

## **Not My Fault: Papua New Guinea, shaking and landslides**

Lori Dengler/For the Times-Standard  
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On February 25, a magnitude 7.5 earthquake occurred beneath the highlands of Papua New Guinea. Earthquakes are no surprise in this part of the world. New Guinea sits in arguably the most complex tectonic regime in the world, stuck in a compressive vise between the Pacific and Australian plates with at least four smaller plates interacting. It makes our Mendocino triple junction seem modest and simple by comparison.

My first post tsunami survey reconnaissance trip was to Papua New Guinea in 1998. The 1998 earthquake was just offshore of the north coast and I never ventured into the interior. But I became fascinated with both the history and geology of this extraordinary place. When plates collide, they build mountains by creating folds and faults. The New Guinea highlands are a testament to this process.

“Remote” doesn’t begin to describe just how steep, rugged and difficult it is to travel in this part of the world. Much of the New Guinea interior remained unexplored by outsiders until after World War II. But those same forces that create the extraordinary topography, also provided gold, silver, copper and other mineral reserves and since the 1970s, mining has dominated the economy. If it weren’t for the mineral wealth, we would probably still know little about the geology of the highlands. But effective extraction means understanding geology and the multinational corporations who head most of Papua New Guinea’s mining endeavors have invested heavily in mapping this terrain.

The highlands are dominated by the east-west trending Papuan fold and thrust belt. More than sixty peaks on the island exceed 12,000 feet with deep valleys in between. The rocks are sheared and faulted and the high rainfall creates ideal conditions for landslides even in the absence of seismic activity. The February 25th quake occurred very near the boundary of the highlands and the large coastal plain of the southern part of Papua-New Guinea and strong shaking occurred throughout the region.

Landslides often don’t get the attention of other quake hazards, but most earthquakes produce landslides and in some cases, they are the biggest problem. In 1970, a

massive avalanche triggered by a M 7.9 earthquake in the Peruvian Andes buried two towns, killing 70,000 people. Landslides triggered by a M 7.6 earthquake in 2001 in El Salvador accounted for 60% of the 944 casualties.

Landslides can have secondary impacts as well. The highest tsunami ever measured in modern times occurred in 1958 when a M 7.8 earthquake unleashed a landslide at the head of Lituya Bay in South Eastern Alaska. The resulting surge planed off old growth spruce trees at an elevation of 1,720 feet above the water surface. It wasn’t the first time this had happened in Lituya Bay. Previous earthquake-induced slides produced a 390-foot high wave in 1853 and a 488-foot wave in 1936.

The impacts of the Lituya Bay tsunamis, although impressive in height, were small because of the remoteness of the area. The 1958 tsunami claimed five lives – people who were unfortunately in boats at the time. The quake that brought me to Papua New Guinea in 1998 had more tragic results. The earthquake was only magnitude 7 and the shaking did little damage to the communities near Sissano Lagoon on New Guinea’s north coast. But about 15 minutes after the earthquake, a series of tsunami surges flooded four villages, resulting in over 2000 deaths. The general consensus is that the shaking triggered a landslide along the continental shelf and the landslide caused the tsunami.

One of the potentially biggest impacts of landslides is when they block a river channel and dam the water behind it. In 1959, a M 7.5 earthquake struck near West Yellowstone, Montana. The shaking caused a mammoth slide that blocked the Madison River. You can still see Quake Lake today, a permanent reminder of earthquake-triggered landslides.

A big worry with these quake dams is that the mud and rock debris edifice is not engineered to last and that as the water builds up behind the dam, catastrophic failure and flooding can occur. This is one of the concerns in Papua New Guinea right now where the earthquake produced dozens of landslides, some of which blocked river channels. Most of these areas are too inaccessible for a detailed hazard assessment.

There is a lesson for us in what is happening in Papua New Guinea. We also have steep terrain that is vulnerable to landslides and the next major North Coast earthquake will make road access difficult or impossible in some areas. Like Papua New Guinea, slides could fill valley bottoms and block rivers. As a rule of thumb, if you feel a strong, long lasting earthquake, it’s always a good idea to get out

of a river channel. You just don't know what might be happening upstream of you.

Also like Papua New Guinea, landslides will block roads, isolating communities from one another and from supplies. No matter where you live in Humboldt or Del Norte Counties, be prepared to be on your own for at least two weeks. This means two weeks of water, food, medicines and other essential personal supplies. And don't forget livestock or pets. Stock up on their supplies as well.

Note: For photos and video footage of the Papua New Guinea landslides, visit  
<https://blogs.agu.org/landslideblog/2018/02/28/papua-new-guinea-crisis/>

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