



Global Rochester: Peru

An engineer takes part in a 'cultural project of the highest kind.'



ROCHESTER AND PERU

People

- 23** alumni living in Peru
- 11** current students from Peru
- 1** student Fulbright recipient
- 44** study abroad students since 2001
- 3** exchange students from Peru in 2014, part of an exchange agreement begun in 2000

Curt Cadorette, the John Henry Newman Associate Professor of Catholic Studies, is an expert on religion in Peru and created a long-standing program for students to visit the country.

Carmala Garziona, professor and chair of earth and environmental sciences, works in the central Andes of Peru and Bolivia to study the geodynamic processes involved in raising the Andean plateau.

Lynne Massaro, assistant professor of clinical nursing, takes nursing students to Peru for a capstone project.

In northern Peru stands a monument at the core of the vanished Moche civilization. Huaca de la Luna—or Temple of the Moon—is a vast pyramid built alongside a volcanic mountain, Cerro Blanco. It is part of a complex of ruins near Trujillo that forms what Renato Perucchio calls “the Rome of the Moche civilization.”

Since 2010, the professor of mechanical engineering and biomedical engineering has been part of a team of engineers who are working with archaeologists and architectural conservationists to protect the structures. The pyramids are made of adobe, which “can be very easily damaged by the torrential rains produced by El Niño and by earthquakes,”

Perucchio says. Huaca de la Luna “is a very fragile monument—it’s essentially just mud.”

The Moche civilization developed approximately at the time of the beginning of the Christian era, and ended around 850 CE. Since 1992, the site has been the focus of an extensive archaeological project sponsored by the Peruvian government. The project has three components: archaeological study, conservation, and involving the local population in maintaining its cultural heritage.

In the field, Perucchio and fellow engineers have carried out studies to model the pyramid’s response in case of an earthquake. It is multidisciplinary research. Cynthia Ebinger, professor of earth and environmental sciences, has visited the site to do geophysical prospection of the area. Spaniards cut slices through the structure in their hunt for treasure, and those cuts, too, affect how the structure will respond to seismic activity. Working with Benjamin Castañeda ’09 (PhD), a specialist in image processing and now associate professor of electronic and electrical engineering at Pontificia Universidad Católica del Perú, or PUCP, the team has created models that accurately reflect the current state of the structure.

Rochester has a collaboration agreement with PUCP that provides for Peruvian faculty to visit Rochester each fall, teaching courses in the Archaeology, Technology and Historical Structures program. There is also a student exchange that runs in both directions. Such collaborations, Perucchio says, have stimulated research projects, including another project near Cuzco, where Perucchio and other team members are studying “baroque Andean” churches built by the Spaniards atop Incan temples. Their interiors are filled with paintings and frescoes—and, like the pyramids, they’re built close to an active seismic area. Much of the restoration of the churches has been aimed at the artistic surfaces. About two years ago, Perucchio and his Peruvian colleague Rafael Aguilar, associate professor of civil engineering at PUCP, began to analyze one of the churches following a procedure virtually identical to what they’ve used at Huaca de la Luna. Based on their preliminary results, PUCP has granted them funds to continue their studies.

An irony of archaeological work is that it exposes lost structures to study—for example, at Huaca de la Luna, bas-relief carvings, once covered by sand, that tell the creation story of a culture that left no written record—their very exposure begins



AT WORK: Perucchio (second from left) and Peruvian colleagues measure the dynamic response of adobe walls in Huaca de la Luna.

their deterioration. “In order to acquire knowledge we risk the destruction of the structure,” he says.

But the work of the engineers aims toward preservation. Says Perucchio, “I feel particularly satisfied that I’m giving my contribution to the conservation of a spectacular example of a culture that flourished in Peru and could easily vanish.”

—Kathleen McGarvey