Day 4: The water in my cup

Activity 1: Make a Water Filter

Introduction
Help kids understand how water from lakes, rivers, and groundwater that ends up in their cup gets cleaned and ready to drink when they engineer a water filter.

Supplies
- Clear 2-liter plastic bottles cut into two pieces, about a 1/3 of the way down the bottle
- Thick paper towels
- Gravel
- Sand
- Dirt
- Items to “pollute” water such as dirt, grass, twigs, bits of plastic, cooking oil, food coloring, etc.
- Water
- Containers for mixing polluted water

Let's get started!
Talk with kids about the importance of water in our daily lives. Get them thinking and talking about how many times today they have used water. Ask the kids: What would you do if you turned on the faucet and no water came out? Where else could you find water? Is that water good to drink? What if you couldn’t buy bottled water or get water from a faucet? What would you do?

Together brainstorm water sources in your community. Have kids identify local bodies of water and ask, Does it look clean? Would you drink that water? Use it to cook or wash or brush your teeth? Even if it looks clean, is it okay to drink it?

Talk about what kids know about filters. Ask, Have you seen a filter before? What does a filter do? Come up with examples kids may have encountered such as coffee filters or aquarium filters and talk about how a filter works. Ask the kids: Can you think of how a filter could help get water clean?

Put some of those ideas to the test. First, pour water into several containers and give kids materials to “pollute” it. Have them make notes about what goes into each container.
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Activity 1: Make a Water Filter
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Now that there is dirty water ready to be cleaned, it’s time to make a water filter! Have kids turn the part of the 2-liter bottle with the neck upside down and fit it into the bottom half of the bottle. Let kids engineer their filter as they see fit, but have them start by putting a layer of paper towels into the bottle right above the neck. Encourage them to layer gravel, sand, dirt, etc. Ask the kids: What do you think will happen when the polluted water is poured through these layers?

Have them make predictions for each of the polluted waters they’ve created and note their results. To avoid flooding the filter — and to get a good look at the filtered water — empty the bottom of the bottle after each test.

Kids may want to redesign their filters after testing. Remind kids that even though water that went through their filter looks “clean” it will still have invisible items, such as bacteria or other contaminants, that need to be removed. Talk about how an additional chemical process is necessary to remove those impurities.

More water filter activities

Walter Filter Science Project (video)
https://www.youtube.com/watch?v=tPP_Yn2w2Sk

Filtration Investigation (Try Engineering)

Make a Walter Filtration Plant Model (U.S. Environmental Protection Agency)
https://www3.epa.gov/safewater/kids/flash/flash_filtration.html

Find more River Rangers activities on the Start with a Book website:
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Steps in Water Treatment

Willamette Water Supply
Our Reliable Water

SIX STEPS
Producing Safe, Good-Tasting Water

These treatment steps make water even purer than required by current state and federal drinking water standards.

1. START HERE
INTAKE SCREENS
Protects fish and prevents debris from entering the treatment facility

2. ENHANCED SEDIMENTATION
Removes river silt and materials that are small enough to pass through the intake screens

3. OZONATION
Destroys contaminants, breaks down organic chemicals and odor causing compounds

4. GRANULAR ACTIVATED CARBON
Removes organic material, dissolved chemicals and odor causing compounds

5. SAND FILTER
Filters any remaining silt or particles

6. CHLORINATION
Protects treated water from bacteria as it’s delivered to customer’s tap

WILLAMETTE RIVER

All the way to homes and businesses

www.OurReliableWater.org
F_09.18

Diagram from Willamette Water Supply, Oregon.
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Steps in Water Treatment

1. The River
   Philadelphia’s tap water comes from the Delaware and Schuylkill Rivers.

2. Gravity Settling
   River water is pumped to reservoirs to allow sediment to settle.

3. Disinfection
   Sodium Hypochlorite is added to kill disease-causing organisms.

4. Coagulation & Flocculation
   Chemicals are added to make fine suspended particles clump together. Gentle mixing of the water encourages this process. The clumps of particles are called "floc."

5. Gravity Settling
   The newly formed "floc" settles by gravity and is removed from the bottom of the settling tanks.

6. Disinfection
   Sodium Hypochlorite is added a second time to kill any remaining disease-causing organisms.

7. Filtration
   Water flows through filters which remove even microscopic particles.

8. Final Treatment
   Fluoride is added to help prevent tooth decay. Zinc Orthophosphate is added to minimize pipe corrosion and Ammonia is added to keep the disinfectant in the water and reduce the chlorine taste and odor.

The average Philadelphia uses 87 gallons of water per day.