Tsunamis pose real threat to P.R.

Wide monitoring network aimed at giving islanders time to find high ground

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Puerto Rico has been threaded with a spiderweb of seismic monitoring stations extending from land out to sea aimed at saving thousands of lives if a tsunami were to swamp a coastal area again.

In the last 136 years, many such waves have hit Puerto Rico and neighboring Caribbean islands, the worst in 1867, 1918, and 1946.

"It is not strange then that the northeastern corner of the Caribbean, the region encompassing the islands of Hispaniola, Puerto Rico, and the United States and British Virgin Islands, have experienced three destructive earthquake-generated tsunamis," a Puerto Rico Seismic Network report states.

Thanks to the efforts of the PRSN, created in 1987, the island has one of the most sophisticated wave graph and state-of-the-art tsunami detection networks in the Caribbean. The Puerto Rico Tsunami Warning and Mitigation Program was established in 2000 with funding from Federal Emergency Management Agency and soon turned over to academic scientists.

Now managed by the Department of Geology at the University of Puerto Rico in Mayagüez, the PRSN has said the island has both earthquake and tsunami event-monitoring through a network of 13 short-period seismometers and 10 broadband seismometers around Puerto Rico and nearby islands. The federal National Oceanic and Atmospheric Administration is also spearheading a program to place wave buoys to monitor the Caribbean region and eastern seaboard of the United States. Some have already been placed off Puerto Rico.

Some stations are concentrated in the Mona Channel, where the 1918 tsunami originated. On land, the PRSN monitors 24 earthquake seismic stations, two of which are owned by the U.S. Corps of Engineers.

"Our equipment can feed us data about seismic activity in Puerto Rico and the Atlantic Virgin Islands, just five minutes after a shake, even at a low scale of 3.5 Richter," said Christa Von Hillebrandt, who heads the PRSN.

Scientists have determined that since 1498 the Caribbean may have been hit with 91 tsunamis, of which 27 have been verified.

Since 1867, Puerto Rico and its environs has suffered at least the three strong tsunami, the deadliest of which was on the Mayagüez-Aguadilla coast in 1918. The wave killed 116 people and caused $4 million in damage to coastal infrastructure. The Oct. 11, 1918, violent quake measured 7.3 on the Richter scale, according to historic documents.

A U.S. Geological Service survey in 2003 concluded that the most tsunami-prone coastal area in Puerto Rico is the west-southwest because of the submarine volcanic structure and tectonic plates that span out hundreds of nautical miles in all directions.

The modern-day tsunami watch means the PRSN monitors most of the tide gauges spread out between Puerto Rico and the Dominican Republic, Vieques, Culebra and Virgin Islands waters without missing a day of the year.

"We monitor 24 hours because no one really knows when a quake will hit on land or water," Von Hillebrandt said.

The seismic expert indicated Puerto Rico has registered a "variable" quake activity on land of 4,600 small shakes during the past two years, but a that deep water tremble can unleash a tsunami at any moment.

"The source of most tsunamis are earthquakes, subaerial or submarine landslides, undersea volcanic eruptions, asteroids and even natural underwater explosions," she said.

Yet Von Hillebrandt said the PRSN categorizes the island as in a "privileged" situation among the other Caribbean islands, thanks to its updated tsunami monitoring equipment.

Daily Sun/César Silva

A sign in Puerta de Tierra warns passers-by they are in a tsunami zone.

Daily Sun/Humberto Trias

Geologist Alberto López Venegas gives a lecture on tsunamis at the University of Puerto Rico in Río Piedras.

The PRSN, she explained, is equipped with its own fast communications network, including satellite feeds, radio frequency contacts and data transmitting buoys.

"We not only monitor, but we have developed an early warning system that is quite effective and we educate communities how to respond to it," Von Hillebrandt said.

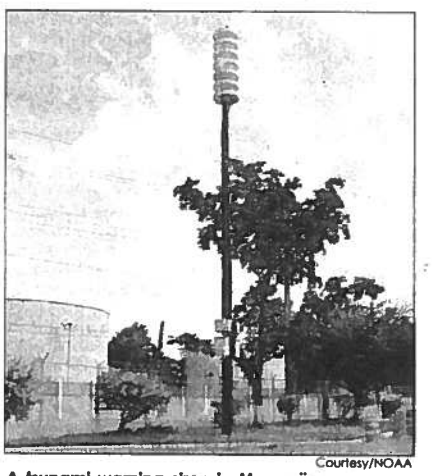
Mayagüez, for example, is the largest coastal city certified as "Tsunami Ready" by the U.S. National Weather Service because of its functional and updated warning system and evacuation plans. Lajas and Dorado have also been certified. The PRSN is shooting for 40 seashore communities to be certified during the next 10 years.

Von Hillebrandt said the requisites are that a coastal community design evacuation maps, have a working emergency plan and go through a set of simulation exercises to train the population in case of a tsunami.

With its monitoring system in place, the PRSN is mainly focused now on public education. It organizes workshops and conferences and prints brochures on the tsunami alert theme. It also works toward more efficient identification of tsunami hazard and risk, a warning protocol, emergency management and mitigation activities and public awareness.

The PRSN has put together a Puerto Rico tsunami video used in many public schools as a teaching tool and has put together a Web-based email advisory list.

"My perception is that the majority of the island population is not 'seismic aware.' Most families have no contingency plan in case of a great quake and the general communication plan in case of a huge seismic emergency is practically non-existent, or at least [not] as efficient as during hurricane season," said PRSN Associate Director Víctor Huérfano. "We must remember that seismic season is all year long."



Courtesy/NOAA

A tsunami warning siren in Mayagüez.

"The smaller Antilles and Hispaniola have been very tectonic places ever since time began, and people need to be educated about this . . . We all live in a very active seismic zone. We must have escape routes from tsunami waves," said geologist Alberto López Venegas.

He is urging the commonwealth government to build a seismic observatory in a key coastal area outside Mayagüez — where the PRSN already operates efficiently. The observatory would be connected to tide gauges, seismographs and a Global Positioning System.