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Not My Fault: A moderate earthquake wreaks havoc in Afghanistan

Lori Dengler/For the Times-Standard
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There is a new earthquake atop the leader board. On June 21, a magnitude 5.9 earthquake struck Eastern Afghanistan near the Pakistan border. As I write, the death toll is listed as 1,193 and nearly twice as many people have been reported injured. The numbers are likely to go up.

Until this week, 2022 had been a modest year for earthquake damage. Prior to Tuesday, only 90 earthquake casualties had been noted, the worst a 5.3 in Afghanistan that killed 30. There is nothing unusual about a sudden change in the statistics. Year in and year out, it's the one or two strategically placed earthquakes that cause most of the impacts. Prior to this week, the 2022 quakes had not struck close to population centers, particularly in areas where buildings aren't designed to withstand shaking.

The size of the Afghanistan earthquake relative to the level of destruction is a little unusual. Earthquakes in the magnitude 5 range are very common – in a typical year there are about 1500, roughly ten times as larger magnitude quakes. But even though far more common, they are much less likely to kill people. They pack less of a punch, affecting a smaller area and lasting for less time. To do major damage, they need to be very near populated areas.

The June 21st earthquake hit the bull's eye. Less than 40 miles from the cities of Khost and Gardez with populations each of about 100,000 people, the USGS estimated that nearly 900,000 people experienced strong to violent ground shaking and nearly 1.5 million felt moderate shaking.

Additional factors added to earthquake vulnerability. Afghanistan is one of the poorer countries in the Middle East and has been ravaged by a half century of conflict. Infrastructure is in disrepair and many homes are built of mud, clay and stone. The same compressional forces that make the country vulnerable to earthquakes, also create and unstable landscape of mountains and valleys, highly prone to landsliding.

In addition to the general factors that make Afghanistan vulnerable to earthquake damage, this one came with two additional strikes. It was shallow, only six miles beneath the surface. Earthquake energy spreads out in all directions from the fault rupture, weakening impacts with distance. The earthquake occurred at 1:24 AM local time in Afghanistan, when almost everyone was indoors sleeping. Had the earthquake been deeper or during daytime hours when many people would be outside working, the casualty numbers would have been less.

Time of day is always an important factor in earthquakes. For California quakes, the safest time for earthquakes is at night as our homes are usually wood frame and resilient to strong shaking. Apartment or condominium complexes must meet building codes that include seismic design elements. We are more vulnerable during the day on highways or commercial settings. It's the opposite in many parts of the world where homes are built of weak materials and during the day, people are likely to be working outdoors.

Weak buildings and landslides are the main culprits and it's a story that has been told over and over again in Afghanistan. Since 1950, Afghanistan has experienced 11 earthquakes that have killed at least 100 people. The five deadliest exceeded 1000 deaths and had magnitudes between 5.9 and 6.6. 1998 was a particularly bad year when a 5.9 and 6.6 earthquake killed more than 7000.

Afghanistan is caught between a rock and a hard place from a plate tectonic perspective. The relentless push of the Indian subcontinent as it slowly slam into Asia produces a broad zone of faults and folds in the eastern part of the country. Additional compression comes from the southwest as the Arabian Peninsula rotates towards Iran, slowly closing the Persian Gulf.

With such a long history of earthquakes, one might think Afghan societies would have developed more resilient construction methods. But resources to build stronger structures are scarce and stone and mud are abundant. 2022 has demonstrated that it doesn't take big earthquakes to wreak havoc in Afghanistan. The January M5.3 killed 30 people and a 4.3 aftershock of Tuesday's quake claimed 5 lives.

As if the deck isn't sufficiently stacked against Afghanistan, add the weather and the Taliban. Heavy rains this weak further weakened structures and limited road access. The

country has relied upon international aid groups for economic assistance for decades. At least 800 non-governmental organizations (NGOs) were operating within the country over the past two decades, providing assistance with food, shelter, schools, and infrastructure projects.

After the Taliban takeover in September 2021, many NGOs pulled out due to Taliban policies, international sanctions, and impediments to operating within the country. Effective disaster response requires planning and capacity. At the moment, Afghanistan has neither. Although United Nations relief and some international assistance has been offered, the lack of infrastructure has delayed getting food, water, and medical assistance into the region.

It might be easy to dismiss the Afghan tragedy as something alien. The type of construction and infrastructure, the culture, and the ravages of war are foreign to us in California. But the June 21 earthquake is relevant. It's not just the Big One that can cause us pain and suffering. A well-placed magnitude 5 will affect us. The 1957 Whittier-Narrows M5.9 near Los Angeles caused about $250 million in damages and claimed eight lives.

Most magnitude 5 earthquakes in California won't make a major impact because we have invested in mitigation efforts. The most important is the enforcement of building codes for earthquake resilient design. New buildings, especially those constructed after 1987 when modern codes were enacted, are unlikely to be badly damaged even in magnitude 6 or 7 earthquakes. But we still have a lot of older building stock – many office buildings and apartment complexes built in the 1960s and 70s that are vulnerable. The June 21st earthquake is a reminder to look at our own vulnerabilities and reduce them.

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times-Standard's. All Not My Fault columns are archived online at https://kamome.humboldt.edu/resources and may be reused for educational purposes. Leave a message at (707) 826-6019 or email rctwg@humboldt.edu for questions and comments about this column, or to request a free copy of the North Coast preparedness magazine "Living on Shaky Ground."