Samaritan's Purse®
INTERNATIONAL RELIEF

BioSand Water Filter

The BioSand Water Filter is an adaptation of slow-sand filtration that is designed for use by families at the household level. This award-winning water filtration technology was developed by Dr. David Manz, a former University of Calgary professor.

The filters are a proven, effective, and inexpensive technology. From start to finish the filters can be constructed in roughly 10 days, at an average cost of $150, which covers the raw materials, construction, transportation, supervision, training for the family in filter maintenance and personal hygiene, as well as monitoring and evaluation.

The filter removes organisms responsible for diseases spread by water, such as cholera, typhoid fever, and amoebic dysentery. The filter also strains out particles causing cloudiness, and much of the organic matter responsible for taste, colour, and odour.

One of the UN Millennium Development Goals is to reduce, by half, the proportion of people without access to safe drinking water and hygienic sanitation by the year 2015. Samaritan's Purse is helping make this possible. Already more than 104,000 BioSand Water Filters have been installed, bringing safe water to an estimated 832,000 individuals worldwide.

The filter is very durable, constructed from concrete, sand, gravel, and PVC piping. These materials can be found in almost every country and enable community members to help construct the filters on location.

Water is poured into the top of the filter and flows down through sand. Water that requires filtration usually contains various types of organic matter, sediment, and living organisms. The water first passes through the diffuser plate, which reduces the disruptive force of the input water and large debris, and protects a delicate biological layer. The filter sand functions as a physical barrier that traps particles and larger organisms, causing them to accumulate in the uppermost layers of the filter. Organic material and organisms caught in the sand eventually develop into a dense population referred to as the biological layer, or schmutzecke.

As the water passes through the biological layer, microbial contaminants such as parasites, bacteria, viruses, and organic contaminants are consumed by the organisms. The filter is designed to hold water above the top of the sand to sustain the biological layer while the filter water is not in use. This provides the constant aquatic environment that is necessary for the organisms present in the biological layer to survive.

The fine sand acts as a microscopic sedimentation bed as the water passes through the filter, helping remove cloudiness, odour, taste, and harmful micro-organisms from the water. The size and shape of the sand grains are critical to the formation of the biological layer and therefore the effectiveness of the filter. Sand is specifically selected and prepared to achieve proper filtration. By the time the water reaches the layers of coarse sand and gravel at the bottom of the filter, 95 to 99.0 per cent of microbial contaminants have been eliminated by the BioSand Water Filter.*1*

The filtered water flows out of the spout and is collected in a safe storage container to prevent post-treatment contamination. The average flow rate of the filter is one litre per minute, which allows for 60 litres to be filtered per hour, enough to provide a family of eight with sufficient water for their daily drinking, cooking, cleaning, and hygiene needs. An individual requires a minimum of 7.5 – 15 litres of water per day for basic needs2, which is well within the capabilities of the BioSand Water Filter.

As the filter is used, the biological layer matures and thickens, causing the flow of water through the filter to slow. Recipients of filters are trained to watch for decreased flow and can renew the filter simply by skimming off any debris from the top of the sand, and by gently stirring the sand to break-up the biological layer. The quality of source water will determine how often this process is necessary.

1.Elliot et al., 2006. Intermittently operated slow sand filtration for point of use water treatment. Safe Drinking Water Symposium, University of North Carolina. 2.The Sphere Project, 2004, Humanitarian Charter and Minimum Standards in Disaster Response.