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Engineering Students Are Helping To Bring Clean Water To El Salvador

By Maggie Master

On Saturday, Jan. 5, a group of CUA students boarded a rickety school bus outside of El Salvador's Comalapa International Airport. The students were headed for a small village, a community that each traveler knew intimately — although none had ever been there. When the bus ran out of paved highway, it continued on bumpy dirt roads until reaching the rural farming community of Santa Clara.

For the group, which included students from a civil-engineering course as well as members of CUA's Engineers Without Borders student chapter, this nine-day service trip came after two years of planning, fundraising and researching. It was the first of three trips planned to this village in southeastern El Salvador.

Since the founding of CUA's EWB chapter in 2006, its members have worked toward a singular goal: implementing a water-distribution project for this Salvadoran community of 3,000 residents. In doing so, the students hope to provide the villagers with something that most Americans take for granted: safe drinking water.

EWB is a nonprofit humanitarian organization that aims to improve the quality of life in the developing world by partnering professional engineers with communities in need. The organization helps implement sustainable engineering projects in the developing world while offering professional engineers and engineering students opportunities to exercise social responsibility. Begun by a University of Colorado professor and eight students in 2000, EWB now boasts 272 chapters, with more than 12,000 members working on projects in 66 countries.



Andrew Smith, Theresa Murray and Trevor Mackessy-Lloyd pose for a picture with Professor Gunnar Lucko (second from left) in El Salvador.



CUA's student chapter was formed in 2006 by Assistant Professor of Mechanical Engineering John Judge and Kerri Allen, then a senior mechanical engineering major. The pair went to observe a meeting of D.C.'s professional EWB chapter, several of whose members knew of Santa Clara's plight and advocated a potential project there. Because the national organization includes both professional engineers and students, CUA was able to join the project. Tim Garland, last year's CUA chapter president, now works for the Whiting-Turner Contracting Co.'s D.C. office as a project engineer, but remains a central force in the Santa Clara project via the D.C. professional chapter of EWB. He accompanied the students on their January trip.

Sophomores Andrew Smith, Theresa

Mackessy-Lloyd, Brendan Gilmore, Murray, and Erica Gonzalez look on as Evan Heisman calibrates a surveying instrument used to measure horizontal angles.

Murray, Evan Heisman and Daniel Pisani; junior Erica Gonzalez; and seniors Brendan Gilmore, Trevor Mackessy-Lloyd and Joseph Gilfoil went on the trip,

representing several engineering disciplines, including electrical, computer, civil and biomechanical engineering. This group was composed of a handful of CUA's EWB members as well as students in "Disaster-Mitigating Design and Practice for the Developing World," a course created by Assistant Professor of Civil Engineering Gunnar Lucko with the help of a three-year grant from the National Collegiate Inventors & Innovators Alliance. The course teaches how to create low-cost yet sophisticated structures in poor, earthquake-prone areas.

El Salvador, which in 2001 suffered a magnitude 7.6 earthquake that destroyed more than 108,000 homes and damaged more than 163,000 dwellings and other buildings, is a country in dire need of such "quakeproofing." So CUA's EWB chapter has teamed up with Lucko and his class to create an "earthquake-proof" community health clinic in Santa Clara, which will double as an administrative building to manage the water system. Lucko's National Collegiate Inventors grant helped pay his students' travel costs and the professor joined them on the trip.

CUA students made the January visit to identify important construction details such as the soil quality, the planned location for the water tank and the proximity of the villagers' homes to that site. The group built a sewage removal system prototype for one home and scouted out a location for the administrative office/health clinic.

But beyond blueprints and soil measurements, the group of traveling engineers earned the trust of this small community, and in return received a powerful incentive to continue with their work.

"This trip finally allowed the students to see the faces and meet the people they had been planning to help, and see how desperate their need is," says Garland.

"The pinnacle moment of the trip for me was recognizing the immediate impact of our efforts on the community," says

Gonzalez, a computer engineering major who is bilingual and served as an interpreter. She recalls when the group finished the construction of the sewage removal system prototype, which is a pit to direct dirty water underground to prevent it from collecting on the surface of the yard and breeding mosquitoes and waterborne illnesses: "It was completely functional. By teaching the members of the community the techniques to construct this system, they can now begin construction of their own pits while we continue fundraising here in the States."

The villagers of Santa Clara depend on hand-dug wells and ox-drawn carts to distribute water to households. When EWB's work is completed, however, water will be pumped from a well, filtered, stored in a holding tank and distributed as needed to approximately 300 households. The project is one of the largest undertaken by EWB and also involves students and recent graduates from the University of Pittsburgh, George Washington University and Howard University. The CUA chapter's role is selecting the water pump, designing the storage tank and designing the water administrator's building/health clinic.

Through their work with EWB and Lucko's class, participating students spent three semesters educating themselves on not only the region's topography and climate, but also the needs of the community —



Two concrete panels cover a brick seepage pit built by the students behind one of the villager's homes. The pit will prevent runoff and erosion caused by water used for washing, which will instead be absorbed by the ground.

details such as how much community members could realistically afford to pay for water and sewer services. It was through this research that the group realized two things: a full-time local administrator would be required to manage the water system, and the village desperately needed a health clinic.



Daniel Pisani and Mackessy-Lloyd enjoy time with the children of Santa Clara during a piñata event to welcome the group of CUA students.

The EWB members brought the community gifts of candy, which the locals put into piñatas and broke open during a welcome ceremony on the first night of the trip.

“The people of Santa Clara are extremely welcoming,” says Gonzalez. “Practically everyone we passed said hello, accompanied with a warm smile. They were also very hard working and willing. When we were digging the trenches, many of those who passed by eventually came back with a shovel or pick to help us out.

In fact, much of the construction will be facilitated by local Salvadoran volunteers. This idea of helping communities to help themselves is a core part of the EWB mission.

install the water tank and set up the water-distribution system. Mechanical engineering faculty members Joe Vignola and John Judge will accompany the students.

Two more groups of CUA students will return to Santa Clara to help complete the project. Participants in the next trip, scheduled for the summer or early fall, will

Professor Lucko says the trip was a transformative experience for him and the students, a chance to move beyond the classroom and really effect change. “When else,” he asks, “do you get to do teaching, research and service at the same time?”

[Back to Top](#)

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