

"A World OF Solvable Problems"

On a dusty dirt road in the impoverished west African country of Burkina Faso stands the Dispensaire de Done, a rustic clinic where Matthew Conway, B.S. '12, chemical engineering, first learned how engineers can make the world a better place.

The clinic serves the needs of more than 8,000 residents in the village of Done and surrounding areas, providing general medical care and delivering 250 babies annually. On Conway's initial visit in 2010 with the University of Maryland chapter of Engineers Without Borders (EWB), the facility operated without electricity or running water. Maternity nurses dashed between the clinic's two buildings, retrieving water from a rusty storage tank to clean tiny newborns. At night, nurses worked by candlelight and flashlight.

At the Dispensaire de Done, Engineers Without Borders student team members Matthew Conway (upper left) and Steve Emiling (upper right), and their faculty mentor Professor Charles Schwartz, civil and environmental engineering (on ground), raise the platform for their water system's main tank to the clinic's roof.

PHOTOS COURTESY OF THE UNIVERSITY OF MARYLAND CHAPTER OF ENGINEERS WITHOUT BORDERS.



- 150** students work on EWB projects annually.
- 50-60** students travel abroad each year, with the remaining students providing support from campus.
- 4-6** projects are managed through EWB at any one time.
- 15** projects have been completed since the chapter formed in 2004.
- 474,036** miles have been traveled by EWB students in the last year alone.
- \$50,000** is the typical project cost.

Standing, left to right: The “well guardian” (name unknown), Mian Khalid, George Kinchen IV, Anne Lederer, Landu Gisele (clinic’s maternity nurse), Prof. Charles Schwartz. Kneeling, left to right: Matt Conway, Bilabega Razo (head nurse at the clinic), Ouattara Keltigui (clinic nurse), Steve Emling.

On that visit, the EWB team installed solar-powered lights in the maternity wards at Done and three other clinics in the area of Dissin, a larger town about five miles away. A major improvement—still, Conway felt compelled to do more.

“We saw a world of solvable problems,” says Conway, “and we knew we could make a difference.” The team returned to the Clark School to research techniques for delivering clean water to the clinic. “With each technique, we asked: Can we find the materials locally? Can the system be maintained by residents?” explains Conway. Finally, the team chose a submersible, solar-powered mechanical well pump that would send water through three tanks—a continuous slow sand filter to purify the water. A second pump would send the clean water to a rooftop storage tank from which it would flow to one sink in the operating room and another in the maternity ward.

“...good job...good job...thank you...”

The team returned to Done in January 2012 and assembled the pump, helped by the residents. “As soon as we lifted a shovel or swung a hammer, the local people rushed in to take the tools out of our hands and do the heavy lifting,” says Conway. “A highlight was when we finally placed the pump—which we had spent two years designing—into the well,” he says. “The eight-member EWB team and six Africans grabbed the pump together and gently maneuvered it into place. That moment was inspiring for everyone.”

Then the unthinkable happened: the pump failed to start. After hours of troubleshooting, the team discovered a more powerful inverter was needed. Thanks to a local electrician, a new inverter arrived the next day by bus from the capital city, Ouagadougou. Later, when the water started flowing, “The residents cheered and thanked the team profusely,” says Conway. “They couldn’t stop smiling.”

Using French as a common language, with gestures and drawings to fill the gaps, the team taught the villagers how to operate and maintain the clean water system. Weeks after their return to the Clark School, the team received a surprise phone call. “Good job...good job...good job...thank you...thank you,” shared a local nurse, who voiced the sentiments of the entire town.

Today, Conway remains “on a high” from the experience. “This project taught me so much: how engineering gets done, how different life is in other countries, how it feels to help people by using my engineering education—it feels really good.”

One of the Nation’s Most Active EWB Chapters

Maryland’s EWB chapter, established in 2004, attracts some 150 students annually, a majority of whom come from the Clark School. Each year the chapter manages four to six missions to improve people’s quality of life in disadvantaged communities in Asia, Africa and South America. (EWB-USA does not sponsor projects in the U.S.) Despite limited resources and tight timelines and budgets, the teams devise innovative solutions to critical engineering challenges, such as clean water, sanitation and transportation. (See map, pages 8-9 for EWB and other service projects.)

“Maryland is one of our largest and most active chapters,” reports Tiffany Martindale, project manager for EWB-USA. “It is uncommon for a student chapter to have the breadth of interest within their membership to successfully pursue so many different programs at one time. The success of their programs speaks to their dedication.”

EWB Chapter Advisor David Lovell, an associate professor of civil and environmental engineering, notes, “Our students are very aware of the global disparity in good fortune. They look at these projects as ways they can put classroom learning to work.” Lovell also advises the Maryland Sustainability Engineering program, another student organization dedicated to sustainable development locally and abroad.

From the onset, the Clark School encourages students to make meaningful contributions to society. “The school does a great job of reminding us that we live in a bigger world,” says Conway. “We’re challenged to solve the world’s problems, and that’s repeated in every class and at every event.”

Key to the chapter’s success is mentoring by practicing engineers and Clark School faculty members. For a typical project, says Lovell, “Students consult five or six faculty members who are experts in various aspects of our projects, from bridge design to wastewater treatment to mapping.”

A faculty member accompanies each student team, notes Lovell, who has made nine international trips with EWB. Sean Connor, B.S. ’13, civil and environmental engineering, who recently returned from Ethiopia, adds, “Faculty mentors become an invaluable source of engineering advice, project guidance and practical knowledge. We get to know them on a personal level, which adds value to our education when we return to the Clark School.”



Sheila Xiah Kragie helped bring clean water to rural communities in Honduras during her 2009-11 Peace Corps mission.

After EWB, Clark School Students Continue Global Service

EWB has opened many students' eyes to sustainable development career and education options and additional volunteer opportunities. Based on his EWB experience, Kevin Fries, B.S. '12, civil and environmental engineering, plans to work in the Peace Corps followed by graduate study in sustainable development. "I want to take a leading role in international development and promote positive change at both the engineering level and the public policy level," explains Fries. He cites a Clark Scholarship as key to his ability to give time to EWB.

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A founding member of the university's EWB chapter, Sheila Xiah Kragie, B.S. '06, civil and environmental engineering and B.A. '06, economics, spent two years in the Peace Corps as a water

"The scholarship assistance I received through the university allowed me to graduate without debt, which cleared the way for me to pursue the Peace Corps."

and sanitation engineer in Honduras, where she designed four gravity-fed water systems in small rural communities. "Thanks to the rigorous technical background the Clark School provided, I knew all the basics and could jump right in, even though I never faced these particular engineering problems," says Kragie. She is now exploring environmental contamination issues as a doctoral student at Columbia University.

EWB alumna Mary Tellers, B.S. '11, mechanical engineering, volunteers as a high school physics teacher with the Peace Corps in Guinea, West Africa. "The scholarship assistance I received through the university allowed me to graduate without debt, which

cleared the way for me to pursue the Peace Corps," explains Tellers. "Through my work, I hope to broaden opportunities for others."

EWB alumni Chris Mattingly and Ryan Payne, both B.S. '08, civil and environmental engineering, have continued their volunteer service activities with support from their employers and connections with Georgetown University's Project Honduras. They have traveled twice to that country to bring clean water to the small community of La Colonia Balfate on Roatán Island. "The Clark School provided the engineering foundation and fundamentals we needed to make an infrastructure assessment and offer sound recommendations," says Payne.

Payne works for GEI Consultants, Inc., a geotechnical, environmental and engineering consulting firm, and Mattingly for Environmental Resources Management (ERM), a global sustainability consultancy. The companies allowed the two engineers to use their resources for design and planning, and the ERM Foundation awarded a grant to Project Honduras to improve access to clean water.

Forget the Beach, There's Work to Do

Fort Lauderdale and college students. If you're thinking young people on the beach sleeping off last night's party, think again. Last year, through the Clark School's Alternative Spring Break Program and Habitat for Humanity, a team of Clark School students traveled to the famous resort town not to relax in the sun, but to build houses for disadvantaged families. "I began to understand firsthand the engineering principles taught in my statics and mechanics classes



George Jin, far right, works with other Clark School students to construct a roof on a new Habitat for Humanity house in Fort Lauderdale.

when we were erecting trusses to support the roofs," says George Jin, B.S. '11, mechanical engineering. "And it was amazing to see people take the keys to their first homes, homes we built." Through the program, states Jane Fines, Clark School's director of International and Leadership Programs, "Students learn more about themselves, develop leadership skills and gain awareness of social and civic issues that affect the communities in which they volunteer."



Megan Halliday, left, takes a break from laying bricks for a new educational facility for farmers in Nicaragua.

With her Clark Scholarship covering a good portion of tuition costs, Halliday says she is able to use more of her savings on service trips.

Through an Alternative Break program sponsored by Maryland Hillel, the center for Jewish life at the university, Megan Halliday, B.S. '13, bioengineering, traveled to New Orleans to rehabilitate a hurricane-damaged house and to Nicaragua to build an educational facility for farmers. With her Clark Scholarship covering a good portion of tuition costs, Halliday says she is able to use more of her savings on service trips. She also credits the Clark School with honing her ability to lead a group. "In Nicaragua, with no technology and little running water, you need to have each other's back. The Clark School's emphasis on teamwork, starting with the hovercraft we built in our very first class, prepared me well."

Six years after Hurricane Katrina devastated the Gulf Coast, Meenu Singh, B.S. '14, civil and environmental engineering, traveled to New Orleans with the University of Maryland Alternative Breaks program, planting trees in coastal marshes and swamps to hold back future storm surges. "When you see the damage caused by a natural disaster, you more fully understand what the Clark School aims to instill in its students—the importance of developing sustainable, cutting-edge designs that will help the world," relates Singh, a Banneker/Key Scholar who was named the 2011 Leading Women Award scholarship winner by the *Maryland Daily Record* for her academic and service achievements.



In New Orleans, Priscilla Tang, electrical engineering, and Meenu Singh, right, plant trees in coastal marshes.

SOCIAL ENTREPRENEURS CREATE THEIR OWN SERVICE ORGANIZATIONS

In true Clark School style, students and alumni launch their own service programs when no alternatives exist.

AGUAYUDA: PROVIDING CLEAN WATER IN COLOMBIA



PHOTO COURTESY OF AGUAYUDA

Born in Colombia, South America, and raised in Columbia, Md., Simón Zimmer, B.S. '99, electrical engineering and B.A. '99, German, returned to his roots in 2006 to launch Aguayuda, a nonprofit dedicated to addressing water supply problems on Colombia's Northern Coast. "Only 16 percent of the residents in that area have access to clean water," says Zimmer. Using problem-solving and engineering skills honed at the Clark School, Zimmer and his team assess the needs of each community on site and develop solutions, such as installing water-distribution systems, water tanks and windmills to pump well water. Aguayuda raises funds, implements the projects together with the community and local subcontractors, as well as monitors and evaluates the projects. To date, the nonprofit has assisted 13 communities, providing clean water to 4,200 people.

SOUTH AFRICAN LACROSSE PROJECT SHOOTS FOR GREATER GOALS



PHOTO COURTESY OF SALP

In 2007, Kenneth "Kip" Hart, B.S. '12, aerospace engineering, and his brother founded the nonprofit South African Lacrosse Project. Their goal: to foster a sense of accomplishment among orphans and at-risk youth in South Africa's Waterberg region, where the Harts' former au pair resided. The organization's weeklong summer lacrosse camp brings 18 coaches to South Africa to teach 160 kids. Today, the Harts are taking the nonprofit to the next level—improving education by providing high school scholarships, creating a computer classroom and sending a teacher/lacrosse coach to work with the community year-round. Says Hart: "My engineering courses helped me develop the skills needed to make a difference, including teamwork, leadership and communications."

GAIA: TOOLS FOR BUILDING EARTHQUAKE-RESISTANT STRUCTURES



PHOTO COURTESY OF DESTA ANYIWO

After a 7.0 earthquake ravaged Haiti in 2010, Desta Anyiwo, B.S. '10, mechanical engineering and African American studies, headed there with a team of 25 volunteers to instruct locals on building earthquake-resistant sandbag structures. A series of logistical challenges, including a lack of supplies, prevented them from conducting the training. "It would have been a better use of our resources to film and forward a 'how-to' video," says Anyiwo. Lesson learned, Anyiwo helped launch The GAIA (Grassroots Action, International Alliances) Group to produce education technology to help teach people in developing countries to improve their living conditions. GAIA's first video CD, scheduled for release this year, focuses on how to build earthquake-resistant infrastructures using natural resources, as well as how to make zero-energy refrigerators, plastic-bottle light bulbs and more.

You Can Help Our Students Serve the World

Through their volunteer efforts, Clark School students are making a difference in the lives of thousands of individuals and communities throughout the world. Your support can help them continue and broaden their good work. Consider making a gift to the following:

ENGINEERS WITHOUT BORDERS

contact Faculty Advisor Dave Lovell at lovell@umd.edu.

MARYLAND SUSTAINABILITY ENGINEERING

contact Faculty Advisor Dave Lovell at lovell@umd.edu.

STUDENT FIRE SERVICE ACTIVITY

The Dr. Harry E. Hickey Scholarship Fund, contact Jim Milke, chair of the Department of Fire Protection Engineering, milke@umd.edu.

UM ALTERNATIVE BREAKS PROGRAM

www.thestamp.umd.edu/Student_Involvement

HILLEL ALTERNATIVE BREAK PROGRAM

contact Shikma Gurvitz at sgurvitz@marylandhillel.org.

CLARK SCHOOL ALTERNATIVE SPRING BREAK PROGRAM

contact Jane Fines at jfines@umd.edu.

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www.aguayuda.org

THE GAIA GROUP

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www.southafricanlacrosse.org

MADIEU WILLIAMS FOUNDATION

contact dahlia@madieuwilliams.org.