



Sending Reinforcement

A new piece of U.S. legislation aims to bring building safety to Latin America.

BY ANNE GUINEY

► **CODES** "When a building collapses in Ecuador, most people say 'Es el deseo de Dios—it's God's will,'" says New York City architect Steven Forneris. "Well, God doesn't construct faulty buildings, we do." Forneris is passionate about building codes in Central and South America, a topic he freely admits is his primary one these days. In the last year, he has become a one-man code-advocacy group, trying to make buildings in Ecuador a bit better able to withstand God's will. His fellow employees at Lee Timchula Architects smile at his proselytizing, but recognize its genesis: Forneris lived and practiced in Guayaquil, Ecuador, for eight years, and so has an informed opinion of the general state of building safety there. He tells stories of malls whose major

doors open inward, of magazine ads for "seismic-proof" steel. The situation, he notes, is pretty grim.

And it could get much worse. In 1999, the RADIUS Project Guayaquil (Risk Assessment Tools for Diagnosis of Urban Areas Against Seismic Disasters), a joint venture of the City of Guayaquil, a Palo Alto-based nonprofit called Geohazards International, the United Nations, and the Catholic University of Guayaquil, released an exhaustive study of the city's building stock, seismic risk, and disaster preparedness. The report stated that within the next 50 years, there is a 50 percent chance that an earthquake of 8.0 or higher on the Richter scale will strike within 125 miles of the central city, and that 26,000 people would die, with another 53,000 requiring

hospitalization. These numbers are estimates based on the history of seismic events in and around Guayaquil, and an assessment of everything from the location of firehouses to the dimensions of high-rises.

During his time there, Forneris asked about codes, but nobody seemed to know anything about them. When he finally tracked one down, he found that it was a 1979 translation of a Universal Building Code from the United States, with no local modifications. On returning to the U.S. a year ago, he started talking to friends and old professors, and called up the major code-writing organizations—the International Code Council, for example—to see if they were interested in the problem. They were. Last spring, armed with support from both the ICC and architects, engineers, and contractors in Ecuador (where he still

The town of Pujilí, Ecuador, experienced an earthquake of magnitude 5.7 in March 1996. Seismic disasters in the country have laid bare a national need for improved building standards.

>features

has ongoing projects), he took his case to Congress.

The result of this activism is the Program to Improve Building Construction and Practices in Latin American Countries, currently an amendment of the United States Foreign Relations Authorization Act. Sponsored by Senator Christopher Dodd (D-Conn.) and Representative Rosa De Lauro (D-Conn.), it is a modest bit of legislation that qualifies more as a friendly gesture than as foreign policy. It calls for the translation into Spanish of a model code or codes from an unspecified American code-writing organization, and then the distribution of 5,000 sets of these codes to architects, engineers, contractors, universities, and other interested parties in Ecuador and El Salvador. (Fornieris's work in Ecuador and the recent catastrophic earthquakes in El Salvador drove the choices.) There is also a "train the trainer" component, so that proper techniques for the implementation of these codes can be spread, along with the copies of the codes themselves. While as of this writing the legislation has not been passed, staffers in Senator Dodd's office were confident that it would be, and that the program would become law. The amendment's language makes clear that adoption of building codes in the foreign countries is strictly voluntary, and not tied to continued aid for their governments.

In addition to the obvious humanitarian intent of the legislation, there are financial motives as well. The United States spends a great deal in relief—\$200 million on El Salvador alone over the last 20 years—to help rebuild after earthquakes and other natural disasters. Thus, if fewer buildings collapse and there are fewer resulting

deaths, then Congress can appropriate less money for relief in the future. The chilling statistic cited by Senator Dodd in his statement on the legislation is that the cost of funding the translation and training for two years—\$3 million—is less than the U.S. government spent on the body bags, tents, and first aid sent to El Salvador last year after two major earthquakes.

For many supporters in Washington, code translation is a straightforward answer to a huge problem. By providing a proven model building code to countries without one, they believe, construction quality will improve, and the death toll in the case of disaster will shrink. However, as even Fornieris will admit, the issue is not just access to good building codes, but their application and enforcement. And this is a problem that may prove much more intractable.

Building codes in Central and South America certainly do exist, but unlike in the U.S., they tend to be applied spottily and may not always be current. (According to Sergio Barrueto of the ICC, until last year, Buenos Aires was using a building code based on German standards from the 1930s.) There are up-to-date codes floating around, says engineer Walter Mera, from the Catholic University of Guayaquil: "I hadn't seen an actual Ecuadorian code until about two years ago, but some designers here do take [U.S. codes] into consideration."

The Ecuadorian code mentioned by Mera was the first new development since the 1979 translation of the UBC. In 1996, then-President of Ecuador Sixto Durán-Ballén ordered an update of the old codes. The first chapter of the Ecuadorian Code of Construction, on seismic regulations, was released with some

fanfare in 1999. However, there was still no way of making sure that it would actually be used. For all intents and purposes, there just isn't any enforcement. Adherence to building codes is taken on by individual architects and contractors as they see fit—a far cry from the high-powered and highly regulated American real-estate environment.

Jaime Argudo, an engineer with Mera at the Catholic University and a member of the RADIUS team, explains that an enormous amount of the construction in Ecuador (and much of Latin America) is informal; by his estimation, only about 25 percent of the buildings in Guayaquil are built with any input by an architect or engineer. "The problem is not just one of updating old codes, but also enforcing them." He explains that most engineers do use some form of seismic code—often the 1997 edition of the UBC—but that engineers generally only get hired to work on high-rise buildings. Mera says that the average house is one or two stories and built out of hollow brick by a local mason with no formal engineering education or incentive to refer to codes; this does not mean it is poorly built, it simply means it was not designed with earthquakes in mind. Between the extremes of the one-family house and the high-rise is a large and dangerous gray area.

If enforcement is really the issue, then it follows that the Ecuadorian government would be a natural player. However, a surprisingly diverse group of people think that regulation is not the way to go: Argudo, who helped write the chapter of the Ecuadorian Construction Code, is joined by Patrick Bredthauer of Cemento Nacional, Ecuador's largest construction materials supplier, and

by Fornieris in preferring a voluntary approach. Bredthauer, who supports the U.S. code proposal, and whose company manufactures products that comply with California's seismic standards, jokes, "If we started fooling around with the government, it would take 20 years and the code would need updating again!" Whether or not governmental inefficiencies would indeed grind the process to a halt, many people see compelling legal reasons to keep the codes within the private sector. As it is, architectural liability in Ecuador falls under the jurisdiction of the criminal courts, not the civil ones. Theoretically, substandard design is already a cause for jail time. However, it generally takes a crisis to set the mechanism of enforcement into action, and by then it is too late. Thus, the notion of instituting an additional code that does not address the lack of an infrastructure of enforcement and inspection strikes a lot of people as ludicrous. Mera and Argudo feel that the culture of construction, especially in the informal sector, must change through reaching out to smaller contractors and local governments and educating them. And the Dodd and De Lauro legislation could help to do just that.

In Ecuador, where labor is still cheaper than building materials, it's hard to be upbeat about improving building safety. Argudo, who is a supporter of Fornieris's initiatives and the Congressionally funded program, tries to be optimistic: "It will be very nice for the universities and the others in the 25 percent of building projects that use engineers, if the codes are translated and distributed," he says. However, without spreading that information widely, he cautions, "the rest of the country will not be affected." ■



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Designated Countries:

Ecuador

Population: 12.4 million
 Urban population: 64.3%
 GDP (US\$): 19 billion
 Foreign investment (US\$): 690 million
 Aid per capita (US\$): 11.70

Major disasters:

August 1998 Earthquake kills three and injures 50 in seaside resort area, and prompts calls for improved building code.

March 1996 In Pujili, near the capital city of Quito, earthquake kills 15 people and injures more than 100.

March 1987 Earthquake leaves at least 20,000 people homeless, prompting a loan of US\$50.8 million from the International Monetary Fund.

El Salvador

Population: 6.2 million
 Urban population: 46.3%
 GDP (US\$): 12.5 billion
 Foreign investment (US\$): 231 million
 Aid per capita (US\$): 29.70

Major disasters:

January-February 2001 Two earthquakes kill more than 1,100 people and destroy nearly 150,000 houses. The United States Agency for International Development appropriates \$58.2 million in relief over two years.

October 1998 Hurricane Mitch causes flooding and landslides in El Salvador, killing 374 persons and displacing 55,864.

October 1986 Earthquake kills more than 1,500, and national newspapers call for greater control over building practices.