

# Rwanda communities team with EWB-USA chapters of University of Colorado at Boulder and Johnson Space Center to improve public health

The EWB-CU/JSC Rwanda project team works with the communities of Mugonero and Muramba to address challenges of public health and social well-being through appropriate technology.

Projects include biogas generation, solar-powered lighting, efficient cookstoves, rainwater catchment, and water purification. Each project is designed to improve the physical, social, educational and economic well-being of the communities.

Funding for cumulative expenditures of \$150,000 was provided by UNESCO, the EPA, AmCom Insurance, First Data Western Union, the University of Colorado at Boulder, Odyssey Space Research, the Manna Energy Foundation, and private donors.

## Panel power spares surgeries from grid glitches

After being broken in a landslide and healing without treatment, the farmer's femur, arm and wrist were badly misaligned. Now, years later, visiting orthopedic surgeons are helping Mugonero's resident doctor to re-break and re-set the bones correctly. Suddenly, the power fails and plunges the operating room into equatorial darkness. Instead of suspending the surgery, the surgeons reach above their heads for a pair of switch chains. The room is flooded with light from batteries automatically charged the previous day by solar panels installed by Engineers Without Borders-USA.

Constructed early in the 20th century, Mugonero Hospital suffered from time and the national holocaust of 1994. Then, 3,000 people hid in the hospital chapel to escape the genocide which eliminated a third of the population in the surrounding province of Kibuye. The priest appealed in a letter to a neighboring church leader: "We wish to inform you that tomorrow we will be killed with our families." Treacherously, the receiving priest directed the Hutu military to the complex where they killed almost everyone in the building.

The operating room lights were requested by resident American surgeon Dr. Mark Ranzinger in 2005, and are part of a larger system providing lighting for the prep room, nursing stations, the delivery room, and hallways. This system consists of three 102-watt solar panels, and ten fifty-amp-hour batteries. A smaller system lights the administration building and dental clinic, and powers emergency internet communications.



**THIS MANY ENGINEERS TO SCREW IN A LIGHT BULB:** Volunteers Johnny Jannetto, Kiran Vinta, Niko Kalinic, Ron Garan, and Evan Thomas, with Rwanda team member Jean-Pierre Habanabakize, reflect upon solar panels atop Mugonero Hospital. Below, Niko ponders proper installation of backup operating room illumination.



To Engineers Without Borders - USA Project Team  
Mugonero Hospital Solar Panel & Water Project

The hospital workers wish that I inform you of their gratitude for the work you have done here. You have helped to light up our lives, but more importantly have gotten people thinking about alternative sources of energy.

Africa has never experienced the industrial revolution based on carbon fuel and, just as with our jump in telephones from virtually nothing to cellular, maybe we can move directly to new energy sources without duplicating the history of developed countries.

I keep being asked, "Where did you find these guys?" To which I can only answer, "It was by the grace of God", and, I might add, the grace of engineers in the U.S. who have looked beyond their own borders to see how they can be a power for good in the world.

With heartfelt appreciation,

Mark Ranzinger  
Medical Director, Mugonero Hospital

# Muramba elders miss old water taste, but village kids escape intestinal ailments

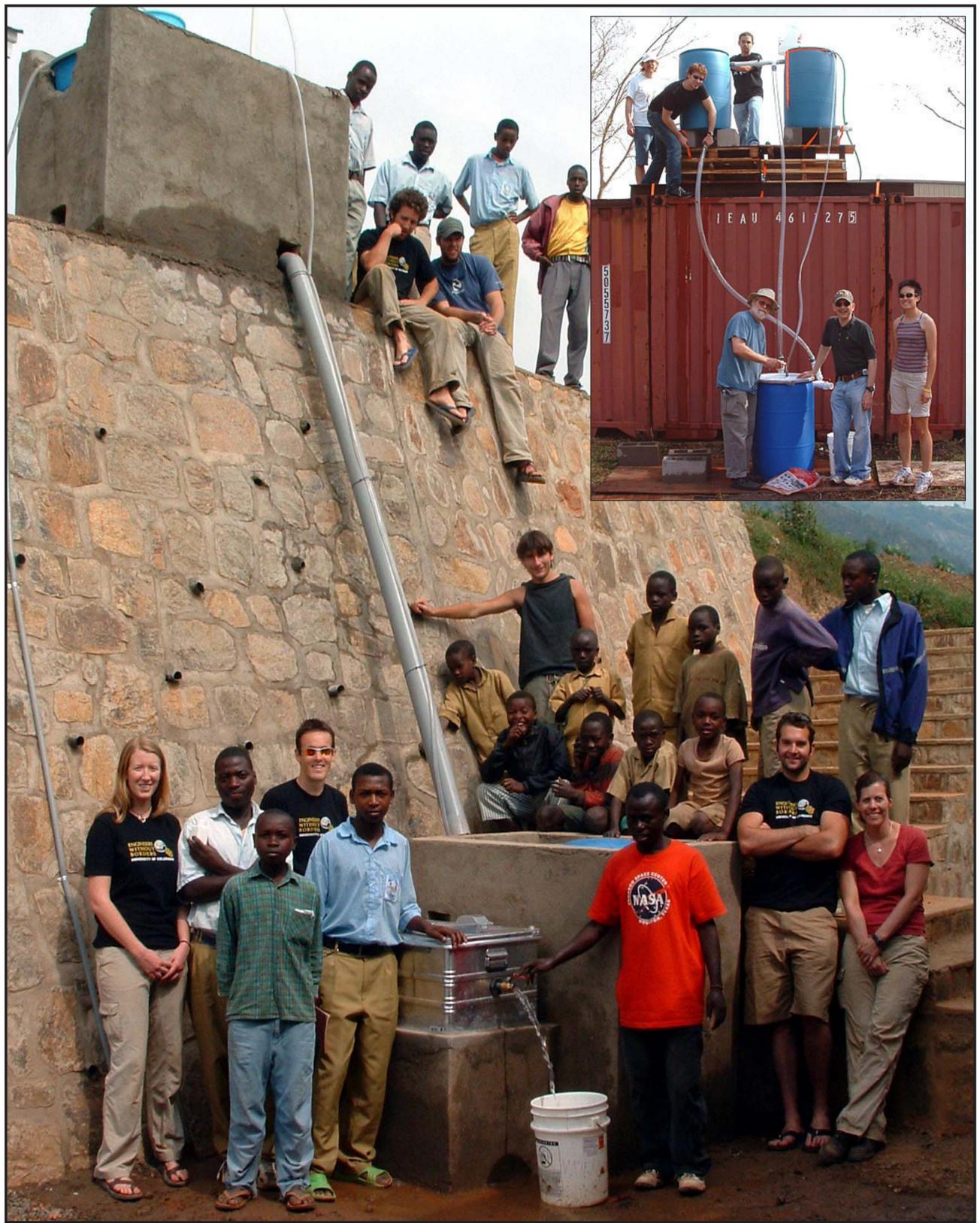
Acceptance was not initially universal for the 'Bring Your Own Water' facility constructed last year in Muramba by EWB-University of Colorado. Some village elders griped that the water just didn't taste the same as the familiar runoff from surrounding livestock pastures.

Younger parents, however, were grateful that the filtered and sanitized output seemed to be sparing their children from the recurring diarrhea which too often leads to death.

Upon an inspection visit nine months after installation, Rwandan team member Jean-Pierre Habanabakize reported: "Those who use the system are encouraging their neighbors to bring their own water for treatment. Thus, the number of users increases day by day."

The Muramba system consists of an elevated input bucket into which residents tip turbid and contaminated water collected from nearby streams and taps. The water passes through a 55 gallon drum containing PVC tube settlers.

A small portion of the water is automatically stored in an adjacent drum for periodic backwashing of the filtration system. The lower drum is a rapid sand filter of gravel, graded sand, and pumice. The filtered water



**TUBE GOLDBERG:** BYOW-Mark 1 was installed in Muramba by Rwandan team member Jean-Pierre Habanabakize (wearing NASA T-shirt) and EWB-CU members Kate Beggs, Evan Thomas, Johnny Jannetto, Iain Elliott, Max Gold, Niko Kalinic, and Meg VanSciver. Inset: EWB-JSC members Tom Smith, Paul Gallegos, Mike Rouen, John Muratore, and Christine Chang develop BYOW-Mark 2 for installation at Mugonero home for orphans of AIDS and genocide. (Rube Goldberg would be proud of BYOW. Cartoonist Goldberg was a graduate of Berkeley school of engineering and worked as an engineer with the City of San Francisco water and sewers department.)

is then sanitized by an electric ultraviolet light powered by a solar panel. A team from the EWB-USA Johnson Space Center Chapter is now developing the second iteration of BYOW for installation this summer in a Mugonero refuge for children orphaned by AIDS and genocide.



**CATCH A FALLING JAR:** EWB-JSC team installed a rainwater catchment system on the main hospital building at Mugonero. Existing piped supply is insufficient and this new rain-based system provides an additional source. Heather Paul of EWB-JSC plays mermaid inside 10,000-liter tank.



**INSIDE POOP:** The EWB-CU team worked alongside the Kigali Institute of Science and Technology to install a family-scale demonstration biogas reactor at Mugonero Hospital. The system extracts methane from animal waste to provide cooking fuel. An identical reactor was installed in Muramba. The system is designed to provide fuel for a single family while demonstrating the technology to a wider audience. EWB-CU volunteer Johnny Jannetto confers with institute staff.



**HOLY SMOKE:** Porous pumice absorbs little heat, meaning hotter combustion and less smoke from indoor wood cook stove. EWB-CU volunteer Max Gold tests prototype in Boulder. First field units are to be installed this summer in Mugonero.