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Indonesian Town Begins Preparation for the Next Tsunami

By [SETH MYDANS](#)

PADANG, [Indonesia](#) — The young disaster workers flinched as the simulated tsunami waves crashed into their city, wavy red and green lines on a computer screen that represented vast destruction.

“Ch-ch-ch-dom! Oooh! Oh, look at it hit!” exclaimed a young man as the screen pulsed and darkened.

The waves followed one another relentlessly, much as they had in Banda Aceh in December 2004, where they took 130,000 lives. Padang is next, scientists say, and in the fairly near future, as the geological rupture that triggered the 2004 destruction travels south, bringing with it the danger of earthquakes and tsunamis.

This is how Padang will be destroyed, said Kerry Sieh, 55, a professor of geology at the [California Institute of Technology](#), who has studied the fault off the shore of western Sumatra for 16 years.

He said historical records, seismic monitoring by global-positioning sensors and a careful study of the growth patterns of corals converged in a remarkably precise prediction of a major earthquake and tsunami here within the next 30 years.

“There are very few things in solid earth science that you can forecast as well as what the data we have suggests here,” said Mr. Sieh. “If the data here are not enough, then there is no forecastability in solid earth science.”

Many other places around the world are similarly at risk, he said, but much less is known about them.

One outcome that can be reliably forecast, however, is higher death tolls, he said, as the world’s population continues to grow, cities expand and people settle in ever more precarious places.

Tsunamis have been recorded in Padang at about 200-year intervals. Since a tsunami in 1797 the city has grown from about 4,000 people to 800,000.

“Since Padang is likely to increase in population density over the next decades, in one sense the sooner the quake happens and the tsunami happens, the better,” Mr. Sieh said.

If it does not happen for at least 10 years, he said, the government has a chance to make some progress in mitigating the effects.

But so far, he added, “There’s very little emergency preparedness, little education about what could happen and what you can do, little or no urban planning to identify dangerous areas.”

Evacuation routes must be widened and bridges reinforced, and an engineering survey is needed to identify buildings strong enough to serve as safe refuges.

“Scary,” said Patra Rini Dewi, watching the computerized waves. She heads a small private group called Kogami that is working, in the absence of a coordinated government program, to educate the public.

Her group’s dozens of volunteers have reached about 50,000 people out of about 500,000 who are at risk in low-lying areas. Padang escaped the tsunami that hit Aceh, but the destruction there woke this city to the danger it faces.

“We tell them, ‘If you can’t stand up for one minute or if structures collapse, just evacuate,’ ” she said, referring to the shock of an earthquake that would trigger a tsunami.

“Don’t wait for instructions from anyone,” she said. “And don’t look for your wife or your child. That is the most difficult, but you will waste time. In Aceh many people died because they were looking for each other.”

Even in the best case, tens of thousands of people are likely to die, Mr. Sieh said, and much of the city of Padang will be scoured flat.

And so it is possible to look at the tree-shaded streets of Padang, as Mr. Sieh does, as if looking back from the future at a city that once existed — like Banda Aceh before the 2004 tsunami — and to wonder about the fates of the people on the streets.

“Looking at the group right here, which would survive?” he asked, surveying strollers near the beachfront.

“Will they wait for the old woman? My guess is that the little boy won’t survive. He won’t leave his grandmother. So they’ll stick together and they’ll all die.”

In a courtyard across the road, young men were playing volleyball.

“Those guys in the military yard, they’ll all survive,” he said. “They’re fit. I’m guessing they’re going to run, and they’ll make it.”

Driving along a riverfront, he selected a few buildings that he thought might withstand a tsunami.

Looking out past the seaside vendors with their bright tarpaulins and grilled corn, past the couples sitting at small tables, he could see the waves rise as clearly as if he were watching a computer simulation.

“Imagine that the quake starts now and you feel the shaking,” he said. “While it’s shaking, the land and sea drop a half a meter. Farther out to sea it drops even more. The ocean will tilt away. The water runs away.”

This is the pattern of tsunamis, he said, as an earthquake rupture first sucks the water, then shoots it back out like the crack of a bull whip, slamming ashore at hundreds of miles an hour.

“The maximum depression will be in about 26 to 28 minutes, and the first big crest will come in about 30

minutes," he said, drawing on complex computer model of Padang's coastline, the ocean floor and a group of small islands off the coast.

"So if you're standing here and you see the sea water, you're dead," he said. "Even if you're fit, if you wait 15 minutes after the shaking starts it's too late."

He said the waves were likely to race one to two kilometers inland, and in some places as far as five kilometers, or three miles.

"The second wave will hit in about one hour," he said, narrating the computer's scenario, "the third in an hour and a quarter and then things will calm down for about an hour.

"And here comes that fourth wave, after about two hours," he said. "And then waves returning from India and the Maldives will hit from four to eight hours after that. So you need to educate people to stay away at least 12 hours." Once that is all over, he said, "You come in with massive amounts of aid and start rebuilding."

The sun was sparkling on a placid sea one recent day as Jak Par, 67, waited for customers at his snack stall by the beachfront.

Business is bad here on the frontline of the next tsunami, he said, as people avoid the seashore. Mr. Par said he lost 30 relatives in Aceh, and like many who lived nearby he has moved his family to higher ground.

Ms. Patra confirmed that property prices near the beach had fallen.

"Everyone is afraid after the tsunami in Aceh," Mr. Par said. "Whenever there are rumors I close up my shop and run. But it's just rumors, causing trouble, causing traffic. Next time I'm going to wait and see if the water goes out before I run."

Just down the beach, Rifai, a drink seller, described a different plan.

"Everything is a test from God," he said. "We are just waiting here because we haven't been tested yet. We'll pray to God to send the disaster some place far from us."

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