GeoHazards International

December 2011 Newsletter

Promoting Earthquake Safety in Rural Peru

Last August GHI project manager Veronica Cedillos and president Brian Tucker joined residents of Chocos, Peru and GHI project partners for a ceremony to inaugurate the remote village's newly retrofitted primary school. The town's celebration and far safer school marked an inspiring close to GHI's project **Improving School Earthquake Safety in Rural Peru**.

This yearlong project—conducted with Stanford University, the Pontifical Catholic University of Peru (PUCP) and the Peruvian nonprofit Estrategia—did much more than retrofit Chocos' three-room elementary school: it produced an innovative set of teaching materials and a scalable model for affordable seismic retrofits of adobe structures. GHI's work in Chocos was made possible through generous support from the Swiss Reinsurance Company, the Thornton Tomasetti Foundation and GHI's Ohya Memorial Fund.

Peru is subject to frequent, sizeable earthquakes: the most recent, a M6.9 earthquake centered just off of Peru's central coast, struck on October 28. The country's vulnerability to earthquakes is increased by its widespread reliance on earth-made construction materials like adobe. Adobe creates heavy, brittle structures that can collapse very easily and be deadly. However, the material is still widely used, especially in rural areas, because it is locally obtainable and provides effective insulation against noise, cold and wind.

Credit: David Hermoza

(Above) Workers applied geomesh, a strong polymer netting, to school walls, added a reinforced-concrete ring beam at the top of walls and anchored the geomesh in concrete footings at the base of walls.

This project was expressly designed to assist a community in rural Peru, where the level of unmet social needs can be acute. In July Cedillos led a team of engineering experts and students to the small village of Chocos, where they would live and work for six weeks. Once on site, the team launched an extensive outreach and training campaign to educate the community about its earthquake risk, while teaching local construction workers strengthening techniques to improve the seismic safety of the school and other adobe buildings.

The GHI-led team documented the trainings and school retrofit on video, asking trainees to point out building vulnerabilities and to explain in their own words how to address them, demonstrating proper technique. These videos have great potential to teach and inspire other communities to reduce their earthquake risk. The trainees are already showing initiative in putting their new knowledge to work: they are currently constructing a seismically-resistant home for a blind resident of Chocos.

In December, Cedillos will return to Peru to meet with government and NGO leaders who have expressed keen interest in bringing the training model developed in Chocos to other communities at risk.

A Computer Model to Change the World?!

How do you persuade an individual or organization to prepare for a future earthquake? What information do government officials need to make their communities safer from seismic events? Or school administrators, to make their students and staff safer? GHI and Colorado State University's Center for Disaster and Risk Analysis are working to answer these and other questions for the Global Earthquake Model Foundation, a not-for-profit initiative to calculate and communicate earthquake risk worldwide.

The foundation has ambitious goals: to develop free online tools and resources that provide community leaders, particularly in developing countries, with reliable earthquake risk information that can help them to design policies and practices for building safer communities. Once developed, the tools might help government officials to identify the most vulnerable neighborhoods in a city or to quantify costs and benefits of various city or nationwide policies.

In December 2010, the GHI-led team began an 18-month project to survey potential users of the foundation's future tools and resources. The team traveled to 11 cities in seven countries, including Bhutan, Peru, Turkey and New Zealand, to speak with more than 120 community leaders about their experiences implementing earthquake risk reduction activities. The team targeted professionals who are not technical experts but have demonstrated an interest in making their cities safer from seismic events. The interviews provided information on earthquake tools and resources that community leaders are already using and ones that they wish they had.

The team's profiles of "local champions" and the communication channels they use will inform GEM's strategies for how to succeed in its long-term goal to reduce earthquake risk worldwide.

(Above) GHI's Justin Moresco with Carla Johnson, one of the community leaders interviewed for the project and a staff member of the San Francisco Mayor's Office on Disability. The two review a map that shows the intersection of vulnerable people, vulnerable buildings and vulnerable sites within San Francisco. This "triple threat," as Carla calls it, represents the neighborhoods that will likely be most severely affected by a large earthquake near the city.

One Man's Fight for Change

Hakan Uslu is one inspiring person whom GHI interviewed for this project and an example of how an individual can effect change in a community.

In 2002, Hakan Uslu opened the first materials testing lab in the Turkish city of Antakya, an ancient Mediterranean city of more than 200,000 people in a region with a history of strong earthquakes. When Hakan opened his business, nearly half of the concrete and steel sold on the market that he tested didn't meet the country's minimum strength standards, and government officials weren't taking steps to improve the situation.

Hakan took it upon himself to push for change. He documented his findings and sent report after report to the government enforcement agency. He published brochures that described the shortcomings of poor materials and passed them out to construction workers, engineers and building owners. After several years of committed effort by Hakan, the government started conducting some of its own testing and began to demand that building owners submit material testing reports before they would be issued occupancy permits. Today Hakan says 97% of the concrete and steel that he tests on the market meets the minimum standards, and a second private testing lab has sprung up to meet the growing market demand.

APEC Focuses on School Earthquake and Tsunami Safety

In October, GHI led a three-day workshop for the U.S. Department of State that brought together representatives from a dozen countries in the Asia Pacific region to discuss ways to make schools safer from earthquakes, tsunamis and other natural hazard events. At the workshop, held in Chinese Taipei, representatives of twelve "member economies," as they are known, of Asia Pacific Economic Cooperation or APEC discussed the risk to schools from natural hazards and learned from each other about measures to reduce risk.

Presenting experts described hazards in the APEC region, school building vulnerability, example school safety policies and case studies from recent events. GHI's Tom Tobin steered debate on drafting an APEC-specific school safety framework. That debate and the emerging framework leveraged elements of GHI's 2004 school safety initiative with the Organisation of Economic Cooperation and Development (OECD).

On a field trip to the central area of Taiwan, which was struck by the September 1999 Chi-Chi earthquake, workshop participants toured the 921 Earthquake Museum on the site of the badly damaged Kwangfu Junior High School. The Museum has preserved the partially-collapsed school as a record of damage wrought by the Chi-Chi earthquake and has surrounded the site with educational installations and tools to inform the public, and school children in particular, about earthquakes and disaster readiness.

APEC's 21 member economies share exposure to natural hazards associated with their location along the "Ring of Fire," an area of intense seismic and volcanic activity. In the past decade earthquakes, tsunamis and volcanic activity have struck frequently with devastating effects on children and schools. One need only consider the recent natural hazard events in China, Chile, Peru, New Zealand and Japan to understand how urgent an issue school safety presents to APEC.

The **School Earthquake and Tsunami Safety in APEC Economies: Reducing Risk and Improving Preparedness** workshop marked an important first step in a multi-year process that GHI hopes will lead to safer schools throughout the APEC region.

At this time, GHI is circulating a draft workshop resolution recommending that all APEC member economies ensure children's safety through implementing a new project, **Safe@School—Protecting Children from Natural Hazards**. Safe@School would provide a comprehensive framework that outlines principles, activities and implementation strategies to guide APEC member economies in carrying out and sustaining effective school safety programs.

The next phase of GHI's work with APEC will be to propose one or more collaborative capacity-building projects that would move the Safe@School framework into implementation.

(Above) The GHI-led workshop brought together experts and participants from Australia, Canada, Chinese Taipei, Indonesia, India, Japan, Mexico, New Zealand, Peru, the Philippines, the United States and Vietnam.

GHI Leads International Network to Make Buildings Safer

For twenty years, GHI has championed safer buildings around the world, often working with engineers and builders to make important community buildings such as schools and hospitals safer. This spring, we launched a project that takes a slightly different tack. With funding from the Earthquake Engineering Research Institute and the U.S. National Academies, GHI formed an international network focused on one particularly lethal building type—made of concrete frames with unreinforced masonry infill walls—that is common from Caracas to Karachi and that has caused tens of thousands of preventable deaths in recent decades.

The Framed Infill Network will promote and coordinate international collaboration among researchers, practicing engineers, architects, builders and building officials. Led by GHI, network members will collaborate electronically in small groups to conduct research into engineering design, construction, education, outreach and training and will strive to change how concrete frames with infill are designed and built, in order to improve earthquake safety around the world.

GHI expects that, with appropriate guidance, engineers and builders can make relatively modest changes to their current practices to create new or retrofitted buildings that intentionally make beneficial use of infill walls to achieve earthquake safety benefits. Buildings using these new beneficial measures would be called "framed infill buildings." Network members are in the process of completing a survey of scientific literature on buildings with infill, which will be available via the network's website, framedinfill.org.

If you are interested to join the Framed Infill Network's activities, including development of draft design guidelines for new framed infill buildings, then please contact Project Manager Janise Rodgers at rodgers@geohaz.org.

(Above) A dangerous building in Kathmandu, Nepal. The grey concrete columns and beams, which form structural "frames," have been filled in an indiscriminate manner with red, unreinforced bricks.

Disseminating Earthquake Information Across the Globe

GHI launched an exciting initiative this year to sponsor the membership of 120 students and professionals in developing countries to the Earthquake Engineering Research Institute, a California-based technical society that is one of the world's leading clearinghouses for information on advances in earthquake-related policymaking, science and engineering. GHI sponsorees include engineers, scientists, planners, architects and government officials from three dozen countries. As members, these students and professionals will gain access to the institute's monthly newsletters, earthquake reconnaissance reports, peer-reviewed journal articles and online workshops and opportunities to network with like-minded professionals worldwide, among other benefits.

Access to emerging, reliable information about earthquake risk can be limited in developing countries. In many places, earthquake professionals have no nationally based associations or ones that meet infrequently and provide few benefits. GHI sees accurate information and the ability to share innovative ideas as crucial to advancing effective risk reduction strategies beyond the borders of the wealthiest nations. This belief inspired our initiative with the Earthquake Engineering Research Institute.

GHI received more than 250 applications for sponsorship. In selecting winners, GHI staff strove for geographic, gender and professional diversity. We plan to share some of their stories in future newsletters and email updates to GHI supporters, and we intend to continue this initiative beyond 2012.