

# Giant catfish and a legacy of disaster in one of the world's most seismically active regions

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Gregory Smits

Greg Smits' interest in earthquakes began with a catfish. A book full of catfish, to be precise.

Back in 2002, Smits, then an assistant professor of history at Penn State, was poking around a used book store in Tokyo, looking for titles relating

to his specialty, the intellectual history of Japan, when a large and colorful volume caught his eye.

It was a comprehensive, illustrated treatment of namazu-e, the brash, fantastic, often satirical prints depicting namazu—mythical giant catfish—that proliferated in the aftermath of the great Ansei Edo earthquake of 1855. Its price had been marked down drastically, and the bargain was too good to resist.

"I bought the book and took it home, and it sat on a shelf for years," Smits recalls. "I finally got around to reading it, and thought as long as I've plowed through this I should write something about it."

At the time, Smits had posted on his professional web page a series of self-written textbooks for use by students in his classes on Japanese history. By the miracle of Google, the chapter he posted on namazu-e found its way to Ruth Ludwin, a University of Washington seismologist who was researching the native earthquake lore of the Pacific Northwest.

"Ruth contacted me with a bunch of questions," Smits remembers. "We eventually wrote an article together, and by the time it was finished I was hooked. I've been working on the history of Japanese earthquakes ever since."

That work has now culminated in two books released in rapid succession, the first a close look at the pivotal Ansei Edo earthquake and its enduring legacy, and the second tracing the broader history of Japanese earthquakes since the 17th century. Both volumes provide important context for the massive disaster that struck the country in March 2011, and whose impacts are still unfolding.

## **An Earth-shaking Event**

The Ansei Edo earthquake, estimated at 7.0 magnitude, shook the capital of Edo (now Tokyo) at about 10 p.m. on November 11, 1855, killing at least 7,000 people and destroying key areas of the city. It was the third of three major seismic events to hit Japan in just over a year, and only one of dozens that have struck the region since records were kept. Yet this earthquake, Smits says, is arguably the most important of the pre-modern era. For one thing, according to the prevailing wisdom at the time, it never should have happened.

"The theory on what causes earthquakes involved the idea of yin and yang, the two fundamental energy types that govern the physical world," Smits explains. Yang energy, in this conception, would be hot and dry: the power of Sun and wind. Yin would be dark and moist, the realm under the Earth's crust. "The theory was that an earthquake happens when yang energy gets trapped underground in a yin environment. It builds up to the point where there's an explosive event."

According to this thinking, Edo was safe from earthquakes, since the city's plentiful water wells provided a means of relieving underground pressure. "So when this earthquake struck, one of the things it shook up was scientific thought," Smits says.

The disaster also exacerbated discontent between different groups in society, especially with respect to disparities in wealth. That's where the pictures of catfish come in. Catfish, Smits explains, had long been regarded as a symbol for earthquakes. "There's this whole elaborate mythology, where catfish symbolize the unruly forces under the earth."



Courtesans and other employees of the Shin-Yoshiwara licensed quarters attack a giant catfish. Shin-Yoshiwara was located in a swampy area and suffered severe ground motion and destruction in the earthquake. Credit: Gregory Smits

In November of 1855, they became something else. "Two days after the initial earthquake, hastily printed, anonymous broadsheets and images began to appear for sale around the city," Smits wrote in the *Journal of Social History*. Over 400 varieties of these namazu-e were soon spilling out everywhere, most of them featuring giant, anthropomorphized catfish.

Some of these prints show angry citizens attacking the local deities who allowed namazu to run rampant. In others, remorseful catfish apologize for their destructive behavior. In still others, gods shower coins on happy tradesmen who would profit from rebuilding, embodying a popular idea that the earthquake had set the world to rights by correcting an

imbalance of wealth.

"Namazu-e were a coded mechanism for making statements about politics or society," Smits says. "Among other things, they tended to show the bakufu, this powerful military government, as helpless vis-a-vis the forces of nature. The invincibility of this military organization was suddenly brought into question."

Sensing the potential import of the catfish prints, the bakufu moved within a month to suppress them. By 1867, the bakufu government would fall, and a new government would form around the emperor. "The earthquake didn't cause this collapse," Smits says, "but it set the stage and presaged it in the realm of rhetoric."

## **Ongoing Aftershocks**

Beyond its immediate impacts, the Ansei Edo revived a tantalizing and tenacious idea: that earthquakes can be reliably predicted from natural phenomena—if only we know what to look for.

Electromagnetic disturbances, for example. "One of the stories that came out of the earthquake was of a huge magnetic stone in a shop, a curiosity—people would throw pieces of metal toward it and the metal would stick to it," Smits says. "Two hours before the earthquake happened, this stone reportedly lost its magnetic properties and all these things fell to the floor."

Another supposed signal of impending doom was unusual activity observed in—you guessed it—catfish. Instead of their usual bottom-dwelling torpor, these fish, pre-earthquake, would be seen swimming on the surface of the water. Cue disaster.

In fact, Smits notes, the idea that catfish can predict earthquakes still

survives in Japan. Government-funded experiments observing catfish in aquariums continued as recently as 1993, and newspaper speculation on the connection between fish and earthquakes popped up repeatedly after the March 2011 disaster.

The broader belief that seismic events can be reliably predicted is a topic Smits takes up in his second book. "In every earthquake since 1855, you get these long lists of possible precursors, all of them applied after the fact," he says. "It's almost like there's a religious faith in this idea."

Today, "Japan spends more money on [earthquake prediction](#) than any other developed country, and probably all the rest combined," Smits adds. "This has produced zero predictive results."



Early catfish prints from 1855 showing the Kashima deity, aided by the thunder deity in image at right, suppressing the earthquake catfish. Credit: Gregory Smits

In addition to being a blind alley, the relentless focus on prediction, he suggests, may feed a troubling gap between what scientists actually know and the public perception of what they know, a gulf that was on dramatic display in the recent much-publicized case of seismologists sentenced to jail for failing to adequately warn people about the 2009 earthquake in L'Aquila, Italy.

"In the '60s, in Japan, you had this public perception that surely we should be able to predict earthquakes by now," he says. "This put great pressure on the seismological community to claim that earthquake prediction was possible." But when the Kobe earthquake hit in 1995, killing 7,500 people, "it was absolutely unpredicted," Smits says. "They didn't even know that the fault that caused it existed.

There was a lot of scrambling among earthquake research agencies, and now, instead of 'predicting,' they talk about 'forecasting.' But the forecasts are so broad as to be of little practical use."

## **Lessons from History?**

A more hopeful outcome of the Kobe disaster is its validation of advances in anti-seismic engineering. "This effort has paid off tremendously well," Smits says. "Purely as a function of building code revisions, everything built after 1980 survived the Kobe earthquake. The technology has improved so much that during the [March 2011] quake tall buildings in Tokyo swayed but they didn't break."

Unfortunately, the so-called "3-11" event spawned a massive tsunami whose giant waves killed 20,000 people and swamped the Fukushima Dai-Ichi nuclear power plant, adding a whole new chapter to the history of earthquake-related disasters in Japan. Ironically, Smits says, officials of the utility company responsible for the plant ignored that history when they argued that no one could have predicted a tsunami of such size.

"They claimed the event was 'unprecedented.' But that's been said about every earthquake for the last couple centuries," he says.

Smits also criticizes the notion of "characteristic earthquakes" that pegged the 2011 disaster as a 1,000-year event, "as though the rupture of faults occurs at regular intervals, and now that this one has happened we can relax for another thousand years."

That kind of rhetoric, he argues, only aggravates general misperceptions. "Instead, wouldn't it be good if the government and the scientific community spoke in a unified voice, and said loud and clear, 'We can't predict earthquakes'? 'And 'There is no place on these islands that is not subject to the possibility of a serious [earthquake](#), but here's how you can minimize the danger'? I think that would help."

It would at least reflect the lessons learned from the record of earthquakes past.

Provided by Pennsylvania State University

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