



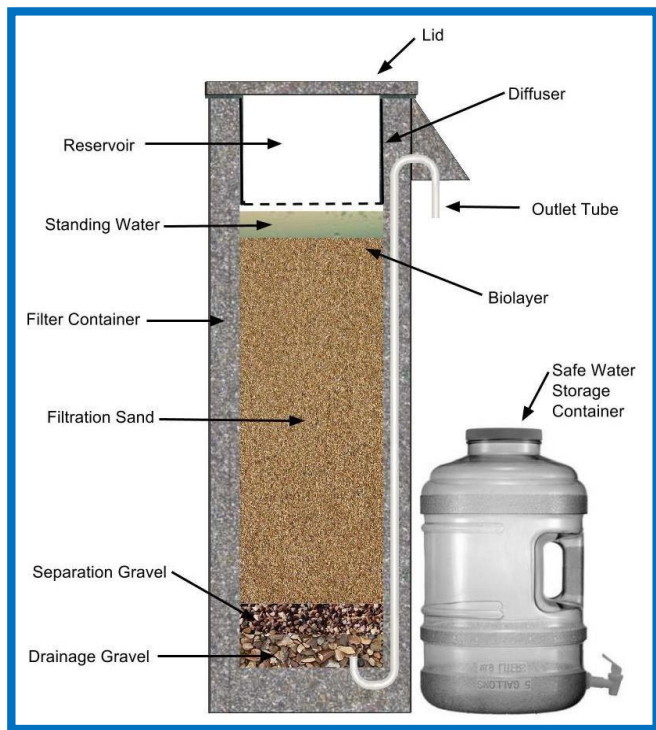
## Make-Your-Own Water Filter Activity

Although over 70% of the Earth's surface is covered with water, only about 3% of the planet's water is freshwater. Most of this freshwater is locked up in ice and glaciers and not available for human use. Of the remaining freshwater, less and less is available to humans because of rising populations and increased pollution.

Here in the United States, we are used to having clean water anytime, at the turn of a faucet. Most of the world's people are not so lucky, and must obtain water from a variety of sources, such as lakes, rivers, streams, ponds, or rainwater. Many of these water sources contain pollution and bacteria which can make them sick. 668 million people in the world use an unimproved source of drinking water and over 1 billion people don't have reliable, safe access to drinking water.

Filtering water is one way to make water safe to drink. It can remove dirt, leaves, worms, bacteria, viruses, and many other microorganisms in water that we can't see.

BioSand Filters are a special type of water filter that are used in developing countries throughout the world. They are usually made out of concrete and use sand, gravel, and natural biological processes to filter contaminants out of water.



In countries where people don't have running water in their home (like we do here in the United States) and have to use pond or standing water, a BioSand Filter is a great technology to give people clean, safe water that doesn't make them sick. The biolayer and the sand in the filter help remove the pathogens that make people sick. **Pathogens are removed in 4 main ways:**

<p><b>PREDATION</b></p> <p>Micro-organisms in the biolayer eat other micro-organisms.</p>	A black, worm-like micro-organism is shown consuming a green, rod-shaped micro-organism. The background is a brown, textured surface representing the biolayer.
<p><b>TRAPPING</b></p> <p>Micro-organisms get trapped in the sand.</p>	A green, rod-shaped micro-organism is shown being trapped in a pore between two brown sand grains. The background is a brown, textured surface representing the sand.



There are many different ways to filter water. Using the materials listed below, participants can make their own sand filter and see firsthand how water can be made safe to drink!

### Materials

- One 16.9-20oz water bottle for each participant. An adult should pre-cut these water bottles in half and a hole should be punched through the cap.
- Transparent Tape (to hold the cut pieces of the water bottle in place)
- Filtration materials, such as:
  - Coffee filters
  - Multiple sizes of gravel (large and small)
  - Sand
  - Activated charcoal
- Materials to be used as “pollution,” such as:
  - Dirt (or coffee grounds)
  - Litter (bits of plastic, small objects like paperclips, etc.)
  - Food scraps (i.e. orange peels, lettuce, etc.)
  - Bits of leaves or grass
  - Food coloring
  - Vegetable oil
  - Use any of the above, or any other materials you may have
- Bins or containers to hold sand, gravel, and other filter materials with cups/spoons
- Water jugs or 2-liter soda bottles to hold “contaminated” water
- Garbage and recycling bins with heavy duty trash bags



Participants are encouraged to experiment with different quantities of materials and the ordering of filter layers to see what is most effective. Step by step instructions are also included on the next page.

### About this Activity

OHorizons is a non-profit coalition of innovators working to end the water crisis. Through our locally-implemented, open-source, and sustainable projects, we are bringing clean drinking water to communities that need it most. In addition to implementing clean water projects, OHorizons also strives to work with communities in the US to raise awareness around the water crisis, particularly by engaging youth on this important issue.



We highly encourage you to rinse clean and recycle finished water bottles.

## Step by Step Instructions

1. Grab a water bottle.
2. Tuck a coffee filter into the bottle so that it is in place to stop other materials from coming out of the cap.
3. Add 2-3 tablespoons of activated charcoal.
4. Add 5-8 tablespoons of the large gravel on top of the charcoal. Try to get the top of this layer as flat as possible.
5. Add 3-5 tablespoons of the small gravel on top of the large gravel. You want to make sure this layer is spread evenly and covers the entire surface. This small gravel helps ensure the sand you're about to add doesn't seep through.
6. (Optional) Lay a coffee filter flat on top of the small gravel. Make sure the entire surface is covered. This is an additional precaution to ensure the sand doesn't seep through.
7. Add 5-10 tablespoons of sand on top of the coffee filter.
8. Chose one of the already mixed "unsafe" water sources and with help, slowly pour it into your filter.
9. Observe for a couple of minutes as the "unsafe" water source moves through the filtration materials.

