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OPINION ASIA

## Being Ready for the Big Wave

The Samoan tragedy shows governments must better prepare for tsunamis.

By **COSTAS SYNOLAKIS**

Updated Oct. 4, 2009 11:08 p.m. ET

The two earthquakes in Samoa and Sumatra last week have again focused the world's attention on Asia's disaster preparedness, less than a week after a tropical cyclone caused flooding in the Philippines. The death toll is above 1,000 in Indonesia, and 180 are dead in Samoa, with one in five Samoans significantly affected by the tsunami. This is the first time since 1993—when a tsunami struck at night in Okushiri, Japan—that so many people have died in a tidal wave caused primarily by an earthquake in the Pacific. It's important to take stock of the steps authorities are or aren't taking to reduce the human toll of such natural disasters.



Leone village, American Samoa, Oct. 3. AFP/GETTY IMAGES

The latest cases show that governments are doing a lot, but not yet enough. Because it's impossible to stop a tsunami once it has started, the key is to detect them early enough that people can reach safe land before they hit. Governments have been making worthwhile investments in new technologies. In the United States, the National Oceanic and Atmospheric Administration has installed more than 40 new tsunamographs (instruments that

record the water-level signature of passing tsunamis) in the Pacific and Indian oceans, up from only six in the Northern Pacific in 2004. Australia, Indonesia and India now have operational warning centers.

This system worked, to an extent, in the case of the Samoan tsunami, but not for Samoa. Thanks to early detection of the 8.3 magnitude earthquake that sparked the wave, a tsunami warning for the Pacific was issued within 26 minutes, and within 34 minutes of the earthquake scientists had already detected the first unusual water motions at Pago Pago in American Samoa, signs a tsunami was triggered. This allowed NOAA scientists to forecast waves in Hawaii and California, and to put both states on alert. Beachgoers were advised to stay off the shore. In New Zealand, the warning came more than three hours before the first waves arrived, and authorities had time to broadcast evacuation messages from helicopters.

In short, those aspects of the warning system were a success. The system worked on the continental U.S. and for most of the Pacific, but not for Samoa itself. What went wrong?

Part of it was a combination of Mother Nature and geography. Large earthquakes last far longer than smaller ones; the 8.3-magnitude tremor south of Samoa shook people for at least three minutes. By comparison, a magnitude 6.5 tremor shakes for 30 seconds or less. Waves may take a few more minutes to reach seismometers, and only then does the automatic location software used by the warning centers pinpoint the earthquake source on the earth's surface. This can take 10 minutes or more if the earthquake is

large. Add the time it takes to predict arrival times and tsunami heights and currents—information necessary to issue a truly useful tsunami alert—and a warning, even if issued, is of little use to islands and territories that the wave reaches within 20 minutes of the triggering earthquake.

So education is critical, because there are warning signs communities can learn to look for even without access to sophisticated instruments. When close to shore and feeling a tremor that lasts longer than 30 seconds, or observing unusual water motions such as a fast-retreating tide, people must move away from the beach or to high ground and wait for at least 30 minutes or official instructions. The death toll from the 2007 Solomon Islands tsunami was relatively low (three) because of this kind of knowledge. People knew that unusual water motions and ground shaking were the harbingers of big waves. Unfortunately, the lesson that education saves lives has apparently been lost to emergency managers world-wide, including in Samoa. Evacuation drills help, but are most effective if locals understand not to wait for official warnings once they spot the obvious tsunami precursors.

Planners also need to do a better job of learning from the drills they conduct. A large scale evacuation exercise in Samoa in 2007 in response to lessons learned in the Solomon Islands identified different areas where permanently fixed ladders would assist rapid access to high ground, but the ladders reportedly were never installed due to lack of funding. During the tsunami, people tried to evacuate by car, instead of on foot, as during the drill. Scientists need to help emergency managers identify safe areas using scenario simulations of possible future events and account for those who need special help during an emergency. And above all, authorities must explain that more often than not they themselves will have no role as the disaster unfolds because there will be no time. People need to know to self-evacuate, warnings or not.

Finally, governments need better policies outside the immediate time of disaster. Better, and better-enforced, building codes would minimize the destruction from both seismic tremors and big waves, and potentially reduce the loss of life. This is particularly true in the Sumatran earthquake zone around Indonesia, the location of last week's 7.6-magnitude Padang tremor, an event that had been anticipated for years based on the earthquake history of the region. Also, governments need to learn to ask for help sooner when faced with a disaster where time counts for saving lives. During the L'Aquillia earthquake in Italy last April, the government delayed letting emergency crews from neighboring countries assist digging out victims. In contrast, the Greeks mobilized their neighbors to send fire fighting aircraft early in the big Athens fire in August, and the scorching was reduced.

Investment in technology is important—witness NOAA's network of tsunamographs—but policy makers must not view instruments as a panacea, especially if investment in too much technology draws money away from other preparedness efforts. India and Germany have poured hundreds of millions of dollars into tsunami warning systems that largely duplicate NOAA's own efforts or that add too little value over older and cheaper systems to warrant the extra investment.

What Asia needs is common sense for disaster reduction. Coastal communities will always be vulnerable to big waves. But they don't have to be helpless.

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