (deadline June 2009) and are hoping to have network up by December 2010).</p>
Existence of sea level stations and integration of real time data from these stations into the tsunami warning process	Yes	One sea level station is located in Apia (3 rd party, Australian Bureau of Meteorology). Samoa MNRE Meteorology Division receives one minute data via a dedicated personal computer and via registered user web pages run by the Bureau. This data is also made available to the GTS for the international community. However, this information is not integrated into Samoa's tsunami warning process at present.
Sharing of seismic and sea level data internationally to facilitate improvement of PTWC tsunami messages for the region	Yes	The seismic station is linked to Vienna via satellite phone and a local dial-up option. This information is available to USGS and will be used by PTWC. The sea level station data is made available by the GTS for the international community. Samoa plans to share the data from the new seismic monitoring network internationally.

Key Component	Rating	Comment
Warnings		
Nation receives PTWC messages	Yes	The National Weather Section of MNRE's Meteorology Division receives PTWC messages via alarmed EMWIN, facsimile and e-mail. The Principal Disaster Management Officer receives these messages via RANET (Radio and Internet for the Communication of Hydro-Meteorological Information for Rural Development) SMS and e-mail. Samoa's PTWC warning forecast point is Apia.
24/7 operational staff at warning receipt and dissemination location	Yes	The National Weather Section of MNRE's Meteorology Division is 24/7. DMO is on call 24/7. DMO acts as a back up to the National Weather Section at present.
Disseminate national tsunami warnings as guided by a Standard Operating Procedure	Yes	<p>The National Weather Section of MNRE Meteorology Division (see SOPs D4 and D8) is responsible for verification of the threat through calculation of local tsunami parameters. In the first instance, warnings are based on PTWC guidance solely, unless there is a felt earthquake or staff find out in another way.</p> <p>Felt Earthquakes</p> <p>SOPs outline action to be taken if there is a felt earthquake. In this instance a warning or watch may be issued based on the MMI/JMA Scale and USGS website.</p> <p>PTWC Messages</p> <p>The Meteorology Division sends "Advisories" from PTWC to the DAC. Message dissemination via fax and telephone. E-mail and SMS are used to distribute PTWC "Watches" and "Warnings" to a comprehensive list (updated monthly) including the DAC, the NDC and key village representatives. SMS are sent via both cellular providers Digicel and SamoaTel. Acknowledgement of receipt of PTWC messages is completed via facsimile and Aeronautical Fixed Telecommunication Network (AFTN).</p> <p>Distant Sources</p> <p>Issuance of tsunami warnings from distant sources are completed when the tsunami is anticipated to reach Samoa within three hours (D8). Distant tsunami procedures are focused on attempting to confirm the existence of a tsunami before issuing a warning.</p>

Key Component	Rating	Comment
Warnings (Continued)		
System redundancies in place for receipt of PTWC messages and dissemination of National warnings	Partially	<p>No robust backup is in place for the National Weather Section of MNRE Meteorology Division. Current back-up arrangements are through SMS messages from PTWC being sent to the Principal Disaster Management Officer of DMO. Technically the DMO can then action warning dissemination through Digicel and SamoaTel if the National Weather Section is incapacitated but this process is not documented. Some more thought is required regarding robust redundancies in this system. A viable option may be to have a back-up EMWIN system placed in the Fire Services (who are 24/7 and mandated for emergency response).</p> <p>Update Feb 2009 - DMO now have an Emergency Communications Trailer at the new fire station. The Trailer includes satellite phone and radio communications (excluding the internet at this stage).</p>
Redundant 24/7 methods available for dissemination of warnings to community (e.g. public radio, sirens etc.)	Yes	<p>Watch and Warning SMS are sent to pre-selected representatives in the villages which includes village mayors, church ministers, school principals, hotels/motels/beach resorts representatives as well as the key personnel of the member agencies of the DAC and all members of the NDC. This list is updated monthly.</p> <p>Sirens, Church and school bells (tsunami is the only hazard these bells are used for), national radio, TV and word of mouth are then used to inform the population. Current sirens are located at the Fire Services and on the airport roof. Plans are to place new sirens at the new Fire Station and on the other main island. Sirens are used for other hazards also but will be sounded continuously for tsunami.</p>
Effective warning dissemination to remote communities	Yes	SMS messages are sent to key village representatives who then use Church and school bells (only used for tsunami warnings), word of mouth etc. to reach their communities.
Communications coverage of whole country that is effectively utilised for the dissemination of tsunami warning messages	Partially	<p>Cellular services cover 95% of the country.</p> <p>Update February 2009 - Samoa has recently investigated using the District Health Centres HF Radio link as a back up communications mechanism to reach communities. Unfortunately, these HF links no longer exist. DMO now have an Emergency Communications Trailer.</p>
Issue of marine tsunami warnings and guidance for vessels, harbours and ports	Yes	Samoa use Marine Band Radio Channel 16VHF (Very High Frequency), 2182HF as well as doorknocking of vessels in harbour. The vessels would also, more than likely hear the sirens. The Fisheries license system sets a condition that each boat must have a communication system but this could still mean cell phone. Cell phone coverage is limited at sea.

Key Component	Rating	Comment
Emergency Response and Evacuation		
Disaster preparedness and emergency response system has been reviewed and opportunities for improvement and training identified	Yes	The National Tsunami Plan identifies that the DMO in collaboration with the DAC will organise and conduct training on the nature of tsunami, safety procedures and first aid skills through Samoa's Village Program. Exercises have been conducted (D11) with the aim of assessing warning dissemination and response at a local level.
Tsunami emergency response, evacuation and recovery plan exists	Yes	The National Tsunami Plan covers preparedness and response arrangements (including warning dissemination and evacuation). Recovery provisions are included in the NDMP. There are future plans to develop a National Recovery Plan for Samoa. In addition village and school plans exist. More recently, disaster plans for schools have been incorporated into village plans, private schools disaster plans will be developed separately and urban areas will keep their school specific plans. D21 "Disaster Management Office and the National Emergency Operations Centre Evacuation Strategy" outlines the procedures for the evacuation of the DMO or NEOC if the office itself is under threat or damaged.
The designated agency for evacuation is identified and have authority by law	Yes	The National Tsunami Plan identifies the Ministry of Police and Prison as being responsible for the coordination of evacuation within the Apia urban area. Outside of Apia it is the responsibility of the Village Mayor to coordinate evacuations. These bodies have authority by law (the Disaster and Emergency Management Act). The DMO can directly issue instructions for evacuation with Police and Fire Services assisting.
Plans have been made for safe evacuation of population centres including aspects such as maps, routes and signage	Partially	A tsunami evacuation exercise was conducted in Apia (D11). It was assessed that it took approximately 19 minutes to evacuate the some 9000 people from Apia from the time the tsunami warning bulletin was received from PTWC. An Apia evacuation map exists (including safe areas and routes, D25). Shelters for small communities are also identified during community workshops. Also, in the Village Program currently being run, evacuation is included as part of the Village Disaster Plan.
Procedures are tested and exercised to improve the response through better planning and preparedness	Yes	Tsunami exercises are run annually. The most recent exercise involved the whole country (D11). The system was tested in two villages before the national test. These two villages included Sapulu in Savaii and Maasina, Fagaloa in Upolu (D11). Recommendations for improvements to the system were made based on the village exercises before the national test. Observations and lessons learned were completed after each exercise and a list of recommendations made. These recommendations were intended to be the next steps in improving the system. Plans also exist to run exercises for districts and local communities when workshops are held.

Key Component	Rating	Comment
Emergency Response and Evacuation (Continued)		
Land use policies and building codes are in place to mitigate against the tsunami hazard	No	Samoa is working towards an improved National Building Code. The code will be updated after completion of the seismic assessment project being completed by SOPAC. This project will include tsunami. The Ministry of Works is responsible for implementation of the Building Code. Several other projects may assist in improving this aspect of Samoa's end to end system.
Tsunami hazard, vulnerability and risk		
Completion of studies to assess the tsunami hazard in the country or Region	Yes	"A Preliminary Study into the Tsunami Hazard faced by Southwest Pacific Nations" has been completed by Geoscience Australia. Geoscience Australia has also completed "A Probabilistic Tsunami Hazard Assessment of the Southwest Pacific Nations". Both studies include Samoa.
Local risk assessments have been completed for at risk communities	No	In Samoa's NDMP, all coastal areas of Samoa have been graded as high threat. Selection of evacuation sites is based on elevation and location. Ability to undertake local risk assessments is limited in Samoa. All villages in Samoa have gone through the Coastal Infrastructure Management Planning consultation process where some risk assessment has been done. The village based Disaster Risk Management awareness programmes then selection hazards for each village based on the Coastal Infrastructure Management Planning outcomes.
Adequate data exists and local inundation modelling has been completed for population centres	No	No inundation modelling has been completed in Samoa. Samoa is currently in discussions with SOPAC regarding plans to complete inundation modelling for Apia. Both the bathymetry and topography data cover the whole of Samoa. The bathymetry chart was completed by SOPAC in 2007 up to about 20m depth (shallow water and channels missing) and topography is reasonably good (last updated 1999, 2m contours around the coastline and 20m inland).

Key Component	Rating	Comment
Public and stakeholder awareness and education		
Measures have been taken to ensure the public understand and take action in the event of a tsunami warning being issued	Yes	<p>A team made up of various departments is delivering Disaster Risk Management workshops (otherwise known as the "Village Program") to all villages. This program focuses on education and training in risk reduction measures specific to the hazards applicable to each village. Coastal infrastructure management plans have also been developed in the last five years (D15). These plans have incorporated consideration of natural hazards and have been developed in consultation with villages. Village Programs are generally arranged with important community members, the Village Mayor and Women Representatives.</p> <p>This project is due for completion in 2013. This is an all hazard approach and will focus on preparedness. National drills for tsunami will be conducted annually. Media campaign (funded by AusAID) includes developing TV and radio programmes on safety procedures for all hazards. UNESCO will be putting further funds into the UNESCO Cluster Office for the Pacific States in Samoa. The UNESCO office will also assist Samoa DMO in further developing and rolling out its Village Program.</p>
Community level education and preparedness programs exist for tsunami	Yes	See above.
Training programs for the National media exist for natural hazard and tsunami	Yes	Press releases to TV and radio, as well as newspaper articles (D39), on current disaster management issues are ongoing. Workshops on geohazards and cyclones are held annually. DMO and UNESCO organised a Samoa Media Disaster Management Capacity Building Workshop in Apia in October 2008. UNESCO will be putting further funds into the UNESCO Cluster Office for the Pacific States in Samoa. This office will work with the Samoa Disaster Management Office to trial a project with the Samoa media with regard to media education and development of unique disaster management plans for each media organisation.