WaterStep

Access to water

Access to water is one of the biggest problems that humanity faces. One in 10 people on the planet do not have access to safe water. That comes to 663 million people--more than twice the population of the United States. Children are the most vulnerable--a child dies every 60 seconds from diarrheal diseases. Additionally, over 200,000,000 person-hours are spent each day collecting water because many villages are not close to a water supply. Women and children in developing countries are traditionally the ones responsible to collect and haul water to their homes every day.

Once the water is collected, it might not even be safe to drink. Children who must spend hours a day carrying water for their family or have to stay at home because they are sick with diarrhea from contaminated water are unable to attend school, learn a skill, or work for a better life. Women who must spend many hours a day to haul water will be prevented from earning income for their families.

While the problem is huge, the solutions are simple. Access to safe and reliable drinking water is the first step to achieving health, getting an education, and learning work skills. Water can transform a community. The World Health Organization estimates that every $1 invested in water yields at least $4 for the local economy.

Who is WaterStep?

WaterStep Founder & CEO, Mark Hogg

WaterStep, headquartered in Louisville, Kentucky, is a U.S.-based 501(c)(3) organization that helps organizations and regions of the world have access to sanitation and safe drinking water. The organization provides mobile disinfectant equipment for water treatment and cleaning and works to develop and implement sustainable solutions to improve the lives of hundreds of thousands in more than 58 countries, including Haiti, Kenya, Pakistan, and the Dominican Republic among many more. In addition, WaterStep has provided mobile disinfectant equipment to disaster areas in the U.S. Since 2001, WaterStep has

equipped more than 380,000 people around the world with the tools, technology, and training needed to provide safe water and critical sanitization solutions within their communities.

WaterStep's Guiding Principles are to train members of communities in developing countries how to use chlorination and bleach making equipment, and repair wells to provide safe and reliable drinking water for community-wide supply. Health and hygiene education are also important by empowering the communities to not only provide a sustainable water supply, but also improve public health, which enables women to work and support their families and children to consistently attend school.

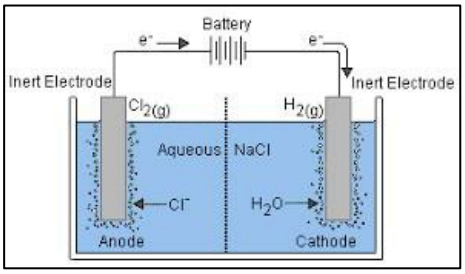
Volunteers in warehouse.

Equipment Manufactured or Supplied by WaterStep

Volunteers testing equipment.

A team of local volunteers including Jerry Anderson show up weekly at the WaterStep warehouse in Louisville to manufacture chlorine generators and bleach makers in a well-equipped shop. After manufacturing, volunteers test each device for leakage and proper operation, then pack the equipment with accessories in boxes for shipment to areas of need.

M-100 Chlorine Generator



WaterStep's M-100 Chlorine Generator uses electrolysis with a 12-volt power supply to create chlorine gas from salt water in a two-cell reaction chamber. Sodium hydroxide (caustic soda) is a byproduct produced in the other cell. The M-100 body is fabricated from 6-inch diameter, clear polyvinyl chlorine (PVC) pipe, 12 inches long, with custom-molded top and bottom PVC caps. A carefully sealed bulkhead is installed lengthwise in the middle of the pipe to create the two cells needed for the electrolytic reaction. The anode and cathode electrodes are custom made with

M-100 Chlorine Generator

plating materials that are resistant to the aggressive aqueous chlorine and sodium hydroxide solutions.

The M-100 can chlorinate up to 38,000 liters of water per day. Functioning with a well, or as a component of a mini-water treatment plant, the M-100 can provide a continuous supply of safe water or batch-treat a storage tank of water using a recirculation pump. Depending on the site of deployment, it is a flexible, stand-alone unit, or can be easily paired with filtration, storage tanks, and hand pumps. Furthermore, it is portable and can be carried from station-to-station to treat water at multiple locations.

Because the electrolytic reaction generates heat, an auxiliary pump is furnished with the M-100 to circulate water in a cooling water loop, which contains a heat exchanger that is immersed in the M-100 reaction chamber to remove excess heat. The cooling water loop also contains a venturi, which suctions the chlorine gas from the reaction chamber and injects it into the cooling water loop. The highly concentrated chlorinated water in the cooling loop is then returned to the water supply source.

Equipment used by volunteers in manufacturing the M-100 include table and band saws, sanders, grinders, a hydraulic press, a drill press, digital flatbed laser cutting machine, and numerous other hand and power tools.

Volunteer sands M-100 component.

The M-100 is easily operated by non-technical individuals in the field using table salt and a 12-volt car battery, solar panel, or a power supply furnished by WaterStep, if a 120- or 240-volt power supply is available.

M-100 Test Cart

One of WaterStep's International partners, Zacharie Tossou, with Global Solidarity Initiative (GSI) lives in Dakar, Senegal. GSI is

working with thousands of street children, an extremely vulnerable population, who survive by begging. One of the largest concerns is lack of safe water and health education. Zacharie uses WaterStep's M-100 Chlorine Generator to address this problem. This need for safe water and health education is widespread, not only in Senegal, but in most of Africa. WaterStep and GSI opened WaterStep's first water training center and storehouse in Africa to meet GSI's needs several years ago. WaterStep is opening (August 2021) yet another training center and storehouse in Kisumu, Kenya.

The BleachMaker

The BleachMaker is a portable, patented device, which produces one gallon of bleach (sodium hypochlorite) in about an hour using only water, salt, and a 12V/DC power source in the field. The product is used for disinfection of a water supply, and/or cleaning and sanitation.

The Bleach Maker

Bleach is extremely effective against viruses and bacteria when used for cleaning. When natural disasters occur in developing countries, bleach is often one of the first items to sell out at the local stores, or the price of bleach locally will often skyrocket. When bleach becomes unavailable, or too expensive, the ability to manufacture it onsite with WaterStep's BleachMaker is an excellent and practical alternative.

The same volunteer team that manufactures the M-100 also builds the BleachMaker. The BleachMaker is simpler than the M-100 with fewer components to manufacture and operate. All necessary accessories come with the device. Operating the BleachMaker is very straightforward and can occur anywhere a power source is available. First, the one-gallon jug is filled with water and a prescribed amount of table salt. Second, the BleachMaker wand (electrode) is placed in the jug. Third, the Bleach Maker connected to a 12-V/DC power source and allowed to react for 70 minutes. The result is one gallon of bleach of sufficient concentration to use for cleaning purposes. This batch process can be repeated continuously.

The concept of a BleachMaker originated in 2014 at a hack-a-thon (an event where programmers collaborate on innovative ideas.) WaterStep liked the idea and believed the device could help them further their sanitation mission

around the world, so they brought engineers together to develop the device. The group included representatives from the University of Louisville, the Louisville Water Company, and General Electric's FirstBuild Innovation Center.

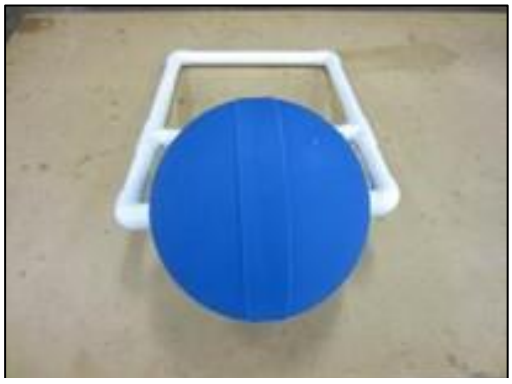
The BleachMaker was first used by emergency workers during the Ebola outbreak in Africa. It was credited for significantly reducing the spread of the virus and has since been used in more than 58 countries across the world, aiding in natural disaster responses and helping combat disease outbreaks.

WOW Cart

The WOW (Water on Wheels) Cart is a mobile treatment system for disaster response designed and manufactured by WaterStep. The system is a small, portable, mini-water treatment plant able to be quickly deployed onsite until infrastructure is restored. The system can provide thousands of gallons of drinking water a day.

Water Ball

When water must be hauled a significant distance from the source to the consumer, the Water Ball has been found to be a simple way to transport water. The Water Ball holds approximately 12.5 gallons (47 liters) of water and easily maneuvers over rough terrain. It is made of food grade, tough, high-density polyethylene (HDPE), which blocks sunlight and prevents bacteria growth.



Production and People Served

From 2006 to the present, over 1,300 M-100 Chlorine Generators and 1,400 BleachMakers have been manufactured. During this time, more than an estimated 4,300,000 people in 58 countries in Africa, Asia, and the Americas have been served by products manufactured by or furnished through WaterStep.

Treatment Units being shipped out.