
TSUNAMI PREPAREDNESS

Legends and lessons: Japan teaches its history with disasters and taps its technological prowess to prepare for the next big one

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EDITOR'S NOTE: *Reporter Winston Ross traveled to Japan in August and September as a World Affairs fellow, sponsored by the International Center for Journalists. This is the first of three parts on how Japan prepares for tsunamis.*

HIROGAWA, JAPAN - Legend has it that a powerful soy sauce maker named Goryo Hamaguchi once saved this entire village from impending doom.

It was Dec. 24, 1854, when a giant earthquake rocked Hirogawa-cho, a village of 1,300 people on Japan's central Pacific coast. Hamaguchi rode out the shaking. But he knew from the stories of his ancestors that nature was not finished. He ran from his house, urging his neighbors to run for high ground. Minutes after the quake, a tsunami struck. A 20-foot wall of water swamped Hamaguchi's narrow, thatched-roof home. The 34-year-old businessman fought his way through the flooded village to dry land. He realized more waves would follow, inundating the town. The villagers knew this, too. But it was dark. People were panicked. They didn't know which way to run.

Hamaguchi gathered some young people. They helped him light torches and set fire to the sheaths of harvested rice piled neatly on his sprawling acreage. The firelight showed villagers the way to safety.

All but 36 of the town's residents survived.

Best-prepared country

One hundred and fifty years after that night, Japan is widely regarded as the best-prepared country for tsunamis and earthquakes in the world, with a vigilance that combines the reflections of the past with the technology of today - at a cost of billions of dollars.

Japan's tsunami detection and warning system pledges to alert citizens three minutes after a major earthquake that a wave is on its way. Massive seawalls line its vulnerable coasts. High-tech computer mapping software shows exactly where and how a tsunami might strike. And officials work constantly to educate young and old about the ever-present threat of this lurking disaster.

When geologists and emergency managers in Oregon consider the peril that faces our own coast, they frequently point east. As geologist George Priest puts it, "We need to be like the Japanese."

In some respects, this is impossible. The main reason Japan is so prepared for earthquakes and tsunamis is that it knows them, the way Florida knows hurricanes and Oklahoma, tornadoes. The country is surrounded not only by water but by fault lines. Ten percent of the world's earthquakes happen in Japan. Ten thousand earthquakes occur there each month. Six a day are

big enough to feel.

Eight major tsunamis have struck the country in the past 160 years, killing tens of thousands of people and destroying hundreds of villages. The largest, in 1896, claimed 22,000 lives. Before the waves that struck Sumatra last year, nearly one in three tsunami victims worldwide were Japanese. Eighty percent of Japan's residents live in coastal areas.

Tsunamis are a part of the country's culture. Japan's most famous painting, by 18th-century artist Hokusai, depicts a tsunami passing by Mount Fuji, an image that can be seen all over the country. Disaster kits - including fire-retardant head bonnets that double as a student's seat cushion - are sold in department stores.

The Japanese have been recording tsunamis for 1,300 years, their records so well-preserved that they showed U.S. geologists just how deadly the West Coast's Cascadia Subduction Zone is. Long considered an inactive fault, records from Japan proved that a tsunami that struck the country's Sanriku coast in 1700 originated less than 100 miles from the present-day United States. The discovery in the 1980s led to a flurry of research and preparedness efforts in Oregon, Washington and California.

It's daunting to think that people in the United States could ever "be like the Japanese" in preparing for earthquakes and tsunamis. But there are lessons to learn from this ancient country, even in the telling of a legend so simple and compelling that a child can grasp its moral.

Hamaguchi's story has been translated into at least nine different languages, fictionalized by a novelist and taught to students and adults around the world. Its purpose is simple: to keep the reality of tsunamis alive in a nation's collective memory.

Rapid warning system

Today the Japanese rely on computers as much as the testimonials of ancestors to warn citizens of an oncoming tsunami.

The Japan Meteorological Agency operates six regional centers that track 180 seismometers collecting data 24 hours a day. When an earthquake hits, computers instantly scroll through 100,000 pre-calculated scenarios, finding the closest geologic and seismic match to the current event, to predict whether a tsunami is likely to occur, where it will strike and with what level of force. A series of monitoring cables on the seabed with attached pressure gauges measure changes in water pressure, another tsunami indicator.

The three-minute warning standard was set after 246 people died when a tsunami wave as high as 93 feet hit the small island of Okushiri in northern Japan in July 1993. But the actual average warning time in recent years has been closer to four minutes, said Juyi Nishimae, chief of the agency's International Tsunami Information Section.

Now, engineers are developing a new technology that calculates data from the seismometer nearest to a quake's epicenter, determining the size of the temblor right at the point of the equipment. By year's end, Nishimae hopes to cut the agency's public alert standard to two minutes.

The warnings are immediately transmitted across Japan's 47 states - called prefectures - and coastal cities. They're also aired on the Japan Broadcasting Corporation, which is available in every home with a television set, reaching nearly 60 percent of the Japanese population, or 28.4 million viewers.

Local government officials then determine whether to evacuate, broadcasting the order across loudspeakers, signaling it with rotating sirens or via portable radios that residents keep in their homes.

The rest is up to the people. Three-quarters of those rescued in one of Japan's more recent disasters, the Great Hanshin-Awaji earthquake that struck Kobe in 1995, were saved by relatives and neighbors - not the government.

"A living god"

The 1854 quake that struck Hirogawa left its people in despair. Their homes and rice fields were decimated. They wanted to leave the town and its killer waves.

Hamaguchi refused to let that happen. With his own money, he built a 16-foot-high earthen seawall, hiring 100 residents to help him. He gave them a way to feed their families and a shield against the next great tsunami.

Hamaguchi was declared "a living god." When he died in New York in 1884, his traveling companion convinced the U.S. government that he was important enough to Japan to be shipped home in an iron coffin, filled with ice. A hundred monks and 1,000 visitors attended his funeral, the largest Hirogawa has ever seen.

"People nowadays still love Goryo-san," said Ueno Shuichi, a local reporter. "The same way they did back then. He's like Superman."

Hamaguchi's seawall was one of the first ever constructed in Japan, but hardly the last. One of the latest projects is on the island of Okushiri, where a magnitude 7.8 quake and resulting tsunami destroyed much of the the city of Aonae's structures on July 12, 1993. The Japanese government spent \$1.3 billion to rebuild the town, construct a seawall that rises as high as 38 feet and put new houses atop a landfill, 20 feet higher than they were before, according to a report earlier this year in the New York Times.

When a quake hits, sensors set off alarms installed in each resident's house. Twenty-two escape routes, lit by solar-powered signboards, offer a path to higher ground. And a 20-foot-high platform serves as shelter at the town's port.

Elsewhere in Japan, there are floodgates at more than 6,500 locations to quell tsunamis that surge up rivers. In the quake-prone Shizuoka prefecture alone, the government has constructed 258 temblor- and tsunami-resistant shelters that resemble lighthouses and allow evacuees to scramble to safety even in low-lying areas.

But the wise know that structures alone are not enough. Public education will save far more lives.

Each year in Hirogawa, the village celebrates the memory of Goryo Hamaguchi, in two

festivals: one where villagers add dirt to the earthen seawall and another called "Inamura no-hi," or "fire in the rice stacks," which has become the title for Hamaguchi's legend.

In this way, the story of "Inamura no-hi" will last forever, hopes Isao Shimizu, a former junior high school principal and director of the town's community center. Shimizu tries to keep the legend alive by hosting reporters who occasionally visit the village to tell them of Hamaguchi's heroism. He's eager to show off the statue of Goryo, his grave, guarded by a gate, and a monument in town, titled "What to do when the earthquake hits."

Actually, there are two monuments, one wooden and another stone.

"The wooden version says the same thing, but it's easier to read," Shimizu said. "The other is permanent. What you hear can be forgotten. This should be carved in stone."

At Hirogawa's primary school, Principal Masayuka Fukuda explains the disaster prevention curriculum, titled "body, head and soul." The "head" refers to a knowledge of what causes quakes and tsunami. The "body" is the five evacuation drills the school holds each year, so that children remember where to go after an earthquake hits. The "soul," the principal says, is the most important. "It's teaching the story of Goryo Hamaguchi; of Goryo, who took money out of his pocket to help his people. To teach the spirit of Goryo to the children - that's the hard part."

Fukuda developed the curriculum only in the past few years, because school officials five years ago asked students what they would do if a tsunami came. An alarming number said they'd go down the hill and look at the waves.

Now, if you ask the sixth-grade class if they know what to do when an earthquake hits, every hand in the room shoots up.

"If I was you," said Taiki Kanamaru, 12, "I would run to the mountainside, or to the other higher places."

"I'd ride my bicycle as fast as I can," added Naoki Fujimoto, 11.

"I want to survive. I always keep a flashlight. We are always prepared," said Hiroki Kaneno, 11.

The legend of "Inamura no-hi" lives beyond Hirogawa, as well. In the early 20th century, a writer named Lafcadio Hearn learned of Hamaguchi - it's not clear how - and wrote a story based on it, titled "A Living God." The story was published widely and read around the world. Today, a group of volunteer storytellers travel Japan with intricate paintings they use to help spread the legend of "Inamura no-hi."

"The Sumatra tsunami gave me the idea to draw the pictures," said the group's leader, Kayu Takada. "I read in the news of a child who let his father and everyone else know when they felt the earthquake, they should head for high ground. That gave me this idea to spread this story first among the children."

The Japanese are diligent about educating all citizens about the threat of tsunamis. Evacuation routes are clearly marked in coastal towns. Flyers and pamphlets are distributed in hotels. The

meteorological agency produces educational videos, sends experts to give lectures in schools and includes information about what to do in the event of a tsunami on its Web site. An earthquake preparedness center in Shizuoka includes a banner depicting the actual height of past tsunamis and a wave basin where the 50,000 visitors who attend each year can witness a simulated tsunami striking model houses.

For the past two years, the country has sponsored a Disaster Prevention Education Challenge Plan, picking the year's top 20 local disaster prevention programs and awarding a prize to the best. This year's winning team created a 3-D map of the coastline, showing where a tsunami would likely inundate it.

But even in a country this well-prepared, there are challenges.

Levels of readiness vary widely

Michio Hamaguchi is the 13th-generation president and chief executive officer of the Yamasa Soy Sauce company, Japan's second largest, which operates a U.S. plant in Salem. Hamaguchi is proud that the story of his ancestor has survived for 150 years, he said.

The legend is enjoying a renaissance in Japan, since the country's Prime Minister, Junichiro Koizumi, learned of it earlier this year at a disaster conference from the prime minister of Singapore, Hamaguchi said. Koizumi researched the topic and retold "Inamura no-hi" in a government newsletter, around the same time the Japan Broadcasting Co. did a 45-minute television segment on the story.

"It was a very popular TV program," he said.

But legends alone can't prepare people for disaster. In truth, levels of readiness in Japan vary widely, from state to state and town to town. Though it's a country clearly more steeled than any other, officials will always battle forgetfulness, complacency - and in some cases, a false sense of security.

When an earthquake shook the Kii Peninsula in September of last year, 30 of the 42 affected cities did not issue a warning or evacuate residents, said Tomoaki Ozaki, deputy director of earthquake and volcanic disaster management in Japan's Cabinet. Of the 12 cities that did evacuate, only one in 16 residents followed the order. Many ran to the shore to watch for waves. A survey conducted afterward showed most mayors predicted the tsunami height would be too small to warrant a warning.

"That was the wrong judgment," Ozaki said.

Although 20 percent of the nation's coastline is at direct risk of tsunamis, only 122 cities, towns and villages among 998 total have published hazard maps detailing evacuation routes, according to a recent report in one of Japan's largest daily newspapers, Asahi Shimbun.

"City to city, town to town is different," said Harry Yeh, a Japanese native and professor of civil engineering at Oregon State University. "Some places put in more effort than others."

The newspaper also reported that 1,200 of the country's 6,500 floodgates are incapable of closing before a tsunami hits because there's not enough staff to operate the gates or no

automatic system in place. A survey conducted by the federal Office of Fire and Disaster Management showed only about 14 percent of autonomies in coastal areas have designated buildings where people can take shelter in a tsunami, and 40 percent don't have emergency broadcasting systems.

In some ways, the country is too prepared. Seawalls and the reliability of government warnings can lead to complacency, say experts. Some people don't bother to evacuate because they think they'll be protected by a wall. Others remain glued to their televisions, waiting for official word that a tsunami will strike.

Some local governments don't issue warnings because they've quickly determined that a tsunami won't occur, so it's unnecessary to alarm townspeople, they say.

Such attitudes are foolish, warns Fumi Imamura, a leading tsunami researcher at Tohoku University.

"Most Japanese people still do not fully understand the true terror of tsunami," Imamura wrote in an editorial he submitted to the newspaper in July. "Nor do they know exactly what to do if a tsunami should strike."

But the real test of Japan's preparedness is proven by the survivors of past events. Many of those who escaped death in Sumatra were warned by Japanese tourists. Even the devastating tsunami that struck Okushiri in 1993 killed far fewer people than it could have. The wave hit the town in less than five minutes from the start of the earthquake, giving people no time to evacuate. It killed 15 percent of the population. A tsunami in Warapu, Papua New Guinea, triggered by an earthquake of similar magnitude, struck a town with a comparable population in 1998. It killed 40 percent of the residents.

The Japanese federal government's chief role is building walls and developing warning systems. The states primarily leave municipalities to their own preparedness measures, arguing that each town has different needs.

Hirogawa, of course, is a model. When the the tsunami struck Hamaguchi's house in 1854, his and 124 more of the town's 339 homes were destroyed. When another tsunami hit 90 years later, only two buildings fell, at each end of the seawall.

Not a single resident died.

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JAPANESE TSUNAMI WEB SITES

"Inamura no-hi" Web site: www.st.hirosaki-u.ac.jp/~tamao/Images/Fireofrice/Ina1.html

Lafcadio Hearn's story, "A Living God": www.inamuranohi.jp/english.html

International Tsunami Information Center: www.st.hirosaki-u.ac.jp/~tamao/Images/Fireofrice/Ina1.html

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