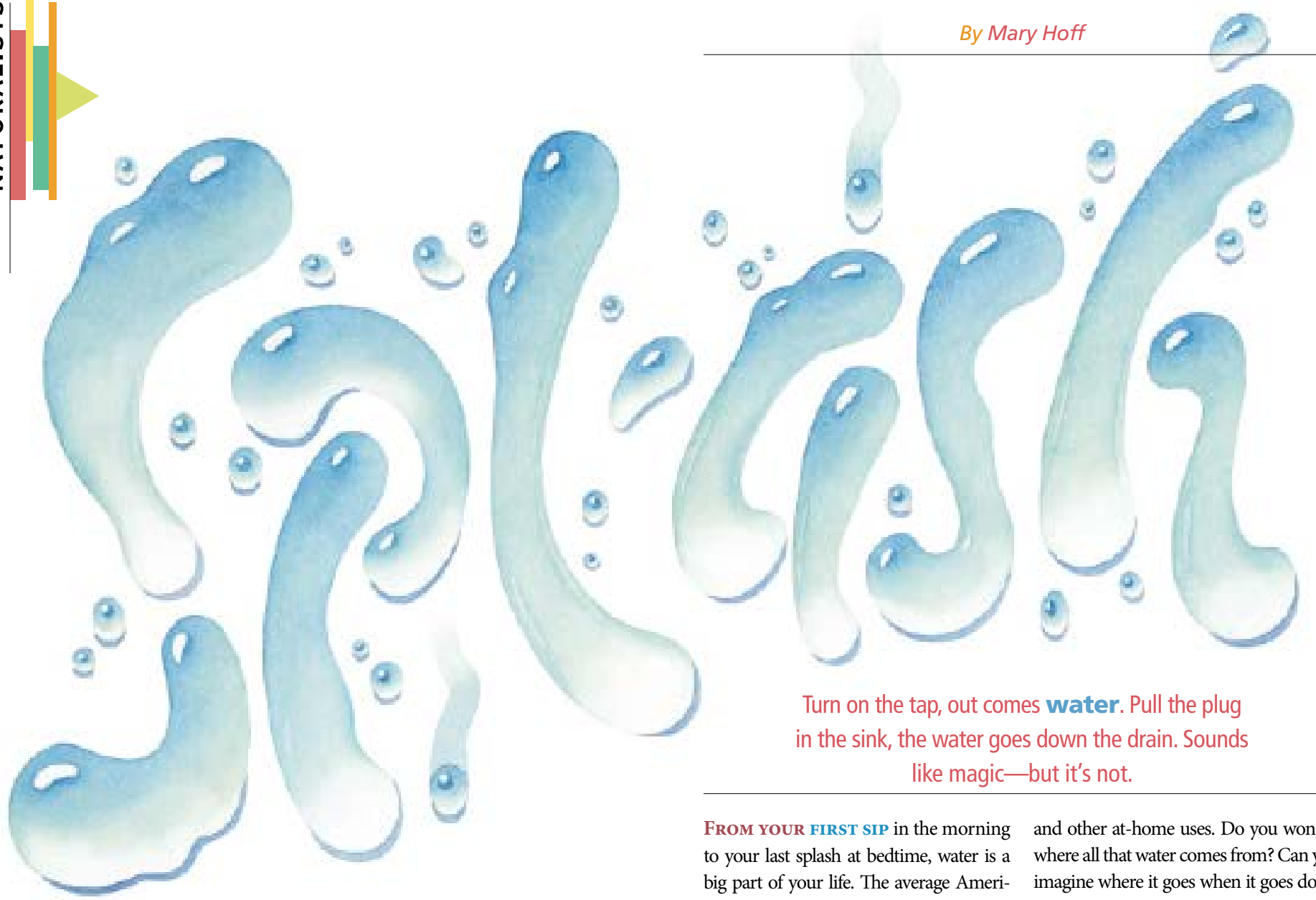
Water

By Mary Hoff



Illustrations by Bill Reynolds

Turn on the tap, out comes **water**. Pull the plug in the sink, the water goes down the drain. Sounds like magic—but it's not.

FROM YOUR FIRST SIP in the morning to your last splash at bedtime, water is a big part of your life. The average American uses a whopping 80 to 100 gallons of water every day for washing, drinking, and other at-home uses. Do you wonder where all that water comes from? Can you imagine where it goes when it goes down the drain? Why don't we run out of water? Let's trace water's trail and find out.

Water in the Air

The water you use to brush your teeth or take a shower may not look like water in a lake, river, puddle, rainstorm, or blizzard. But it probably was, once upon a time. The water that runs from your tap every day is the same water that travels through rivers, lakes, air, and land as part of a giant loop called the *water cycle.*

Most water that comes into Minnesota arrives in the air. Water in the air becomes water on land when rain or snow falls.

Fresh from Underground

Some of the water on land soaks into the ground and travels deep underground, inch by inch, to become *ground water.* Most of Minnesota's water lies far beneath our feet in *aquifers*—underground formations of rock, sand, and gravel that act like giant sponges.

Some ground water eventually seeps into lakes, ponds, rivers, and streams. Some ground water trickles up above ground as springs, where it joins lakes, streams, or other *surface waters.* Streams and rivers join, and water flows out of Minnesota and to the ocean.

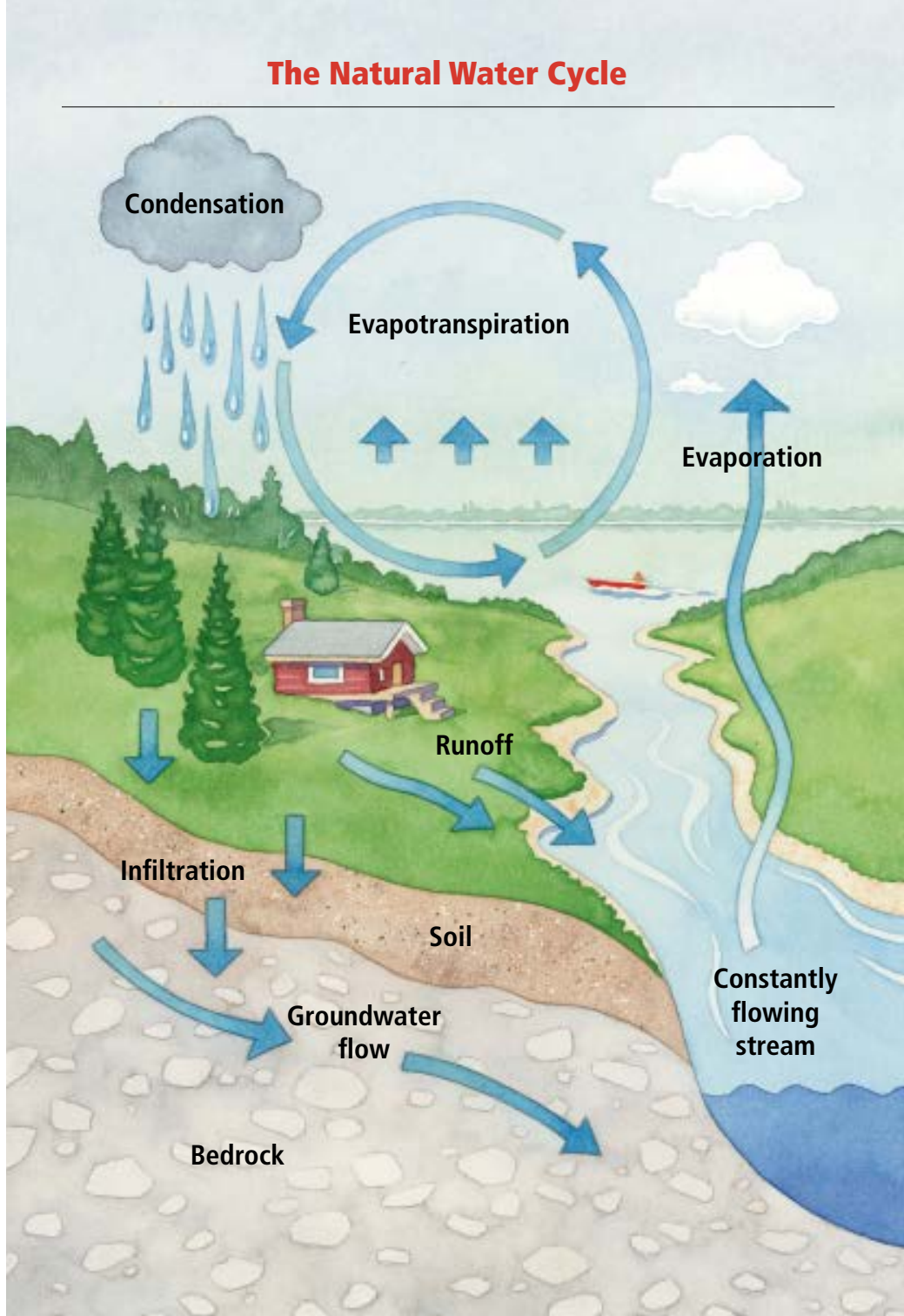
Water All Around

This grand circle dance of water among land, lake, stream, ocean, and sky carries water to every living thing. And that's good, because every living thing needs water.

Like all animals, you need water inside your body to carry nutrients, energy, and oxygen to your heart, lungs, and all other parts. Water flushes wastes out of your body.

Plants need water to move their food from roots to shoots. Without water, a plant droops. Give it a drink, and it can stand tall.

Fish, wild rice, turtles, and lots of other *aquatic* plants and animals live and grow in water. For them, water is *habitat*—a place to call home.



Water in the House

How does your house fit into the water cycle? If you're in the country, you might have an underground well that draws clean water up from the ground and a septic system that returns it to the ground when you're done with it. If you're in a city or town, your community probably supplies your home with clean water and takes your dirty water away. Here's a look at how the water travels into your house.

Country Water

Many farmhouses, cabins, and other places in the country have their own wells. To reach ground water, a well driller uses a giant drill to dig a deep, narrow hole through the ground and into the aquifer. Then the driller sends a long pipe down the hole. An electric pump (not shown) is attached to the pipe. This pipe gathers, or *taps*, water from the aquifer. The pump uses electricity to draw the water up the pipe, which connects to the water pipes in the house.

If you live in a house with a well pump in the basement you might hear the pump start up when you run water. Inside your house, the pump sends water into a container called a *pressure tank*. The pump packs water so tightly into the pressure tank that it wants to escape. This *pressure* pushes the water through a pipe that branches into pipes that lead to faucets.

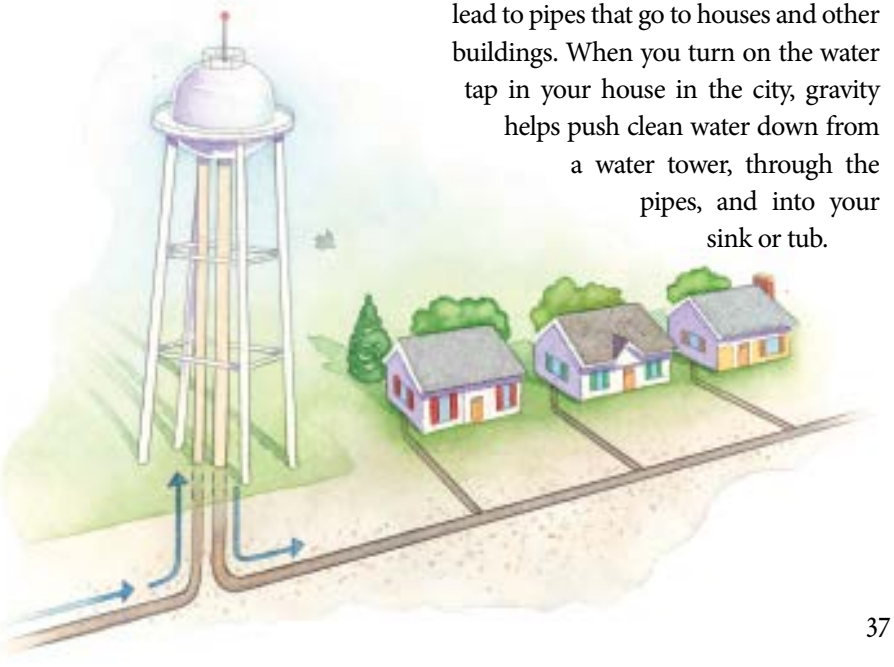
City Water

Most people in Minnesota get water from a water system they share with others in their city or community. Like private wells, the community water supply usually comes from ground water. Some cities pump water from a lake or other surface waters. Minneapolis and St. Paul, for example, draw water from the Mississippi River.

To make the water safe to drink, the city system must remove bits of soil and other particles floating in the water. A *drinking water treatment facility* cleans water before it reaches homes, schools, and other places in a city or town. Many of these cleaning systems use a pump that can move thousands of gallons per minute through pipes 8 to 12 inches in diameter. In many systems, the water flows into a large tank where chemicals are added to make soil and other particles clump together. The clumps, called *floc*, settle to the bottom. A truck carries the floc to a waste management facility.

Next the cleaning system filters the water through sand, gravel, and charcoal to trap more particles and make the water even cleaner. After that, the water gets mixed with a chemical called *chlorine* or put through other processes to kill germs. Some water systems add *fluoride*, a chemical to help prevent cavities in the teeth of people who drink it.

An electric pump moves the clean water into a storage tank in a tower or on the ground. Large, underground pipes called *water mains* lead from the water tower to neighborhoods. Branching off from the water mains, smaller underground pipes go down each street and lead to pipes that go to houses and other buildings. When you turn on the water tap in your house in the city, gravity helps push clean water down from a water tower, through the pipes, and into your sink or tub.



Water Out of the House

Pull the plug, flush the toilet, and there goes the dirty water down the drain. Then what?

Just as your home has pipes that bring clean water to you, it has pipes that carry water away from sinks, tubs, and toilets.

Tanks a Lot!

If you live in the country, the wastewater most likely goes into a big, covered tank buried in your yard. In this *septic tank,* solids—toilet paper, poop, food from the garbage disposal—settle to the bottom. There, bacteria break them down until they're soupy. Grease and oils float to the top. The soupy water runs out of the tank and into a *distribution box.* The solids and grease stay in the septic tank. When enough of them have collected there, a truck comes in and pumps them out to haul to a nearby wastewater treatment plant.

The water in the box runs through underground pipes to land called a *drain field.* In the drain field, water trickles through holes in pipes into the soil. *Microbes* (alive but too small to see without a microscope) and tiny soil particles in the field break down and trap dirt and grime in the water. This helps cleanse the water as it seeps down to the aquifer. Then the clean ground water in the aquifer is ready to become drinking water again.

Back to the Lake

In the city, your wastewater has a longer trip to take. After it leaves your house, it travels many miles through pipes called *sewers* beneath the street. Sewer pipes can be as big around as 13 feet—more than twice the height of a tall person. They carry the water to a *wastewater treatment plant.*

A wastewater treatment plant is an amazing place with an enormous job: to make millions of gallons of dirty water clean again every day. The water must go into a river or lake, where fish live and other animals come to drink and find food. People will use the lake or river water for swimming, fishing, boating, and maybe even drinking.

To clean wastewater, most treatment plants in Minnesota follow certain steps. The first step screens out big objects such as bottles and sticks. The last step removes germs and dissolved chemicals.

Nature's Filters

In nature, water goes through a cleansing process too. Wetlands remove bits of soil and nutrients such as nitrogen and phosphorus, which would make a lake or river green with plant growth.

Soil, gravel, and sand act like a giant filter, capturing potential pollutants such as metals and harmful bacteria from rainwater and snowmelt running off the land and soaking down into the ground.

Handle With Care

As you have learned, the water we use comes from nature and goes back to nature. As part of the cycle, we can use water wisely and keep it clean. Here's how you can share and take care of your water.

Share. In some places, as more people use more and more water, Minnesotans are taking water out of the ground faster than nature can replace it. Here are some ways we all can save water:

Turn off the  while brushing teeth.

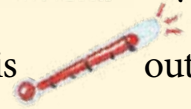
Use a  to collect rain running off the roof. Then use it to water your lawn and  .

Keep water in the  instead of running the  to get cold water to drink.

Fix the drip from the  .

Take a  instead of a  .

Throw only  in the  .

Water the  only twice a week, early in the  before it is  outside.

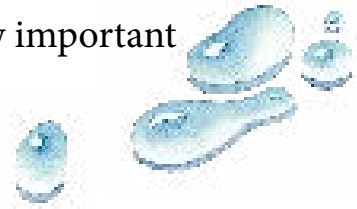
Take Care. When chemicals and other pollutants get into water, they can be very hard to remove. Here are some ways we all can prevent water pollution:

Pick up after your dog. Dog  and  left on the ground get swept into the  and ends up in a  .

Keep  out of  and  .

Don't pour  down the  .

 your friends and family how important is to every living thing.



Teacher Resources

Teachers guide: *www.mndnr.gov/young_naturalists*

Minnesota Project WET (Water Education for Teachers): *www.dnr.state.mn.us/projectwet*

U.S. Geological Survey water supply classroom activities: *water.usgs.gov/education.html*

Take a visual tour of a wastewater treatment plant: *http://goo.gl/8v8Dh9*