TsuInfo Alert

prepared by the Washington State Department of Natural Resources on behalf of the
National Tsunami Hazard Mitigation Program
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Tsunami, earthquake detection improved since 2004 disaster

By Cheryl Pellerin, USINFO Staff Writer
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This is the first in a series of articles about U.S. contributions to a global early warning system for tsunamis and other hazards.

Washington -- Peru is two continents and an ocean away from the Indian Ocean, but the speed and accuracy with which a massive earthquake near Lima recently was measured is a direct result of the global response to the 9.1-magnitude temblor and tsunami that struck South and Southeastern Asia on December 26, 2004.

The deadliest disaster in modern history caused the loss of nearly 230,000 people. At the time, the United States and Japan were the only nations whose shores were protected by tsunami early warning systems, and people around the world looked to experts in those countries for help.

Today, in an effort coordinated by the UNESCO Intergovernmental Oceanographic Commission (IOC), a global tsunami warning and mitigation system slowly is taking shape in the world's oceans and along its coastlines.

EARTHQUAKE IN PERU

One hundred to 200 kilometers off the Peruvian coast, tectonic plates that cover the planet are active. There, the Nazca Plate grinds under and pushes up the South American Plate, releasing energy that sometimes becomes an earthquake.

In the early evening on August 15, an 8.0-magnitude earthquake occurred near the coast of central Peru, about 145 kilometers southeast of Lima, according to the U.S. Geological Survey (USGS). The earthquake killed more than 500 people, injuring 1,600 and left tens of thousands homeless.

The National Oceanic and Atmospheric Administration's (NOAA) Pacific Tsunami Warning Center in Hawaii issued and later cancelled a tsunami warning and watch for the Pacific coast of South and Central America, which experienced small tsunami waves less than a meter high.

Among the seismic stations that helped pinpoint and characterize the major earthquake were five new stations that USGS has installed in the Caribbean over the past two years. The agency plans to install four more seismic stations there by the end of 2007.

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Natural Resources
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(*continued from page 1*)

"These newer instruments are making available the kind of data that makes a difference when trying to estimate the kind of earthquake and the magnitude," seismologist Walter Mooney, lead coordinator for the USGS Indian Ocean tsunami warning system program, said during an August 16 USINFO interview.

"The correct magnitude probably came significantly faster and more accurately than it would have in 2004," he added.

Another difference since 2004 is the expanded use of deep ocean assessment and reporting of tsunami (DART) buoys, designed by NOAA's Pacific Marine Environmental Laboratory (PMEL) in Seattle to detect tsunamis as they move across the ocean.

The Peruvian tsunami was detected by a Chilean-owned DART buoy that sent tsunami data to the Pacific Tsunami Warning Center within one hour of tsunami generation. The data were used to provide experimental tsunami forecasts for 13 U.S. ports within two hours of tsunami generation.

"The DART data and forecast were instrumental in the quick cancellation of the warning," said PMEL Director Eddie Bernard, in an August 17 e-mail. "This is the big difference from 2004 to now. With DART data, tsunami forecasts are now possible. Good forecasts lead to good decisions."

TOWARD GLOBAL EARLY WARNING

In Paris in 2005, the IOC, already tasked with helping U.N. member states on the Indian Ocean rim establish a tsunami warning system, created a framework for developing regional early warning systems in the Indian Ocean, the Caribbean and the Mediterranean.

Along with the Pacific Tsunami Warning System that IOC established in 1965, these regional systems would conform to the same standards, ultimately to share data and form a global system for monitoring and detecting a range of natural and other hazards, including tsunamis.

With funding approved by Congress in 2005, the U.S. Agency for International Development Office of Foreign Disaster Assistance (OFDA), NOAA, USGS, the U.S. Forest Service and the U.S. Trade and Development Agency are lending expertise and technology to these efforts.

For the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas, the United States is acting mainly as an observer and technical provider to the lead group, the Instituto Nazionale di Geofisica e Vulcanologia, one of Europe's largest geophysical research institutions.

"We're working very closely with them," NOAA Tsunami Program Manager David Green, said in an August 15 *USINFO* interview, "to develop strategies and work with the different observing systems."

LAND USE AND HAZARDS

Progress has been made in the Mediterranean region to bolster and integrate different national seismic and ocean observing networks, and in transitioning from using the instruments for research to using them as part of an operational early warning system.

For the sea-level stations, Green said, "the first steps are to identify the stations that need to be part of the network, then upgrade them to real time [sea-level reporting], then combine them with the seismic effort to make a system."

Until a full-fledged system is in place for the Mediterranean, Italy will provide 24-hour-a-day watch coverage of seismic data from the seas around Europe. Portugal and Spain are providing access to real-time seismic data.

In the meantime, contemplating Europe's heavily developed and populated coastlines, the Mediterranean group brought to IOC's attention the need to bring hazards and coastal zone practices for mitigation and land adaptation and use into every aspect of coastal life.

As a result, IOC brought together experts from its member states, including the United States, and from the World Meteorological Organization and the U.N. International Strategy for Disaster Reduction. The group will develop a set of guidelines for including ocean hazards in integrated coastal zone management.

The concept of integrated coastal area management has been in place since the 1990s for sustainable management of coastal zones but until now has not been applied to tsunami planning.

More information about the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas is available at the IOC Web site.

An animation of the Peru event is available at NOAA Pacific Marine Environmental Laboratory Web site.

From:
http://usinfo.state.gov/xarchives/display.html?p=washfile-english&y=2007&m=August&x=20070817112121lcnirellep0.9808618

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NTHMP Steering Committee

The next National Conference will be held the week of October 29, 2007, Honolulu, Hawaii. The approved voting structure of the NTHMP Steering Committee (as agreed at the November 2006 meeting) is as follows:
CA, OR, WA, AK, HI, Puerto Rico, U.S. Virgin Islands - 1 vote each
Eastern States - 1 vote
Gulf States - 1 vote
Pacific territories/commonwealths - 1 vote
FEMA-USGS-NOAA-NSF - 2 votes each ♦

Disasters and communities—Understanding social resilience

By Brigit Maguire and Patrick Hagan

From: *The Australian Journal of Emergency Management*, (May 2007) v. 22, no. 2, p. 16-20.
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Abstract

Social resilience is the capacity of social groups and communities to recover from, or respond positively to, crises. In this paper, we review the multifaceted nature of social resilience, and how this capacity is thought to have various properties, notably resistance, recovery and creativity. We also discuss the idea that social groups within a community differ insofar as their levels of resilience and the threats to which they are resilient. While research in the social sciences suggest that social resilience is a 'naturally emergent' response to disaster, we argue that emergency management plans must recognise and build on this capacity, and that improved indicators of social resilience are a priority area for future research.

Introduction

In today's world, the general public experiences disasters in ways unlike any other period in history (Omand, 2005). With each edition of the nightly news, we are able to view images of the latest disaster regardless of where it has occurred. Cheap travel options mean it is easy for us to visit the sites of disaster (see Jagannathan, 2006 on visitors to 'Ground Zero') and, as fuel prices testify, international trade brings tangible consequences of disasters to those far from affected areas.

With this heightened salience comes a growing understanding that authorities cannot prevent all disasters from occurring, or alternatively, shield people from all their consequences (Osterholm, 2005). It is generally acknowledged, for example, that Australia is *inherently* vulnerable to natural disasters (e.g., floods, drought and cyclones) (e.g., Reser & Morrissey, 2005). Furthermore, our democratic culture and participation in various military deployments are often associated with an increased risk of terrorism and while preventative efforts have proved successful in recent years, officials remind us of complexities and inevitabilities (Nolan, 2005; Sydney Morning Herald, 2004).

If it is not possible to totally prevent disasters, or shield people from their consequences, what can be done to minimise disruption and damage? Many government and non-governmental organisations now consider it a priority to strengthen the *resilience* of groups and communities in Australia, and are addressing this through research, policy and program development, as well as in crisis management and education initiatives (e.g., Coghland & Norman, 2004). For example, Emergency Management Australia (EMA) has taken *Building Individual and Community Resilience* to be its current research priority.

Yet, in order to be able to effectively promote resilience, we should first understand what it is. To that end, this paper outlines an understanding of *social* resilience. It provides a basis upon which to develop practical actions to strengthen social resilience in Australia and to guide future research.

The three properties of social resilience

In broad terms, social resilience is the capacity of a social entity (e.g., a group or community) to 'bounce back' or respond positively to adversity (e.g., Almedom, 2005; Landau & Saul, 2004; Omand, 2005). More specifically, social resilience is understood as having three properties comprising aspects of how people respond to disasters: resistance, recovery, and creativity (Kimhi & Shamai, 2004). A community that is highly resilient has the capacity to demonstrate each of these properties.

Resistance relates to a community's efforts to withstand a disaster and its consequences. It can be understood in terms of the degree of disruption that can be accommodated without the community undergoing long-term change, e.g., to its social structure (Adger, 2000). One way to represent this idea is shown in Figure 1a. Here, resistance is the distance between the community's pre-disaster level of functioning (r') and a threshold (t) beyond which the community would be unable to return to its usual state (with t represented by a dotted line). For highly resistant communities, r' and t are far apart—considerable disruption is needed to move the community to the threshold. For less resistant communities, r' and t are close together. (see page 8 for figure)

Recovery relates to a community's ability to 'pull through' the disaster (Adger, 2000; Buckle, Marsh, & Smale, 2000a; Kimhi & Shamai, 2004). It is this property that refers directly to the idea of a community 'bouncing back' to its pre-disaster level of functioning (Breton, 2001). Recovery can be understood in terms of the time taken for a community to recover from a disruption, as shown in Figure 1b. A more resilient community returns to its pre-disaster state quickly and efficiently whereas a less resilient community recovers more slowly, or will fail to recover at all (Aguirre, 2006).

An optimal recovery involves not just returning to an initial equilibrium point. Rather, by adapting to new circumstances and learning from the disaster experience, higher levels of functioning (and thereby resilience) can be attained (Kimhi & Shamai, 2004; Pooley, Cohen, & O'Connor, 2006; Sonn & Fisher, 1998). This is the property of creativity (Kimhi & Shamai, 2004) and is represented by a gain in resilience achieved as part of the recovery process (Figure 1; see page 8).

To illustrate, consider the example of a school community that is affected by a disaster. With respect to resistance, one can imagine a threshold beyond which the

school community changes permanently. For example, a particularly severe disaster may cause many deaths in the community, leaving survivors too afraid or disorganized to attend school, causing the school's eventual closure. A more resilient community may provide support for teachers and students so that normal functioning (e.g., re-established classes) can resume quickly. Indeed, a creative community may learn from the experience and teach its members how to better prepare for future disasters (e.g., teaching people how to recognise tsunami warning signs), so that higher levels of post-disaster resilience are attained.

Aguirre (2006) sees resilience as encompassing all three of these components. In an ongoing process, a resilient community predicts and anticipates disasters; absorbs, responds and recovers from the shock; and improvises and innovates in response to disasters.

Social resilience as multi-faceted

A society's resilience to disasters should not be thought of as a discrete capability. Even relatively straightforward communities contain multiple social groups, and these groups differ in significant ways (Pooley, Cohen, & O'Connor, 2006). Groups may differ in terms of their socio-economic status, their degree of geographic isolation, or vulnerability to psychological trauma. These group differences may mean that different groups within the one society can be more or less resilient to a disaster (Buckle, Marsh, & Smale, 2000b).

Vulnerable social groups, such as the elderly, children, or the economically disadvantaged, may have fewer resources available to cope with disaster. According to Oxfam (2005):

> …disasters, however 'natural', are profoundly discriminatory. Wherever they hit, pre-existing structures and social conditions determine that some members of the community will be less affected while others will pay a higher price. (Oxfam, 2005, p. 1)

This was clearly demonstrated during the South-East Asia tsunami in December 2004. In various countries affected by the tsunami, women were disproportionately impacted. Specifically, in Indonesia, India and Sri Lanka, more women were killed than men. The resulting demographic changes (the gender imbalance) may have a number of long-term negative social consequences, including poor treatment of women and unequal economic freedoms (Oxfam, 2005). Non-government organisations such as Oxfam are attempting to counter such problems by involving women in medical, fire and police roles; registering houses in the names of women as well as men; supporting women's livelihoods; and ensuring wage parity across genders. As well as supporting the recovery of the community, these sorts of activities are a form of creativity. That is, they act to increase the social resilience of the community so that it can minimise similar consequences in the event of another disaster.

Thus, in order to truly understand the social impacts of disasters, and to manage and prevent adverse consequences, we must understand the impacts of disasters on particular groups (Oxfam, 2005). Moreover, it is important to identify the potential 'fracture points' or social cleavages within a community. From this, it may be possible to predict future breakdowns in social resilience in disasters, and to design preventative initiatives.

It is also true that the resilience of a community can vary with different types of disasters (Roisman, 2005). Disasters cover a broad spectrum of events, and can be differentiated in terms of their agent (natural or human-caused), proximity, impact (visible or invisible), size, scope, duration, magnitude, and the number of deaths. Furthermore, Danieli, Brom and Sills (2005) suggest that individuals can be resilient and vulnerable at the same time, depending on the type of disaster (see also Buckle, Marsh & Smale, 2001). A community in a bushfire-prone area might have the social resources to deal with a bushfire, as an experience they are used to. However, at the same time, the community might be more vulnerable to pandemic influenza as an experience they are not used to, and the lack of social resources to deal with.

Disaster management and resilience

Disaster management professionals describe the process of human reaction to disasters as cyclical, having four phases: mitigation, preparedness, response, and recovery (e.g., Comfort, Ko & Zagorecki, 2004: Mileti, 1999). Mitigation is the general process of strengthening a community's capabilities so that it has the resilience to better cope with any future disaster. Preparedness involves anticipation of an imminent disaster, and the creation of a response capability. This includes analysing probable threats, setting up warning and communication systems, response management structures, organising training, and stocking supplies (Mileti, 1999). Response refers to the actions taken during, and immediately after a disaster occurs. The focus here is on saving lives, minimising damage to property and minimising disruption to the community. Recovery is the short- to long-term phase of rebuilding and restoring a community to its pre-disaster state. During this phase damage assessment is completed, and used to inform the reconstruction of housing and infrastructure, and the re-establishment of community institutions.

Mitigation is a vital link in the cyclical process of disaster management, and predominantly takes place after a disaster has already occurred. Similar to the creativity component of social resilience, mitigation involves more than just preparing for, responding to, and recovering from a disaster, but involves implementation of the

lessons learnt in the creation of new policies and activities that will increase the community's resilience (Mileti, 1999). Without mitigation, a community is unlikely to become more resilient in the future, as it continues through cycles of short-term preparation, response and recovery, without any fundamental changes (Moore et al., 2004).

The greatest improvements in social resilience will be achieved when all four stages of the disaster process are considered in emergency management planning. It is vital, however, that such plans recognise the innate nature of social resilience (see also Yates & Anderson-Berry, 2004). It was once thought that panic, social disorder and adverse psychological consequences were expected and normal responses of a community to a disaster. In this 'Hollywood' conception of disasters, resilience and positive coping are seen as rare and unusual (Auf der Heide, 2004). However, research into human reactions to disaster has overwhelmingly recognised that resilience in response to disaster is much more common than suggested by the media, and "mass trauma may not necessarily be a given" (Almedom, 2005, p. 254). In the immediate aftermath of a disaster, communities tend to come together, with more prosocial behaviour being demonstrated by most individuals (Auf der Heide, 2004; Barsksy, Trainor & Torres, 2006). To be effective, emergency management plans need to build on the capacities arising from naturally emergency social resilience.

Indicators of social resilience

An important step for future research is to determine valid indicators of social resilience. While we have an intuitive knowledge of what makes a resilient community, there is as yet little research that systematically sets out such indicators. Methodologically, this may involve the identification of factors that predict higher levels of resilience by comparing communities that have responded differently to similar disasters. To date, the literature would suggest that an array of factors are potentially relevant here, including:

- Trust (e.g., Enemark, 2006)
- Leadership (e.g., Ink, 2006)
- Collective efficacy (e.g., Moore et al., 2004)
- Social capital (e.g., Breton, 2001)
- Social cohesion and sense of community (e.g., Poynting, 2006)
- Community involvement (e.g., Clauss-Ehlers & Lopez-Levi, 2002)
- Existing norms/attitudes/ values (e.g., Oxfam, 2005)
- Communication and information (e.g., Ink, 2006; Rohrmann, 2000)
- Resource dependency (e.g., Adger, 2000)

Research must determine which of these (if any) are predictive of resilience-related outcomes, the degree of overlap amongst them, and indeed whether such factors are themselves driven by more fundamental processes.

Summary and future directions

In this paper, we have outlined a definition of social resilience that will guide our future research. Social resilience is understood as having three properties: resistance, recovery, and creativity. It is a multi-faceted, rather than a discrete capability, and there can be vulnerable groups even within a generally resilient community.

Communities can also be resilient to some disasters and vulnerable to others. Past research strongly suggests that social resilience is a naturally emergent response to disasters, and it is important that emergency management plans recognise and build on this capability.

While Australian society is resilient to most disasters, little is known about the limitations of this resilience. Events such as the 2005 Cronulla riots would suggest, for instance, that there remains the potential for disasters to disrupt the multicultural fabric of Australian society and undermine resilience-building initiatives. Future research must also set out to identify indicators of social resilience and begin to leverage predictive insights through the development of theory and empirical analyses.

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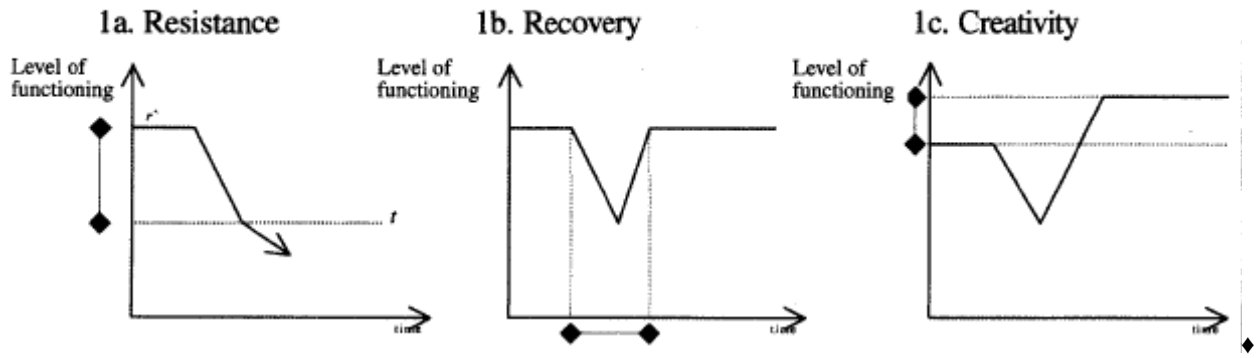
BANDA ACEH, Indonesia—Indonesia will build a $7.5 million tsunami museum in Aceh province to commemorate the 230,000 people who died when towering waves crashed into Asian coastlines nearly three years ago.
For full story and link to poster of museum design:
http://www.mercurynews.com/breakingnews/ci_6680290?nclick_check=1

Figure 1: Properties of resilience (adapted from Adger, 2000)



Seaside Model to Study "Vertical" Tsunami Escape
Media release, 09-12-07

CORVALLIS, Ore. – Seaside, Ore., which has good warning systems, evacuation plans and a reputation as one of the more "tsunami-prepared" communities in the world, will soon get a chance to see whether those plans work and just what these really big waves are like – over, and over, and over, and over again.

As its buildings and infrastructure are repeatedly overwhelmed by giant waves that come rolling in after a massive earthquake, the good news is that it's all being done in a research facility at Oregon State University – and the findings should help not only that community, but many more like it, determine how best to plan for and live through a catastrophic tsunami.

Sitting just miles from the Cascadia Subduction Zone, a geologic fault structure very similar to the one that caused the massive tsunami in East Asia in 2004 and killed about 230,000 people, Seaside will provide a model system to study tsunami behavior, building safety and other issues.

In particular, engineers and scientists want to find out whether many people might be better served by going above, rather than away from an imminent tsunami.

"The Japanese, who have been living with tsunamis for centuries, have developed systems of both conventional evacuation and shelters that are above the wave, and can withstand its force," said Dan Cox, a professor of coastal and ocean engineering, and director of the Hinsdale Wave Research Laboratory at OSU. "The U.S. has not really considered that option."

"But realistically, there will not be much time for whole coastal populations to evacuate to higher ground following a subduction zone earthquake that is very nearby," Cox said. "We need to find out more about what the impact on structures will be from a tsunami, and whether vertical evacuation to certain buildings is a viable approach."

Perfectly suited for that project is the $5 million Tsunami Research Basin at OSU, created with funding from the National Science Foundation through its Network for Earthquake Engineering Simulation, or NEES Program. This unique facility, operated by the OSU College of Engineering, has been turned into a working model of Seaside, with similar undersea terrain, shoreline, and miniature buildings, all waiting for the big one to hit.

And hit it will. Construction on the new model is now complete, sensors are being installed, and this winter the tsunamis will be coming in with regularity. Researchers say the studies on this simulation may take years, but will provide an enormous amount of data and information about how structures withstand the impacts, how the undersea terrain affects the tsunami, how debris can turn into "battering rams" that compound the problems, and many other issues.

Perhaps more than any other coastline in North America, the area from southern British Columbia to Northern California is at great tsunami risk, because of the Cascadia Subduction Zone. An area once believed to be fairly seismically stable – at least by Southern California standards – is now known to be vulnerable to the greatest earthquakes of them all, the types caused by subduction zones.

These massive earthquakes and related tsunamis, such as the one that hit Alaska in 1964 and more recently destroyed villages, towns and cities all over the Indian Ocean, are the most powerful seismic events in the world. They can last for minutes, cause massive building destruction, enormous tsunamis, and in the case of the Pacific Northwest, will come with comparatively little warning.

Scientists say there is a 14 percent chance that the Cascadia Subduction Zone event will happen in the next 50 years. It is believed to be about 300 years since the last known break on this subduction zone, and stresses have been accumulating since that time.

What would that mean to Seaside, or other communities like it? To start, the first massive waves might arrive within 30 minutes. It could happen at any

time, during the day or the middle of the night. Many people, especially unaware tourists or the elderly, may not be able to evacuate vulnerable areas in time.

In this research, scientists will study water flow speed, flow depth, potential forces on infrastructure, and how realistic it is to believe that existing or new structures could serve as close, elevated places people could go to, in order to get above the waves. Computer simulations of such events will now be compared to the "ground truthing" provided by real, physical models of wave impacts.

The study, which is being funded by the Oregon Sea Grant program, will also include interaction with coastal officials and residents, keeping them aware of the findings and the procedures that would be most effective in the event of a tsunami. International interest is expected in the project. And the wave research facilities will allow different scenarios to be explored and tested – over and over again - until scientists fully understand the forces at work.

About the OSU College of Engineering: The OSU College of Engineering is among the nation's largest and most productive engineering programs. In the past six years, the College has more than doubled its research expenditures to $27.5 million by emphasizing highly collaborative research that solves global problems, spins out new companies, and produces opportunity for students through hands-on learning.

From: http://oregonstate.edu/dept/ncs/newsarch/2007/Sep07/seasidestudy.html ♦

Canada's New Government Activates the Atlantic Tsunami Warning System

Fisheries and Oceans Canada
News release: January 23, 2007
http://www.dfo-mpo.gc.ca/media/newsrel/2007/hq-ac01_e.htm
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HALIFAX – The Honourable Stockwell Day, Minister of Public Safety, today announced on behalf of the Honourable Loyola Hearn, Minister of Fisheries and Oceans, an Atlantic tsunami warning system.

"The security of Canadians is a priority of Canada's new government. The devastating tsunami in southeast Asia heightened concerns about tsunami warnings in coastal areas around the world," said Minister Day.

"Today, I'm pleased to announce that we are taking action to strengthen our security by activating a warning system for tsunamis along Canada's East Coast."

The new Atlantic tsunami warning system uses the same equipment and procedures already in place to issue storm surge warnings to government agencies, the media and the public. In fact, the enhancements made to the existing system to allow tsunami warnings will also improve the capacity to predict storm surges, which are much more frequent events on the East Coast.

"This system is bringing together Canada's state-of-the-art earthquake monitoring networks with the best alert technologies available in Atlantic Canada," said the Honourable Gary Lunn, Minister of Natural Resources.

"Earthquakes, whether centered under land or sea, could have a dramatic impact on coastal communities, and systems such as this allow us to quickly alert eastern Canadians to potential hazards."

The tsunami warning system is led by the Department of Fisheries and Oceans (DFO), and the result of collaboration between the federal departments of Natural Resources, Environment Canada, and Public Safety and Emergency Preparedness, with provincial emergency management agencies in the 5 easternmost provinces and the U.S. National Oceanographic and Atmospheric Administration (NOAA). It anticipates the development of an international system for issuing tsunami warnings for the Atlantic and Indian Oceans, similar to the one existing for the Pacific Ocean.

"By linking with the existing weather warning system through Environment Canada's Atlantic Storm Prediction Centre, the new tsunami warning capability ensures Canadians will have access to timely early warnings which may someday save many lives," said the Honourable John Baird, Minister of the Environment.

"We can never be too vigilant in ensuring the safety of our citizens," emphasized Gerald Keddy, MP, South Shore – St. Margaret's. "While we can't stop tsunamis from happening, we can work to avoid the tragic loss of life such as that which resulted from the 1929 Grand Banks tsunami." The new system will continue to be refined and enhanced as technology improves.

Backgrounder:
Atlantic Tsunami Warning System--Why develop a system?

On December 26, 2004, a magnitude 9.0 earthquake occurred off the coast of Indonesia. This triggered destructive tsunami waves that impacted the coasts of Indonesia, Thailand and Sri Lanka, as well as other countries in the Indian Ocean region. There was both an international and Canadian response to this tragedy.

Here in Canada, it was recognized the East Coast lacked a tsunami warning system. While the West Coast receives tsunami warnings via the internationally-coordinated Pacific Tsunami Warning System, there was no equivalent system for the Atlantic Coast. Even though over 70 per cent of tsunami events occur in the Pacific Ocean, due diligence demands that some detection and warning capability also be available on Canada's Atlantic Coast and Gulf of St. Lawrence. It is important to remember the most devastating Canadian tsunami originated on the Grand Banks in 1929 - leaving 29 people dead, many

people homeless, and 50 communities affected in Newfoundland and Labrador and Cape Breton Island, Nova Scotia.

Who has been involved in the development of the Canadian Atlantic Tsunami Warning System?

The development of this system has involved both the Canadian and United States governments and has been done in consultation with provincial emergency management organizations in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick and Quebec. Fisheries and Oceans Canada (DFO) led the initiative, along with Natural Resources Canada (NRCan), Environment Canada (EC), Public Safety and Emergency Preparedness Canada (PSEPC), and the United States National Oceanic and Atmospheric Administration (NOAA). The system will continue to be refined as further infrastructure is developed and international initiatives progress.

The existing procedure used by the EC Atlantic Storm Prediction Centre (ASPC) to issue surge and other weather-related warnings has been significantly enhanced to now include tsunami warnings. The cost of this upgrade is approximately $250,000 and ongoing additional costs are projected to be about $125,000 per year. The improved system will also augment the capacity to predict storm surges, frequent events on the East Coast.

How does the system work?

NRCan, through its Geological Survey of Canada, has enhanced the real-time sharing of seismic data from Atlantic Canada with earthquake/tsunami experts at the U.S. NOAA. Whenever warranted, these experts will relay to the ASPC, the information needed to immediately distribute Atlantic tsunami alerts (warnings, watches and information bulletins) to provincial and federal emergency management authorities, the media and the public in the five easternmost provinces. As well, the Canadian Coast Guard's Marine Communications Traffic Services (CCG-MCTS) will broadcast tsunami alerts to mariners.

DFO has upgraded several Atlantic sea level gauges to collect tsunami-quality data, which the ASPC can monitor for indications of a tsunami and, in consultation with DFO and NRCan, determine the extent of the danger. Once a warning is issued, PSEPC will coordinate any response effort among federal departments and provincial and territorial emergency management organizations.

The ASPC will typically start the warning dissemination process 10-20 minutes after the earthquake event. This is comparable with warning times on the Pacific coast.

Next steps

There are plans in place to test the Atlantic tsunami warning system regularly and refine it.
B-HQ-07-01E(a) ♦

Kuril Island tsunami impact in Crescent City, California 15 November 2006

By Burak Uslu and Aggeliki Barberopoulou
http://ioc3.unesco.org/itic/categories.php?category_no=81
ITIC Newsletter, v. 38, no 4, p. 7-8
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On Wednesday, 15 November 2006 at 11:14:16 (UTC) a large (M_w=8.3) earthquake occurred on the Kuril Islands subduction zone. The event caused a Pacific-wide tsunami which was expected to reach Japan in 64 minutes and California in 8 hours and 20 minutes.

The first wave arrived in Hanasaki, Hokkaido with an amplitude of 30 cm. After the observation of this minor tsunami in Japan, a large tsunami was not expected in Alaska or along the US West Coast.

However, around 11:00 AM Pacific Standard Time (PST), the Crescent City, California, Harbor Control and Emergency offices received a warning for possible strong tsunami surges which were expected to arrive around 11:30 AM. Because the tsunami effect was expected to be relatively minor, a full evacuation was not ordered, but rather targeted verbal warnings were issued for people in the harbor. Mr. Erik Macee from the fishing vessel *Resolution* confirmed that he was warned by the harbor control at around 11:10 PST.

The first wave arrived as expected but it was not noticed by the harbor control. Mr. Macee said he was in his boat when he first noticed the withdrawal. He was able to watch the tsunami from his boat, looking at the water elevation change at the piling and breakwater.

The tsunami surges did not cause any damage until after 2 PM. Mr. Macee said the largest waves arrived around 2 or 2:30 PM. The second in the series of larger waves did the most damage when mooring lines from vessels berthed at Dock H were severed. Dock H had three boats, including the biggest boat in the harbor, *Delana*. The *Delana* was connected directly to the piling, while the other two vessels were connected to the exposed dock. The dock could not resist the strong current and the pull coming from the boats and failed.

The current was so strong, harbor facilities manager Paul McAndrews reported that a white buoy at the entrance of the harbor was buried under water as the current flowed out of the harbor. He also noted that harbor seals and sea lions were not able to swim against the current.

Other witnesses described the tsunami in the harbor as 'flowing like a river'. It caused a whirlpool effect and was flowing in a clockwise direction. Dock H was the first dock in the flow direction and could not resist the flow.

After Dock H, it was just a matter of time before Dock G failed. The loose boats carried pieces of Dock H when they crashed into Dock G and later into Dock F. A large portion of Dock F was also damaged, but it did not move around as did Docks G and H.

Docks E, F and G are used for small craft and sail boats. *Windrose* and *Allarion* are two of the sail boats that use Dock G. Robert Nunneley and Jim Herriott, owners of the vessels, learned about the tsunami and arrived at the harbor around 3:40 PM. They noticed that the currents were still very strong. Their boats, *Windrose and Allarion*, were pushed on to the other boats at Dock C. The Coast Guard helped them to move the boats from Dock C to F.

Sam and Kathleen Burke, who work at a local RV camp, returned to the campground around 2:30 PM. They noticed that the tide level was different than what would be expected for that time. They also observed several water level changes. Mrs. Burke measured the time between wave crests to be 12 minutes. She repeated this for three more waves to confirm her observation.

Public works technician Kevin Tupman came to north harbor around 2:40 PM. He also observed the changes in water level due to the tsunami. Mr. Tupman estimated the distance from the low water mark to the high water mark was some 850 ft. he was at the north harbor from 3 until 4 PM and he saw three full wave cycles, which confirms Mrs. Burke's observation.

Fortunately, it was low tide when the tsunami surges first arrived around 11:30 AM. Total damaged in the harbor is expected to be between $500,000 to $1,000,000. Had the tide been high at the time of the tsunami arrival, damage could have been more severe. ♦

NEWS

Annual ARRL simulated emergency test

The Amateur Radio Relay League (ARRL) has begun preparations for its annual Simulated Emergency Test to help demonstrate amateur radio's readiness and active participation in emergency communications. Starting the first week in October, the annual ARRL Simulated Emergency Test is a nationwide exercise in emergency communications, administered by ARRL Field Organization Leaders across the country.

ARRL is joined in this exercise by the Amateur Radio Emergency Service® (ARES®, ARRL National Traffic System, Radio Amateur Civil Emergency Service (RACES) and several other amateur radio public-service oriented groups. The Simulated Emergency Test gives participants the opportunity to focus on emergency communications capabilities while interacting with public service agencies, organizations and related emergency response groups. Although the main Simulated Emergency Test weekend in 2007 is October 6-7, local and ARRL section-wide exercises may be held throughout the upcoming fall season.

From: Citizen Corps Newsletter, September 2007, p. 8.

Hawaii benefits from added Pacific tsunami stations

Four new DART stations were installed in the northwest Pacific Ocean, east of Japan and Russia, reported a news item dated August 1, 2007. For full article, see http://the.honoluluadvertiser.com/article/2007/Aug/01/br/br3054912786.html

One-third of coastal residents will refuse hurricane evacuation orders

A Harvard School of Public Health survey released last week found that nearly one-third (31 percent) of residents in high-risk hurricane areas would not leave if government officials issued an evacuation order due to the threat of a major hurricane.

Survey respondents gave the following reasons for choosing not to evacuate:

-75 percent said their home is well built and would be safe

-56 percent said the roads would be too crowded

-36 percent feel that evacuation would be dangerous

-33 percent said they worried their possessions would be stolen or damaged

-27 percent said they would not leave their pets

Titled "Project on the Public and Biological Security," the study was conducted in Alabama, Florida, Georgia, Louisiana, Texas, Mississippi, North Carolina, and South Carolina. In addition to noting the reasons for not evacuating, the study also looked at respondents' feelings related to evacuation shelters, household hurricane preparedness, problems facing minorities and low-income residents, and problems during past hurricanes.

The complete study is available here, www.hsph.harvard.edu/news/press- releases/2007-releases/press07242007.html.

From: Disaster Research 483, August 9, 2007. Natural Hazards Center at the University of Colorado, Boulder.

Oregon's tsunami signs go global

According to an article in the News Times (newportnewstimes.com: July 06, 2007) Oregon State University Extension Service Designer, Tom Weeks, translated OSU Extension Sea Grant scientist Jim Good's idea for tsunami signs into the design now used by the five Pacific coastal states.

Recently Somrudee Meprasert, one of Good's graduate students, took copies of the sign to meetings with officials in Thailand. In May 2007, the signs were installed along Thailand's beaches.

From: http://www.newportnewstimes.com/articles/2005/07/06/news/newsl5.txt

Search and Rescue program for special needs population

In western Pennsylvania, the Search and Rescue Development Center works with Project Lifesaver and CERT to design and implement programs for special needs populations. Project Lifesaver issues radio frequency transmitters to people with Autism, Alzheimer's, Downs Syndrome and other disabilities, who could wander away and become lost.

The program offers electronic search specialist training and certification, which is accredited for continuing education hours through the State Department of Health. Project Lifesaver has implemented the "Take Me Home" volunteer registration database, which is available to first responders and contains important information on individuals with special needs so they can be identified in an emergency or disaster.

Project Lifesave also uses the Special Population Planner (SPP), which is the first GIS program of its kind, developed by Argonne National Laboratory and donated to Project Lifesaver to assist with their work. The SPP allows users to visualize emergency planning for the special needs population by entering the data and providing threat scenarios that can be created in layers, along with escape routes, shelter locations and other safety measures that will provide the special needs population with emergency planning equal to or greater than the typical population. Trainings are ongoing and a "Condition Red" program has been added to the local CERT curriculum.

From: Citizen Corps Newsletter, May-June 2007, p. 7
Submitted by Cynthia A. Garfold, Executive Director, Western PA Search and Rescue Development Center. For more information: http://www.wpsardc.org or contact Cynthia at cgarfold@wpsardc.org.

NOAA weather radio all hazards

An all hazards/public alert warning radio is a simple and affordable preparedness tool that anyone can obtain online and in many stores. When deciding on a radio, the National Oceanic and Atmospheric Administration (NOAA)—a Citizen Corps Affiliate—suggests looking for receivers that carry the "Public Alert" logo. The Public Alert Standard (CEA-2009) was developed by the Consumer Electronics Association in conjunction with the National Weather Service. Devices carrying the Public Alert logo meet certain technical standards and come with a number of features, including

- Tone alarm prior to a broadcast, which activates the radio receiver even if the audio is turned off
- SAME technology, or Specific Alert Message Encoding, which allows users to specify the particular area for which they wish to receive alerts
- Events alert selection, which allows the user to turn off the alarm for certain events that may not be important to the user
- Battery backup to provide constant coverage during power outages that often occur during storms
- External antenna jack, which will allow users to connect to a larger antenna (indoors or outdoors) in areas where reception is less reliable

To learn more about NOAA All Hazards/Public Alert radios, please go to http://www.weather.gov/nwr/.

From: Citizen Corps Newsletter, Sept. 2007, p. 5.

Most Americans are not prepared for a disaster

David Paulison, head of the Federal Emergency Management Agency (FEMA), is making it one of his top priorities to educate Americans about being prepared for a disaster. Paulison said he is more adamant than ever about spreading the message, because Americans still aren't listening—even in the aftermath of 9/11 and Hurricane Katrina. His mantra is simple: Have a disaster kit ready with food, water, medicine, and emergency supplies; have an evacuation plan in place; and know where to meet family members if disaster strikes.

A survey done by Citizen Corps revealed that almost one-third of Americans admit they have done nothing to prepare for an emergency. Of this group, the survey results indicate that:

- Nearly half (45%) simply have not thought about it
- One-third (34%) do not think an emergency will happen to them or their family
- One-quarter (25%) think that nothing they can do would be effective
- 24% do not want to think about it
- 21% say that not knowing what to do is a major reason for their lack of preparedness
- 18% say it takes too much time
- 16% say it costs too much money

To access the full survey results and report, visit http://www.citizencorps.gov/pdf/pri_report.pdf

From: Natural Hazards Observer, v. 32, no 1, p. 5
[Editor's note: see www.operationhope.org/pdpg/ listed below for a personal disaster preparedness guide]

'GPS shield' will mean faster tsunami alerts

"The German-Indonesian Tsunami Early Warning System (GITEWS) is being developed by a team led by Jörn Lauterjung of the National Research Centre for Geosciences in Potsdam, Germany. Unlike a GPS method proposed last year, which detects seismic waves transmitted through the Earth's crust to distant receivers, the new ground-based system takes real-time measurements of vertical ground motion - the type of fault movement more likely to produce tsunamis (*Journal of Geophysical Research*, DOI: 10.1029/2006JB004640)."

From: NewScientistTech online, 15 September 2007: http://technology.newscientist.com/article.ns?id=mg19526215.700&print=true

Related article: GPS can help give early warning of tsunamis
http://technology.newscientist.com/article/dn9456

Related link: German-Indonesian Tsunami Early Warning System (GITEWS) project: http://www.gitews.org

Myanmar, Japan cooperate in establishing earthquake warning system

For full story: visit http://www.maung.net/modules.php?op=modload&name=News&file=article&sid=965

Tsunami risk for Hong Kong and Macao

Although Chinese records of tsunamis date back to AD 171, the hazard was largely ignored until the cataclysmic Sumatra tsunami in 2004. However, the structure of the complex plate boundary on the eastern side of the South China Sea, running from Taiwan to the Manila trench, makes shallow subduction-related quakes particularly likely. This problem was highlighted by the quake in December 2006 that hobbled internet traffic in the region when it ripped through subsea data cables. Such earthquakes could also trigger tsunamis.

For full story, visit http://environment.newscientist.com/article/dn12544-tsunami-risk-for-hong-kong-and-macao.html

Scientists propose changing tsunami alerts

Scientists at the Pacific Tsunami Warning Center want to loosen the requirements for issuing tsunami warnings when earthquakes hit near the Hawaiian Islands.

For full story, visit http://news.speeple.com/newsfactor.com/2007/01/03/scientists-propose-changing-tsunami-alerts.htm

Reefs may weaken tsunami

Healthy coral reefs may be able to reduce tsunami run-up on land by half, according to a study published in the December 2006 issue of journal *Geophysical Research Letters* (v. 33, no. 23).

New Zealand upgrades tsunami warning system

There is a trial gauge in Wellington Harbour, and two new gauges will be installed off the coast of the North Island, near Gisborne and Napier. A total of 20 potential sites have been identified. Land Information New Zealand , Institute of Geological and Nuclear Sciences (GNS Science), and National Institute of Water and Atmospheric Research (Niwa) are cooperating on this project.

For the full story: visit http://www.theage.com.au/news/World/NZ-upgrades-tsunami-warning-system/2007/08/05/1186252522923.html

Vietnam all set to build tsunami-quake warning system

Construction of a tsunami and earthquake early warning system will begin in 2008, to be completed in 2011, according to the Central Institute of Geophysics. The 34 seismic stations will be spread all over Vietnam at a distance of 100km-200km from each other.

From: http://www.thanhniennews.com/society/?catid=3&newsid=31255

PUBLICATIONS

Research Digest

The Natural Hazards Center is proud to announce the availability of *Research Digest*, a quarterly online compilation of recent research related to hazards and disasters. It provides the complete references and abstracts (when available) for current research in the field. The aim of *Research Digest* is to advance and communicate knowledge on hazard mitigation and disaster preparedness, response, and recovery within an all-hazards, interdisciplinary framework.

The first issue includes more than 125 articles cataloged between April and mid-August. Additional issues will follow in December and March. The issues are compiled and edited by library and research staff and include more than 35 peer-reviewed publications. Check out the first issue online at www.colorado.edu/hazards/rd.

From: Disaster Research 486, Sept. 20, 2007.

12th Annual Disaster Resource Guide, 2007-2008

"Continuity in a changing world". Also visit the online Guide at http://www.disaster-resource.com.

Citizen Corps Newsletter

You can receive notices by email when each new edition of the newsletter is available. To subscribe or unsubscribe, please send an email to citizencorps@dhs.gov.

To get back issues, visit http://www.citizencorps.gov/news/enews/

Preparedness publications available from FEMA

Disasters disrupt hundreds of thousands of lives every year. Each disaster has lasting effects, both to people and property. To help communities, families, and individuals get informed, the Federal Emergency Management Agency (FEMA) offers free publications designed to provide assistance in planning and preparing for disasters.

The "Are You Ready?" guide provides step-by-step approach to disaster preparedness, showing the reader how to gain knowledge of local emergency plans, how to identify hazards that affect their area and instructing them

on the development and maintenance of an emergency communications plan and a disaster supplies kit.

Other FEMA publications:

- Preparing for Disaster – FEMA 475
- Helping Children Cope with Disaster – FEMA 478
- Food and Water in an Emergency – FEMA 477
- Preparing for Disaster for People with Disabilities and other Special Needs – FEMA 476
- Disaster Preparedness Coloring Book – FEMA 243E

To obtain these publications and many more, visit www.fema.gov, or call the FEMA Distribution Center a 1-800-480-2520. You can also request them by mail from Federal Emergency Management Agency, PO Box 2012, Jessup, MD 20794-2012.

From: Citizen Corps Newsletter, July 2007, p. 3

Environmental Disasters, Natural Recovery and Human Responses

Roger del Moral and Lawrence R. Walker. 2007. 209 p. ISBN 0-521-67766-1. Cambridge University Press; (845) 353-7500; www.cambridge.org.

Volcanic eruptions, earthquakes, hurricanes, tsunamis, floods, landslides, fires and other natural events are becoming more frequent and their consequences more devastating. In this book, biology professors del Moral and Walker provide a comprehensive summary of the diverse ways in which natural disasters disrupt humanity and how humans cope. Burgeoning human numbers, shrinking resources, and intensification of disaster consequences have produced a crisis of unparalleled proportions. Through this detailed study, the authors provide a template for improving restoration to show how relatively simple approaches can enhance human well-being and that of the other species on the planet. Detailed examples are presented throughout the text, providing a greater depth of coverage and creating stronger links between science, culture, and history.

From: Natural Hazards Observer, v. 32, no. 1, p. 14.

2007 Workshop Materials Available Online

Each summer, hazards researchers and professionals from federal, state, and local government, nonprofit organizations, and private industry convene in Boulder, Colorado, for the Natural Hazards Center's Annual Hazards Research and Applications Workshop. Participants debate, explore, and share information on a wide range of issues. This year's workshop included discussion of the legacy of Gilbert F. White, social vulnerability, the National Flood Insurance Plan evaluation, pets in disasters, and much more.

Brief session summaries, abstracts of research and projects presented, and some photographs of the event are now available online at www.colorado.edu/hazards/workshop/2007/.

From: Disaster Research 486, Sept. 20, 2007

Washington tsunami evacuation brochures

Tsunami Evacuation Brochures: New and revised tsunami evacuation brochures for the following communities are available online at http://www.dnr.wa.gov/geology/hazards/tsunami/evac/:
- GRAYS HARBOR COUNTY: Aberdeen and Hoquiam; Cosmopolis and South Aberdeen; Ocean City, Copalis Beach, Pacific Beach, and Moclips; Ocean Shores and vicinity; Westport, Grayland, and Acosta
- JEFFERSON COUNTY: Hoh Reservation
- PACIFIC COUNTY: Bay Center and vicinity; Long Beach and Ilwaco; North Cove and Tokeland; Ocean Park and vicinity; Raymond and South Bend
- WHATCOM COUNTY: Bellingham; Lummi Reservation; Point Roberts; Sandy Point

WEBSITES

http://www.iaem.com/NCCP2007Presentations.htm

The 2007 National Conference on Community Preparedness was hosted jointly by the International Association of Emergency Managers (IAEM) and the National Emergency Management Association (NEMA). The event was open to all who are interested in making their communities safer, stronger, and better prepared for all types of hazards. A long list of presentations, handouts, and reference materials from the conference are available here.

From: Disaster Research 483, August 9, 2007. Natural Hazards Center at the University of Colorado, Boulder.

http://www.homesafetycouncil.org/expert_network/en_blaug07_w001.aspx

Bottom Line: Helping People Get Ready and Know What to do for Disaster. As more studies show that the majority of Americans are not prepared for disaster, this resource from the Home Safety Council gives tips for "engaging the disengaged" and helping people become ready for a catastrophic event. Tips include avoiding the "all-hazards" approach and asking people to prepare only for events that can happen where they live, presenting information in simple terms, using images to show people the best practices, and clearly explaining what to do and why. A list of resources is also available.

From: Disaster Research 483, August 9, 2007. Natural Hazards Center at the University of Colorado, Boulder.

http://onlinepubs.trb.org/onlinepubs/trnews/trnews250_p14-17.pdf

"Conceptualizing and Measuring Resilience: A Key to Disaster Loss Reduction"
This featured article in the May/June issue of TR News, from the Transportation Research Board of the National Academies, explores the components and dimensions of resilience, and its implications for disaster response. Disaster resilience, according to the authors, can be measured by the functionality of an infrastructure system after a disaster and also by the time it takes for a system to return to previous levels of performance.

From: Disaster Research 484, August 23, 2007; Natural Hazards Center; Institute of Behavioral Science, University of Colorado.

http://www.ready.gov/america/about/instructional.html

Ready.gov: Instructional Videos
In order to encourage Americans to prepare themselves, their families, and their communities, the U.S. Department of Homeland Security and The Advertising Council have created these instructional videos to help educate and empower Americans to prepare for and respond to all kinds of emergencies. The videos, in English and Spanish, are designed to show how American families can get an emergency supply kit, make a family emergency plan, and be informed about the different types of emergencies in their community.

From: Disaster Research 484, August 23, 2007; Natural Hazards Center; Institute of Behavioral Science, University of Colorado.

http://www.fema.gov/oer/reference/index.shtm

"A Reference Guide for Accommodating Individuals with Disabilities in the Provision of Disaster Mass Case, Housing and Human Services"

The Federal Emergency Management Agency (FEMA) has released a new reference guide that outlines existing legal requirements and standards relating to access for people with disabilities. The guide summarizes equal access requirements for people with disabilities within disaster mass care, housing, and human services functions, and explains how applicable federal laws relate to government entities and non-government, private sector, and religious organizations.

From: Disaster Research 484, August 23, 2007; Natural Hazards Center; Institute of Behavioral Science, University of Colorado.

http://www.naco.org/Template.cfm?Section=Surveys&template=/ContentManagement/ContentDisplay.cfm&ContentID=21623

"Emergency Management in County Government: A National Survey" In 2006, the National Association of Counties commissioned the National Center for the Study of Counties to conduct this survey assessing key aspects of county emergency management, including organizational structure, budgets and funding, personnel and training, use of technology, and ways counties collaborate with other government entities and non-governmental organizations.

Findings include the following: more than three-fourths of counties have established an emergency management agency; most emergency management agency heads have duties beyond emergency management; and about two-thirds of counties have conducted some type of emergency management training exercise within the last year.

From: Disaster Research 484, August 23, 2007; Natural Hazards Center; Institute of Behavioral Science, University of Colorado.

http://users.rcn.com/pgordon/homeland/stateofEM.html

"The State of Emergency Management and Homeland Security" This article, first printed in the PA Times (a publication of the American Society for Public Administration), asks the following questions: "What is the present state of the two fields of emergency management and homeland security? Should they even be viewed as separate fields?" Paula Gordon explores the differences between those working in emergency management and those in the relatively new field of homeland security.

From: Disaster Research 484, August 23, 2007; Natural Hazards Center; Institute of Behavioral Science, University of Colorado.

http://www.GUIDErequest.com/CCR

Effective, timely response to a mass fatalities incident requires just-in-time, accurate information. The National Mass Fatalities Institute Online Resource Center provides an electronic library for the mass fatalities management community, researchers, and the general public. Planners, educators, and responders will find links to a broad range of information on planning, prevention, response, and recovery. Sources include government, education, military and non-profit service sites.

Go to the URL above to link to these resources.

From: 12th Annual Disaster Resource Guide, 2007-2008, p. 156.

http://fe12.news.re3.yahoo.com/s/afp/20070828/sc_afp/environmentclimate

Natural Disasters More Destructive than Wars.
Jan Egeland, former United Nations head of humanitarian affairs, said last week that natural disasters devastate seven times more people than war does, and that global climate change will only worsen natural disaster impacts. "Climate change, it's happening. It's not a threat," Egeland said.

http://www.empower-women.com/mc/page.do

EMPOWER (Emergency Management Professional Organization for Women's Enrichment)
This emergency management organization for women was created to build a platform where professionals can come together to share experiences, build skills, and expand and deepen industry knowledge. EMPOWER helps facilitate the advancement and enrichment of women in emergency management.

From: Disaster Research 485, Sept. 6, 2007: Natural Hazards Center at the University of Colorado

http://www.govexec.com/story_page.cfm?articleid=37855&dcn=e_gvet

FEMA Looks to Private Sector for Disaster Provisions
This Government Executive article shows how the Federal Emergency Management Agency (FEMA) is increasingly outsourcing responsibilities to the private sector, termed "third-party logistics." FEMA officials claim these arrangements will improve the agency's response.

From: Disaster Research 485, Sept. 6, 2007: Natural Hazards Center at the University of Colorado

http://www.em-dat.net/documents/Annual%20Disaster%20Statistical%20Review%202006.pdf

Annual Disaster Statistical Review 2006
Every year, the Centre for Research on the Epidemiology of Disasters (CRED) reports on the effects of disasters on human populations. This first Annual Disaster Statistical Review is an analysis of the disaster figures in 2006 compared to 2005 and 2000-04. The 2006 CRED report of disasters and their damages is online: http://www.em-dat.net/documents/Confpress%202006.pdf.

From: Disaster Research 485, Sept. 6, 2007: Natural Hazards Center at the University of Colorado

http://www.govtech.com/em/articles/118808

"Planning Ahead." This article provides tips and useful advice on creating an effective emergency management Web site. Drawing on the results of a study conducted at the American University in Washington, DC, author Sherry Watkins discusses how to provide user-friendly disaster information and communicate effectively with the public online.

From: Natural Hazards Observer, v. 32, no. 1, p. 18.

http://www.operationhope.org/pdpg/

Personal disaster preparedness guide, developed by Operation HOPE. This easy-to-use guide allows users to fill in important information, including emergency contacts, phone numbers, necessary medications, and meeting locations. The site then turns that information into a convenient "Personal Disaster Preparedness Guide" to be readily accessed during and after disaster.

From: Natural Hazards Observer, v. 32, no. 1, p. 18.

http://www.sia.org/frg_files/

First responders guide to satellite communications was produced by the Satellite Industry Association. It is a comprehensive overview and tutorial of satellite technology and its role in the response to natural and human-induced disasters. Included in the guide is a glossary of terms, an overview of satellite capabilities, and easy-to-follow steps for using satellite data.

From: Natural Hazards Observer, v. 32, no. 1, p. 18.

http://cdd.unm.edu/products/tips_web020205.pdf

Special populations: Tips for first responders was developed for first responders and emergency professionals by the University of New Mexico Center for Development and Disability and presents easy-to-understand tips on how to assist people with various types of disabilities, including mobility, visual, or hearing impairments; cognitive disabilities; and multiple chemical sensitivities.

From: Natural Hazards Observer, v. 32, no. 1, p. 18.

http://www.opencrs.com/rpts/RL34146_20070827.pdf

Congressional Research Service, FEMA's Disaster Declaration Process: A Primer (CRS Report to Congress)

This Congressional Research Service report to Congress addresses the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which authorizes the president to issue "major disaster" or "emergency" declarations before or after catastrophes occur. The report explains in depth the process by which disaster declarations are made.

From: Disaster Research 486, Sept. 20, 2007

CONFERENCES

November 11-14, 2007

55th IAEM annual conference & EMEX 2007, Reno, Nevada. This annual conference provides a forum for current trends and topics, information about the latest tools and technology in emergency management and homeland security, and advances in International Association of Emergency Managers (IAEM) committee work. Sessions encourage stakeholders at all levels of government, the private sector, public health, and related professions to exchange ideas on collaborating to protect lives and property from disaster. info@iaem.com; http://www.iaem.com/events/Annual/intro.htm

From: Natural Hazards Observer, v. 32, no. 1, p. 21.

November 21-23, 2007

2007 Emergency Preparedness Conference, Vancouver, British Columbia, sponsored by Pacific Northwest Preparedness Society. This conference supports the evolving disaster management field by inviting speakers

from all jurisdictions across Canada and the United States to discuss new ideas, concepts, and technology and to share this knowledge with delegates from the region. This, in turn, provides an opportunity for community emergency practitioners to improve their knowledge and skill level and keep abreast of new and improving technology and concepts of operation.
epconference@vancouver.ca;
http://www.jibc.ca/epconference/.

From: Natural Hazards Observer, v. 32, no. 1, p. 21.

April 1-2, 2008

Partners in Emergency Preparedness Conference, Tacoma, Washington. This conference has grown into the largest emergency management conference in the Pacific Northwest, bringing together nonprofit organizations, public agencies, business and industry, military, healthcare, and schools to explore emergency management issues, principles, and practices. The theme for the 2008 conference is "It's a Different World: Looking to the Future." PartnersCurriculum@gmail.com;
http://capps.wsu.edu/conferences/emergencyprep/.

From: Natural Hazards Observer, v. 32, no. 1, p. 23. ♦

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Idea for all coastal states and regions

Bringing hazard information together in Maryland
Reprinted with permission

Many agencies typically work on state coastal hazards issues, which can make it hard for property owners, teachers and students, and even coastal resource managers to know where to turn for information and assistance. To solve this dilemma, Maryland coastal managers helped lead an effort to bring together all the state's coastal hazards information and tools onto a single website.

"Our vision was having a one-stop shop for coastal hazards in Maryland," says Audra Luscher, coastal hazards specialist for the Maryland Department of Natural Resources Coastal Zone Management Program. "We've been working on hazards for five years, and we wanted a centralized place where everyone could access all the great stuff we've been working on"

The result is Maryland Shorelines Online, a coastal hazards Web portal that enhances state agency coordination and provides information to a variety of users on assistance and tools needed to understand, assess, and manage hazards issues.

The Web portal provides everything from policies and regulations to information on technical and financial assistance. It gives users access to geographic information system (GIS) maps and shoreline inventory tools, as well as teacher lesson plans and fact sheets.

"We were at one of those points where technology became available that could meet our needs," Luscher says. "Internet mapping systems became more accessible and widely used and will soon allow us to include very memory-intensive data sets, such as lidar elevation data."

The Maryland Coastal Program worked with Towson University Center for Geographic Information Sciences and Maryland Geological Survey to develop and design the website.

Luscher notes that there was "a lot of discussion up front" between state agencies working on hazards issue to determine the scope and content of the website. Needs assessments of various groups, including local and county governments and citizens' groups, also were used.

"We wanted to tailor it to all of our needs," she says.

One of those needs included developing a training manual and users' guide for the site. In addition to sending out press releases and working with the media to attract users, coastal program staff members went on the road to festivals and meetings and provided training sessions to targeted user groups.

Survey feedback shows that the site is being used by a "wide network of users," Luscher says, with homeowners using the site the most. Government staff members also are using the site to work with homeowners to help them understand their hazards risks.

"The Web was the perfect tool for this," Luscher says. "When you have aerial imagery and can see water overlying the majority of a county, it's easier for homeowners to understand. It's also easy for resource managers to print one page off and have a dialogue about it."

To view Maryland Shorelines Online, go to http://shorelines.dnr.state.md.us.

From: *Coastal Services,* v. 10, no. 4, p. 7. ♦

NTHMP Partners -- Update.

According to website nthmp.tsunami.gov/partners.html, The National Tsunami Hazard Mitigation Program partners now include USGS, DHS/FEMA, NSF, NOAA and state, territorial and commonwealth partners: Alaska, Hawaii, Oregon, Washington, California, Texas, Louisiana, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware, New Jersey, New York, Rhode Island, Connecticut, Massachusetts, New Hampshire, Maine, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Northern Mariana Islands, and Marshall Islands ♦

Volume 26, Number 1 (2007) of the *Science of Tsunami Hazards* journal is now available at http://www.tsunamisociety.org/OnlineJournals07.html

http://www.csc.noaa.gov/psc/project_pages/tsunami.html

Hawaii Tsunami Hazard Information Service

Overview

The Tsunami Hazard Information Service provides residents and visitors of the State of Hawaii online access to the tsunami evacuation zones maps, as well as general tsunami awareness information.

To find out if you are located in a tsunami evacuation zone, enter your address or select an island area in the search boxes below.

Search By Address

Address:

City:

Zip:

Submit: Search Address

Search By Island Area

Island Area:

Island Area

Submit: Search Island Area

The Tsunami Hazard Information Service was developed using the Hazard Education and Awareness Tool (HEAT) Web site template. To find out more information on HEAT and how else it can be used, contact Russell.Jackson@noaa.gov.

Also available at :

http://www.prh.noaa.gov/ptwc/hawaii.php

http://www5.hawaii.gov/tsunami/

http://www.prh.noaa.gov/hnl/pages/tsunami.php ♦

Material added to the NTHMP Library,
September - October 2007

Note: These, and all our tsunami materials, are included in the online (searchable) catalog at http://www.dnr.wa.gov/geology/washbib.htm. Type 'tsunamis' in the Subject field to get a full listing of all the tsunami reports and maps in the collection.

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Darienzo, Mark, 2003, Tsunami sign placement guidelines: Oregon Department of Geology and Mineral Industries Open-File Report 03-06, 11 p.

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STATE EMERGENCY MANAGEMENT OFFICES
updated 3-31-2006

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PO Box 5750
Fort Richardson, AK 99505-5750
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Fax (907) 428-7009
http://www.ak-prepared.com/

California Office of Emergency Services
3650 Schriever Ave.
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http://www.oes.ca.gov/

Hawaii State Civil Defense, Dept. of Defense
3949 Diamond Head Road
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(808) 733-4300; Fax (808) 733-4287
http://www.scd.state.hi.us

Oregon Division of Emergency Management
PO Box 14370
Salem, OR 97309-50620
(503) 378-2911; Fax (503) 373-7833
http://www.oregon.gov/OOHS/OEM/

Washington State Military Dept.
Emergency Management Division
Camp Murray, WA 98430-5122
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http://emd.wa.gov

Provincial Emergency Program
455 Boleskin Road
Victoria, BC V8Z 1E7 Canada
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http://www.pep.bc.ca/

INFREQUENTLY ASKED QUESTIONS

COMPILED BY LEE WALKLING

*How might white pumice from Thera have been placed in Tel Habuwa, Egypt?

"Researchers in Tel Habuwa, Egypt, found white pumice in the northern Sinai desert that some suggest came from the ancient eruption of Santorini [Thera], some 850 kilometers away. The Greek island of Santorini, in the Mediterranean north of Crete, erupted in the 17th century B.C., killing about 35, 000 people and devastating the island. An ensuing large tsunami may have carried the pumice inland." –The Associated Press, April 3, 2007.

From: Geotimes, v. 52, no. 8, p. 11.

*How many Citizen Corps councils are there in the U.S.?

Currently there are **2,262** Councils which serve **217,392,111** people or **76%** of the total U.S. population

Citizen Corps asks you to embrace the personal responsibility to be prepared; to get training in first aid and emergency skills; and to volunteer to support local emergency responders, disaster relief, and community safety.

From: http://www.citizencorps.gov/

(To subscribe to the Citizen Corps newsletter, see page 13, under "PUBLICATIONS")

*Where is Europe's first tsunami station located?

Europe's first tsunami detecting and alert station is to be situated some 150 kilometres off the Algarve coast, according to an August 2007 report by the Portugal News Online.

From: http://www.the-news.net/cgi-bin/article.pl?id=922-11 ♦

VIDEO-CD-DVD RESERVATIONS

To reserve tsunami videos, CDs or DVDs, contact *TsuInfo Alert* Video Reservations, Lee Walkling, Division of Geology and Earth Resources Library, 1111 Washington St. SE, MS 47007, Olympia, WA 98504-7007; or e-mail lee.walkling@dnr.wa.gov

Adventures of Disaster Dudes (14 min.). Preparedness for preteens. American Red Cross.

The Alaska Earthquake, 1964 (20 min.) Includes data on the tsunamis generated by that event.

Business Survival Kit for Earthquakes & Other Disasters; What every business should know before disaster strikes (27 min.). Global Net Productions for the Cascadia Regional Earthquake Workgroup, 2003. With CD disaster planning toolkit & other data.

Cannon Beach Fire District Community Warning System (COWS) (21 min.) Explains why Cannon Beach chose their particular warning system.

Cascadia: The Hidden Fire–An Earthquake Survival Guide (10 min.). Global Net Productions, 2001. A promo for a documentary about the Cascadia subduction zone and the preparedness its existence demands of Alaska, Oregon and Washington states. Includes mention of tsunamis.

Disasters are Preventable (22 min.) Ways to reduce losses from various kinds of disasters through preparedness and prevention.

Disaster Mitigation Campaign (15 min.). American Red Cross; 2000 TV spots. Hurricanes, high winds, floods, earthquakes.

Earthquake…Drop, Cover & Hold (5 min.). Washington Emergency Management Division. 1998.

Forum: Earthquakes & Tsunamis (2 hrs.). CVTV-23, Vancouver, WA (January 24, 2000). 2 lectures: Brian Atwater describes the detective work and sources of information about the Jan. 1700 Cascadia earthquake and tsunami; Walter C. Dudley talks about Hawaiian tsunamis and warning systems.

International Tsunami Information Centre, 2004, Tsunami warning evacuation news clips and video footage, UNESCO /IOC International Tsunami Information Centre, 1 **DVD**, 12 min.

Killer Wave: Power of the Tsunami (60 min.).National Geographic video.

Mitigation: Making Families and Communities Safer (13 min.) American Red Cross.

Not Business as Usual: Emergency Planning for Small Businesses, sponsored by CREW (Cascadia Regional Earthquake Workgroup) (10 min.), 2001. Discusses disaster preparedness and business continuity. Although it was made for Utah, the multi- hazard issues remain valid for everyone. Websites are included at the end of the video for further information and for the source of a manual for emergency preparedness for businesses.

Numerical Model Aonae Tsunami–7-12-93 (animation by Dr. Vasily Titov) and Tsunami Early Warning by Glenn Farley, KING 5 News (The Glenn Farley portion cannot be rebroadcast.)

Ocean Fury--Tsunamis in Alaska (25 min.) VHS and **DVD**. Produced by Moving Images for NOAA Sea Grant College Program, 2004.

The Prediction Problem (58 min.) Episode 3 of the PBS series "Fire on the Rim." Explores earthquakes and tsunamis around the Pacific Rim

Protecting Our Kids from Disasters (15 min.) Gives good instructions to help parents and volunteers make effective but low-cost, non-structural changes to child care facilities, in preparation for natural disasters. Accompanying booklet. Does NOT address problems specifically caused by tsunamis.

The Quake Hunters (45 min.) A good mystery story, explaining how a 300-year old Cascadia earthquake was finally dated by finding records in Japan about a rogue tsunami in January 1700

Raging Planet; Tidal Wave (50 min.) Produced for the Discovery Channel in 1997, this video shows a Japanese city that builds walls against tsunamis, talks with scientists about tsunami prediction, and has incredible survival stories.

Raging Sea: KGMB-TV Tsunami Special. (23.5 min.) Aired 4-17-99, tsunami preparedness in Hawaii.

The Restless Planet (60 min.) An episode of "Savage Earth" series. About earthquakes, with examples from Japan, Mexico, and the 1989 Loma Prieta earthquake.

Run to High Ground (14 min.). Produced by Global Net Productions for Washington Emergency Management Division and Provincial Emergency Program of British Columbia, 2004. Features storyteller Viola Riebe, Hoh Tribe. For K-6 grade levels. Have video and **DVD** versions.

Tsunami and Earthquake Video (60 min.). "Tsunami: How Occur, How Protect," "Learning from Earthquakes," "Computer modeling of alternative source scenarios."

Tsunami: Killer Wave, Born of Fire (10 min.). NOAA/ PMEL. Features tsunami destruction and fires on Okushiri Island, Japan; good graphics, explanations, and safety information. Narrated by Dr. Eddie Bernard, (with Japanese subtitles).

Tsunami: Surviving the Killer Waves (13 min.). 2 versions, one with breaks inserted for discussion time.

Tsunami Chasers (52 min.). Costas Synolakis leads a research team to Papua New Guinea to study submarine landslide-induced tsunamis. Beyond Productions for the Discovery Channel.

Tsunami Evacuation PSA (30 sec.). DIS Interactive Technologies for WA Emergency Management Division. 2000.

TsunamiReady Education CD, 2005, American Geological Institute Earth Science Week kit.

Understanding Volcanic Hazards (25 min.). Includes information about volcano-induced tsunamis and landslides.

UNESCO/IOC International Tsunami Information Centre, 2005, U.S. National Tsunami Hazard Mitigation Program public information products—B-roll footage, tsunami science, warnings, and preparedness: UNESCO/IOC International Tsunami Information Centre, 1 **DVD,** 57 min.

The Wave: a Japanese Folktale (9 min.) Animated film to start discussions of tsunami preparedness for children.

Waves of Destruction (60 min.) An episode of the "Savage Earth" series. Tsunamis around the Pacific Rim.

Who Wants to be Disaster Smart? (9 min.). Washington Military Department/Emergency Management Division. 2000. A game show format, along the lines of *Who Wants to be a Millionaire*?, for teens. Questions cover a range of different hazards.

The Wild Sea: Enjoy It...Safely (7 min.) Produced by the Ocean Shores Wash. Interpretive Center, this video deals with beach safety, including tsunamis. ♦

Stop the Presses

PTWC website redesigned
By Brian Shiro and Nathan C. Becker
From: *Tsunami Newsletter*, Jan.-Mar. 2007, p. 15-17

We are pleased to announce a major overhaul and upgrade of the NOAA Pacific Tsunami Warning Center (PTWC) website. We hope that visitors to the website, whether they are emergency management professionals or members of the general public, will find its greatly improved presentation to be more intuitive and useful when they need information about recent tsunami-related events.

After visitors point their web browsers to the PTWC website (http://www.prh.noaa.gov/ptwc), they will see a global summary of seismic events and tsunami hazards analyzed by PTWC for the last 90 days, including any ongoing event. A colored banner at the top of the window indicates the current tsunami thread level (i.e., green=low, yellow=moderate, orange=high, red=severe), and clicking on this banner shows the most recent message sent by PTWC. Below the banner is an interactive map with a corresponding table using the same color scheme to show the locations of recent earthquakes and their tsunami risk as report in current and past PTWC tsunami messages. If the visitor clicks on any event on the map or "html" under the "Details" column in the table, the browser will then show a detailed description of the event, including a map of the earthquake region. Clicking on the detailed map or the "Message Text" link on the event's webpage will display the original text of the PTWC tsunami message in the browser. Alternately, the visitor can find the PTWC tsunami messages directly form the homepage by selecting "text" under the "Details" column in the event table.

Though PTWC only provides preliminary scientific data about earthquakes soon after they occur, the United States Geological Survey (USGS) continues to analyze the earthquake and will later provide improved estimates of the earthquake's parameters. As these improved data become available, PTWC will also update its website to include the newer data in order to avoid confusion for our customers when, for example, PTWC's preliminary magnitude estimate differs from the better-constrained magnitude later determined by the USGS. Therefore, visitors to the PTWC website will always have access to the most current and accurate data without having to visit multiple websites. In addition to the global summary map and table, the new PTWC home page also includes tabbed windows for each of PTWC's customer groups: the countries located in the Pacific Ocean, Indian Ocean, and the Caribbean Sea, plus the state of Hawai'i. Each of these windows follows the same scheme as described above for the global summary page, but the information displayed under each tab is only relevant to the specific regions.

The menu bar on the left side of the PTWC website contains links to useful information. The "About Messages" page describes each message product that PTWC issues, and website visitors can also access this page by clicking on any map legend. The "Information" section contains links to many resources, and the "FAQ" page in particular contains a useful list of frequently asked questions. The "History" and "Responsibilities" pages describe the organization of the Tsunami Warning System and how NOAA's two tsunami warning centers divide and share their responsibilities. The "Contact Us" page allows users to securely send feedback to PTWC.

PTWC's "Really Simple Syndication" (RSS) feeds drive the content of its new website. These live feeds broadcast PTWC's tsunami messages to anyone who wants to receive them via a RSS newsreader on a computer or mobile device. The "Subscribe" page on PTWC's website provides links to each of PTWC's RSS feeds, which are also conveniently available via the "XML RSS Feeds" link at the top of the left menu bar or the RSS symbol at the far right of the browser's address bar. In the future, PTWC also will produce other kinds of message feeds in such formats at Common Alerting Protocol (CAP) and Keyhole Markup Language (KML), the latter of which allows information to be displayed in Google Earth. For those users who prefer to receive information via email, PTWC's messages are still available through the International Tsunami Information Center's (ITIC's) electronic mailing list, which can also be accessed via the "Subscribe" page on the PTWC website or from the ITIC website.

Eventually, PTWC's website will move from its present server in Honolulu to a more robust set of redundant servers on the U.S. mainland. This transition will facilitate the inclusion of even more features, such as the ability to look up archived tsunami messages from a database. NOAA plans to eventually have its two tsunami warning centers merge their websites into a single site and locate it at http://www.tsunami.gov. Until then, PTWC's website will have the same address it has had for many years: http://www.prh.noaa.gov/ptwc.

Please check it out and give us your feedback. Mahalo!

Collaborative effort leads to distribution of Tsunami Travel Time (TTT) software
From: *Tsunami Newsletter*, Jan.-Mar. 2007, p. 17

U.S. NOAA's National Geophysical Data Center, as the World Data Center (WDC) for Solid Earth Geophysics—Tsunamis, and the IOC's International Tsunami Information Centre (ITIC), are collaborating to provide, free of charge, tsunami travel time calculation and display software to government organizations involved in providing tsunami warning and mitigation services.

The Tsunami Travel Time (TTT) software was developed by Dr. Paul Wessel (Geoware, http://www.geoware-online.com) and is used by the NOAA Pacific Tsunami Warning Center for its operations calculations. Map graphics are made using the open-source Generic Mapping Tools (GMT) developed by Drs. Paul Wessel and Walter Smith (http://gmt.soest.hawaii.edu). The ITIC has purchased the TTT license to permit widespread free distribution.

The TTT software calculates first-arrival travel times n a grid for a tsunami generated at a given source location(s), such as an earthquake epicenter(s). The technique used by the software to compute travel times over an entire grid is an application of Huygen's principle. The principle states that all points on a wavefront are point sources for secondary spherical waves. Minimum travel times are computed over the grid starting at the point of interest (e.g., earthquake epicenter). From the starting point, times are computed to all surrounding points. The grid point with minimum time is then taken as the next starting point and times are computed from there to all surrounding points. The starting point is continually moved to the point with minimum total travel time until all grid points have been evaluated. This technique is explained in Shokin, Y. I.; Chuborav, L. B.; Novikov, V. A.; and Sudakov, A. N., "Calculations of tsunami travel time charts in the Pacific Ocean—models algorithms, techniques, results," Science of Tsunami Hazards, v. 5, no. 2, p. 85-113.

(Available online at http://epubs.lanl.gov/tsunami/).

U.S. National Tsunami Hazard Mitigation Pacific Region Program Meeting, 14-15 March 2007, Seattle

From: *Tsunami Newsletter*, Jan.-Mar. 2007, p. 17

The U.S. National Tsunami Hazard Mitigation Program (NTHMP),Pacific Region met at the NOAA Pacific Marine Environmental Laboratory (PMEL) in March 2007.

The meeting, chaired by Mr. R. Jeffrey LaDouce, Director of the U.S. National Weather Service, Pacific Region Headquarters, was attended by over 20 participants from Alaska, California, Hawaii, Oregon, Washington, US affiliated Pacific Basin territories and commonwealths, NOAA, USGS, ITIC, and the Federal Emergency Management Agency.

The group discussed the passage of a new Public Law, PL 109-424 entitled, "Tsunami Warning and Education Act." The law authorized funding for NOAA tsunami research, forecast and warning programs, the NTHMP, and global tsunami programs. The group also received reports on progress from its mapping and modeling and mitigation sub-committees. Moreover, the group discussed a continuing and evolving process of expanding the NTHMP from its charter U.S. western coastal states established in 1997, to include the eastern and Gulf coast states, and the U.S. affiliated Pacific Basin territories and commonwealths.

The next NTHMP meeting will be held in Honolulu, Hawaii 31 October-1 November 2007. For more information, see http://nthmp.tsunami.gov/index.html.

Jakarta Tsunami Information Centre (JTIC) website online

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Under the auspices of UNESCO-IOC, the Jakarta Tsunami Information Centre (JTIC) is dedicated to being the clearinghouse of information on the development of the Tsunami Early Warning System in Indonesia and the point of dissemination of information on tsunami preparedness through a website: www.jtic.org.

In its unique position in Indonesia, JTIC strives to become a quality information centre focusing specifically on tsunami hazard by periodically compiling information and data from verified sources. Its website is presented in two languages (English and Bahasa) and hosts various quality materials (books, booklets, leaflets, posters, newsletter, articles, etc.) on tsunami. It is hoped that these quality resources could in turn be of useful reference for decision makers and other stakeholders involved in the development of Tsunami Early Warning System in Indonesia (InaTEWS) and in conducting public education on tsunami. This endeavor has been made possible through the cooperation between JTIC and various parties, both national and international, that share their activities and programmes information on the management of tsunami mitigation (upstream and downstream).

Some other items available on the website are guidelines and common knowledge on how people can be prepared for tsunamis and what to do when the hazard strikes. These include the tsunami glossary; Tsunami Teacher, and examples of tsunami standard operating procedures (SOPs) from different regions. In the future, it is intended that the website will be the source of SOP information for area/districts in Indonesia who are in the process of developing SOP for tsunami disaster and could use examples.

Among many distinctive features available, the JTIC website provides a special section called "Discussion Forum" in which the general public and experts alike can discuss and contribute materials on tsunami-related issues. Consequently, through this forum, it is expected that the public can enrich the discourse on the management of tsunami mitigation in forms of breakthrough ideas and recommendations. Currently the website has 8 threads in the Discussion Forum: capacity building, community preparedness, national SOP, local SOP, seismic monitoring, oceanographic monitoring, tsunami modeling, and communications systems.

Please send your suggestions, comments, ideas and information to info@jtic.org. ♦