Times-Standard
Times-Standard / Humboldt Beacon

Not My Fault: Mid-6 earthquakes now and then

Lori Dengler/For the Times-Standard
Posted January 11, 2020

The first earthquake casualty of 2020 was reported this week. On Tuesday morning, a magnitude 6.4 earthquake off the coast of Puerto Rico caused the walls of a home to collapse crushing the single occupant. It was also the first casualty on US soil since the 2009 earthquake in Samoa. It's tempting to stash the Puerto Rico earthquake into your "too far away to be relevant to me" file, but don't. Ten years ago, we experienced a very similar earthquake here, with a few important differences.

If you were anywhere between Eureka and Petrolia ten years ago, you likely remember where you were and what you were doing at 4:27 pm on Saturday, January 9. I was in a waiting room at Heathrow Airport about to return home from a two-week stay in England when my phone beeped with a message about a 6.5 earthquake offshore of Eureka.

No time for jet lag. It was important to find out as much as possible about the earthquake and the impacts. The next week was busy, working with colleagues to assess what had happened, field trips to check out liquefaction, landslides and toppled monuments at the Ferndale cemetery, studying building damage with structural engineers, and topping it all off with a briefing for Governor Arnold Schwarzenegger.

The earthquake was on a vertical strike-slip fault within the Gorda plate about 20 miles due west of the mouth of the Eel River. It caused strong shaking from Ferndale (23 miles from the epicenter) to Eureka (30 miles away) and was reported felt as far away as San Francisco, Reno and Eugene, Oregon.

It was a typical Gorda plate earthquake, the most common source of historic damaging earthquakes in our region. The Gorda plate lies offshore and beneath Humboldt and Del Norte Counties and is being crushed by the larger plates to the north and south. Since 1900, we have experienced more than 30 earthquakes of magnitude 6 or larger in the Gorda plate.

Fortunately most historic Gorda quakes have been too far offshore to cause damage. But closer ones, like 1980's M7.2 that knocked down an overpass on 101, and the modest 5.4 in 1994 (more than $2 million in damages), have been problematic. Location is everything and 2010 was definitely close enough to populated areas for impacts.

The earthquake was particularly hard on the City of Eureka. Eureka was just far enough away from the 1992 earthquakes to get through nearly unscathed. But the 2010 earthquake was closer and the fault orientation focused S-waves, the vibrations that cause the most damage, directly at Eureka. Within a week of the earthquake, Eureka's building department had logged nearly 200 reports of damage, 78 of which required yellow tagging (limited access).

Chimneys were the most common problem. Brick chimneys toppled, rotated, pulled away from buildings or suffered internal cracks. Only one home suffered severe damage, the cripple walls beneath a small Victorian collapsed causing the house to slide off its foundation. Fortunately the owners have now invested in a perimeter foundation and the home will weather the next strong quake in much better fashion.

Unreinforced brick buildings (URMS) are the most vulnerable type of building to shaking. Back in 1989 when the county was required to identify these buildings, there were 40 of them on Humboldt County's list. By 2010, demolitions, fire and retrofits had reduced the number to 14.

Retrofitting works. None of the URMs classified as rehabilitated suffered any structural damage in 2010. Four of the remaining buildings suffered significant damage. The most dramatic was the three-story Old Town Bar and Grill on 2nd street (vacant at the time). Part of the parapet wall collapsed onto an adjacent structure (also vacant). The building was red tagged (no occupancy allowed) and subsequently slated for demolition. Fortunately for Old Town, Kurt Kramer came to an 11th hour rescue, retrofitting and restoring the building.

The most common source of damage and all 35 reported injuries was non-structural damage –falling ceiling tiles, broken glass windows, falling and toppled items in homes and stores. One of our sobering findings was that almost all of these injuries could have been avoided if people had done the right thing during the shaking – dropped to the floor or ground, gotten under a table or desk if one was nearby and not moved during the shaking. The Bayshore Mall was the site of eight ambulance calls, most caused by

people running and falling in the earthquake. Several people at the Mall reported that some staff encouraged people to run, exacerbating the situation.

This earthquake did not produce a tsunami. But the duration of shaking should have immediately brought to your mind that possibility. When a local earthquake occurs, the shaking is your warning. Don't expect to get cell phone notifications or hear radio/tv alerts. If the earthquake feels "long" to you, that's your warning. If you aren't sure it is "long," treat it as an opportunity to practice your evacuation skills. In 2010, at least a dozen people in Samoa recognized the natural warning and did evacuate to the dunes. But many more people should have followed their example.

We were lucky ten years ago. Had the earthquake been a little bit larger or a little bit closer to the coast, the situation would have been different, and a bit more like what Puerto Rico is experiencing right now. The January 7th earthquake was about the same magnitude as the Eureka quake but only three miles from the coast and 12 miles from Ponce, a city of over 150,000. We were also fortunate that much our building stock is more resilient to shaking and we weren't still recovering from major hurricanes that destroyed much of Puerto Rico's infrastructure two years before. But just because we were lucky ten years ago, doesn't mean that Mother Nature will spare us next time.

The modest national media attention the Eureka quake generated, quickly dissolved three days later when a far more catastrophic quake struck 3500 miles away. More about the Haiti earthquake and the country's difficult recovery next week.

Note: A report on the 2010 earthquake is posted at http://learningfromearthquakes.org/2010-01-10-eureka/images/2010_01_10_eureka/pdfs/January_9_OffshoreNorCal.pdf. You can find a photo memory of 2010 at https://www2.humboldt.edu/kamome/resources under the Additional Resources for Teachers links.

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