Service learning has become so popular within the College of Engineering that demand for participation can sometimes outpace immediate supply. For some students, one-to-two weeks of international experience serves as a teaser. Rather than merely getting their feet wet, they hope to be fully immersed.

“Nothing surprises me more than the level of commitment of our students,” says Jordan Ermilio, Director of the Engineering Service Program. “I often have students that stay involved after they graduate and who want to work on these projects while studying in graduate school or as volunteers. It is one thing to volunteer for a week working on a water project. It is completely different to spend an entire summer living and working in solidarity with our host partners.”

In response, the College is exploring innovative ways to provide more of these unique learning opportunities. In 2011 the College piloted an international summer service internship, an eight-week program that sent undergraduate students to Panama and the Philippines. Students who were selected for participation were oriented on campus by engineering faculty and spent the summer working on projects identified by international partners.

The internship offers a deeper opportunity to make a difference in the lives of people living in developing communities. During this time, students live with a local host family and go to work directly for a local organization to help them meet their development objectives. “For the first time, they are completely immersed in a problem by themselves. As engineers, they are called upon as experts and they begin to realize the responsibility and the impact that engineers have on society,” says Professor Ermilio.

**A Plan not Wasted**

Kyle Johnson CE ’13 traveled to Kiangan, Ifugao, in the Philippines to help the local government create a solid waste management plan to prevent potential health and environmental issues.

“‘Enlightening’ is the word I use to describe my time in the Philippines. Your work feels more important when you get to know the stakeholders personally. No feeling compares to knowing you are making a significant impact in the community,” says Johnson.

Before he arrived, Kiangan had no enforceable plan for solving waste management issues and no sanitary landfill. Instead, the townspeople disposed of waste in a dumpsite where toxins were free to infiltrate and contaminate the water supply. “Once we found a site suitable to develop a sanitary landfill, planning for a sustainable program began,” he says.
Johnson facilitated meetings for Kiangan’s Solid Waste Management Board, charged with updating the community on moves toward proper sanitation. He assisted in developing timetables for solid waste collection and helped balance and forecast the program’s budget. A design for the future sanitary landfill was then divided into sections for medical and residential waste, accounting for the different decomposition needs of each material. Finally, Johnson helped create a 10-year plan to enforce the new solid waste management program.

“The major steps in this plan contribute to the larger picture—achieving a healthy environment,” says Johnson.

“I will never forget my time in Ifugao—what I learned is something you cannot learn in the classroom. The implications of a project like this helped me develop a different perspective toward academics. Now, whenever I learn something in the classroom, my first thought is always ‘how would this apply in Ifugao or a similar setting?’” he says. “In my time there, Ifugao became a second home to me. The relationships I developed there and the progress we made have me anxious to return as soon as I can.”

**A Sustainable Lake**

“Like many other students, I wondered how the information we learn in class is truly applicable. After embarking on my voyage to the Philippines, I realized first-hand how the lessons we learn benefit society,” says Colleen O’Neil CE ’12.

As part of a collaborative team charged with developing a sustainable eco-tourism plan for the small town of Taytay, Palawan, O’Neil helped develop a means by which the area could generate capital. “When I first arrived, I felt overwhelmed. I was flying to a remote island where I did not know anyone or the language,” says O’Neil. Things quickly changed when she met the local people, who diminished her anxiety and re-ignited her passion for service. Along with representatives from the local municipal office, O’Neil went to work.

Although the capital city of Manila attracts many tourists, Taytay also has much to offer visitors. For example, Taytay’s Lake Danao is a stunning body of water and home to more than 150 species of birds. “No one is benefitting from this lake, so why not make this spot a tourist destination and have the Taytay villagers who live nearby create goods that can be sold to visitors?” O’Neil asked herself.

To promote the lake, her plan leveraged the town’s infrastructure to improve transportation to the site. She also considered the area’s attributes, such as population distribution and appearance, throughout the year. She then created a website that captured the beauty of the lake and provided tourist-friendly information about Taytay and Lake Danao. Before she returned to the U.S., O’Neil completed a comprehensive report that detailed findings, research, and future plans to expand their sustainable tourism development plan.

“My experience in Taytay has put engineering in perspective for me. Although I am interested in civil engineering, I know an aspect of my career will have something to do with service,” says O’Neil.

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Colleen O’Neil CE ’12 contributed to the development of a sustainable eco-tourism plan for Taytay, Palawan.

Carlin Joseph CE ’12 supported the development of an integrated water system for an organic farm on the island of Mindoro in the Philippines.
A Local Garden of Eden

Carlin Joseph CE ’12 traveled to the island of Mindoro in the Philippines, where she helped create an integrated water system for an organic farm. “With all of the resources and education we receive, why not help someone else, and in the process, learn about each other’s cultures?” says Joseph.

She admits to being a little nervous upon arriving. The idea of living in an unknown country was frightening. But after a ride in the side-car of a motorcycle and a long boat ride to Mindoro, Joseph’s feelings of apprehension subsided when she discovered the key to assimilation was getting involved. During her stay, Joseph lived in a children’s home, where she befriended several boys and girls. “I shared my talents, and they shared their lifestyle,” says Joseph.

Situated on a mountain, the town of Bclaylan lacks many resources that towns on level ground take for granted, such as abundant food and water. Working with the Stairway Foundation, Inc., Joseph helped the organization develop a sustainable organic farm by utilizing a nearby spring. Part of the plan incorporated ways to teach villagers organic farming techniques.

“Since gravity plays a pivotal role in utilizing the spring, we began by measuring the flow of water. Then we determined the flow during the rainy and dry seasons. We used this information to decide whether we needed water storage and how much,” she says. Next was the “tasty” part: understanding the different types of crops that the Bclaylan people could grow. Joseph sampled local jackfruit, coconuts, citrus, and mangoes—her favorite.

“Before leaving, I created a proposal which includes an implementation plan and various designs and suggestions on how to go about constructing an irrigation system for sustainable organic farming,” she says. “I now look at a career in engineering in a completely different light. Civil engineers are doing amazing work, and I want to be a part of that,” says Joseph.

There in Spirit

William Angiolillo CE ’12 impacted projects in Panama from Villanova’s campus. “I may not have interned in Panama, but my heart and work were there,” he says. Besides, having worked there on three prior service trips, he was no stranger to the challenges he would face. “When I was informed I would be working on a project for Panama, I thought to myself ‘fantastic—I am familiar with the country, the people, and even the site I will be designing for,’” says Angiolillo.

His project called for the re-design of local “vados,” or culvert bridges, intended to mitigate the overflow of water from rivers onto streets and stream-crossings. Instead, water should flow through the culverts. The culvert bridge also features large, protruding triangular structures called the “Fingers of God” to counteract potential damage of obstructive objects and debris. However, wet season storms prompt small streams to flood and occasionally cause bridges and stream-crossings to become impassible.

Working with fellow Villanova Engineer Ian Dardani ME ’13, who was working on-site in Panama, Angiolillo received pictures of the culvert and began to re-design the structure to prevent failure. “It was often challenging in the sense that I could not visit the site and examine the structure; I had to visualize,” he says.

Using a model replica of the culvert bridge, Angiolillo used a sedimentation flume to emulate how it would naturally respond to erosion. He tested how different sized culverts affected water flow and sediment accumulation. In the end, he provided a detailed report outlining his recommendations and suggestions on the optimal hydraulic design to benefit the community.

“Humanitarian engineering is the career path for me. I believe everyone is called to do good work, and I feel that my work had purpose,” says Angiolillo.

Gaining Global Perspective

As this program develops, students will strengthen their engineering skills and embrace a new desire for life-long learning. “Students will gain a global perspective, learn how to communicate with different audiences, and gain a holistic understanding of engineering,” says Professor Ermilio.