Bringing Clean Water to Haiti

NEW ENGINEERING PLAN, REDESIGNED OVERNIGHT, KEEPS OUT CONTAMINANTS

With schematics and parts for a water-purification system in suitcases, a team from Embry-Riddle Aeronautical University's Daytona Beach Campus in Florida took off for an eighth year of helping a Haitian community gain access to clean water.

But when the team arrived in Drouin – which has no electricity, plumbing or sanitation – the drinking water was worse than expected. Instead of water flowing from an underground aquifer into a well, it was coming from the Artibonite River, which was contaminated with raw sewage containing the bacteria *Vibrio cholerae*, as well as *E. coli* and other waterborne pathogens.

The group of 11 students and two professors had to redesign the system overnight since their plans and previous installations had been designed for use with well water. Luckily, they were able to take parts from an older Embry-Riddle system, located about an hour away.

"There was a lot of scrambling around. It was really engineering in action," says mechanical engineering student Rachel Hunt.

The team was already planning to use a reverse-osmosis filter, which has a semipermeable membrane to remove ions, molecules and particles larger than 0.0001 micron. The Helix disc filters, which are able to remove sediment and some bacteria, came from a sponsor, Miller-Leaman of Daytona Beach.

Because the water was so contaminated, however, the students also took another filter from the older system to remove even more particles before filtering the water through the reverse-osmosis membrane. Three months later, the team returned and installed yet another prefilter after the system clogged.

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Joe Noto, an aerospace engineering master's student and president of Project Haiti 2017, says the team underestimated the river-water challenge. Despite the group's high-tech plans, time and gravity proved the best approach through the use of a sedimentation tank. By running the system once weekly, they found that sedimentation fell to the bottom of the tank, preventing it from going into the system.

In addition to the purifier, the team installed a 3.5-kilowatt solar panel and backup battery system to power the well and purifier. The well pumps water from the river into a 500-gallon storage tank. The water then moves through the Helix filters and through a carbon filter to remove odor and bad tastes. The reverse-osmosis purifier pushes the clean water into another 500-gallon tank while the pathogens are routed back into the river. Special color gauges signify when the filters need cleaning.

The 2017 project team also included Marc Compere, associate professor of mechanical engineering; Geoffrey Kain, professor and director of Embry-Riddle's Honors Program; and students Calli Brown, Felina Chotoo, Noah Driggers, Audrey Hallam, Zahra Khan, Fevens Louis-Jean, Dynamite Obinna, Jon Prine and Daniel Tellez.

/ DEBORAH CIRCELLI

The Project Haiti 2017 team redesigned a water filtration system overnight to help give one Haitian community access to clean water.

Marc Compere