

# What the Nepal earthquakes mean to California

**H. Kit Miyamoto, Sacramento Bee, 9-27-15**

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It's always a bit unsettling flying into a foreign airport to find everyone trying to leave the country. But this is what our team of structural engineers does when responding to earthquakes.

This time our team arrived in Nepal three days after a 7.8-magnitude earthquake devastated the country April 25 and killed more than 8,600 people, with economic losses of \$5 billion. The first scenes we encountered were disturbing, but not unexpected: historic temples and towers in crumbled ruins; remote villages leveled by landslides; high-rises cracked as if made of eggshells.

Rural areas over a 124-mile stretch were particularly devastated, with villages destroyed and further isolated by damaged roads and the threat of more landslides.

As is the case in much of the world, unreinforced masonry construction presented the biggest problem. In rural, mountainous Nepal – where traditional homes are made of stone, mud and wood – we found up to 90 percent of the structures destroyed. Whole villages were gone.

Many of the newer high-rise buildings in Kathmandu experienced crippling damage. We've assessed more than a dozen to date, and what we found is that even when modern building codes are adhered to, a big gap exists between what code provides and what society expects.

At one meeting in Kathmandu, luxury condo owners were stunned and angry to learn that the buildings they bought into met international standards, but were too badly damaged to occupy or repair.

They wondered how this could be. They were new and well built, yet these structures are no longer usable. The people attending the meeting wondered what they would do next. Where will we go? How can we start over again?

Earthquakes cause tremendous upheaval, for entire regions and each affected individual. This is something I never get used to no matter how long I do this, even though in recent years I've pretty much lived in a disaster zone continuously from Haiti to New Zealand and now in Nepal. I do this to transfer the knowledge I have as a structural engineer about how to build better.

The truth is, building codes worldwide are designed to keep a structure standing so you get out with your life – period – and this is true in places far beyond Nepal. In places like Los Angeles and San Francisco, people are not prepared for the reality that building codes may save lives, but not always property.

The parallel between buildings in California and Nepal is very real because, here in California, we will face the same post-earthquake challenges. What happened in Nepal represents a major wake-up call for the countless California cities sitting on known and unknown faults across the Golden State. That there is any comparison between the \$5 billion in earthquake damage in Nepal and California cities remains unknown to most building owners and residents.

Crippling damage like that seen in buildings in Kathmandu could happen in our major cities when a large

earthquake strikes. The building code that applies to most structures in California protects “life safety” only. That code isn’t good enough is well known in New Zealand, where the city of Christchurch saw old and new buildings severely damaged in the earthquakes that struck in 2011.

More than 1,800 of the 2,400 buildings in Christchurch, where the code and technology are similar to the United States, were a total loss. They were torn down, because the building code focused on life safety rather than on building earthquake-resilient communities. Imagine a Los Angeles or San Francisco with many buildings no longer useable.

The economic loss in New Zealand totaled \$40 billion. Haiti’s 7.0-magnitude earthquake in 2010 resulted in \$7.8 billion in losses. The United States government shelled out more than \$30 million to businesses and residents who suffered damage in Napa’s 6.0-magnitude earthquake in 2014, and that one was very small by comparison.

When we urge clients in California and other high seismic areas to “build better” or “above code,” we explain that building to current code means their building may or may not be repairable after an earthquake – and that, as New Zealanders found, many will have to be torn down.

When I reported on the parallels of Nepal and California before the state Seismic Safety Commission in Sacramento recently, some of the members were concerned – surprised, even.

“That was a really frightening talk,” said one of the commissioners, Southern California Earthquake Center Director Greg Beroza, a notable seismologist and Stanford University professor of geophysics. “I share the concern that the public is going to say, ‘Why didn’t you tell us?’ ”