



**WATER DROP PATCH**

**HOW<sub>2</sub> OBSERVE:  
GROUNDWATER**

# *Water Drop Patch for Brownies*

The **WATER DROP PATCH** Project inspires Girl Scouts to learn about water quality and to take action in their communities to protect and restore local water resources, including their local rivers, lakes, streams, wetlands, and groundwater. The project supports the Girl Scout Leadership Experience Program by promoting the following **GOALS** for Brownies:

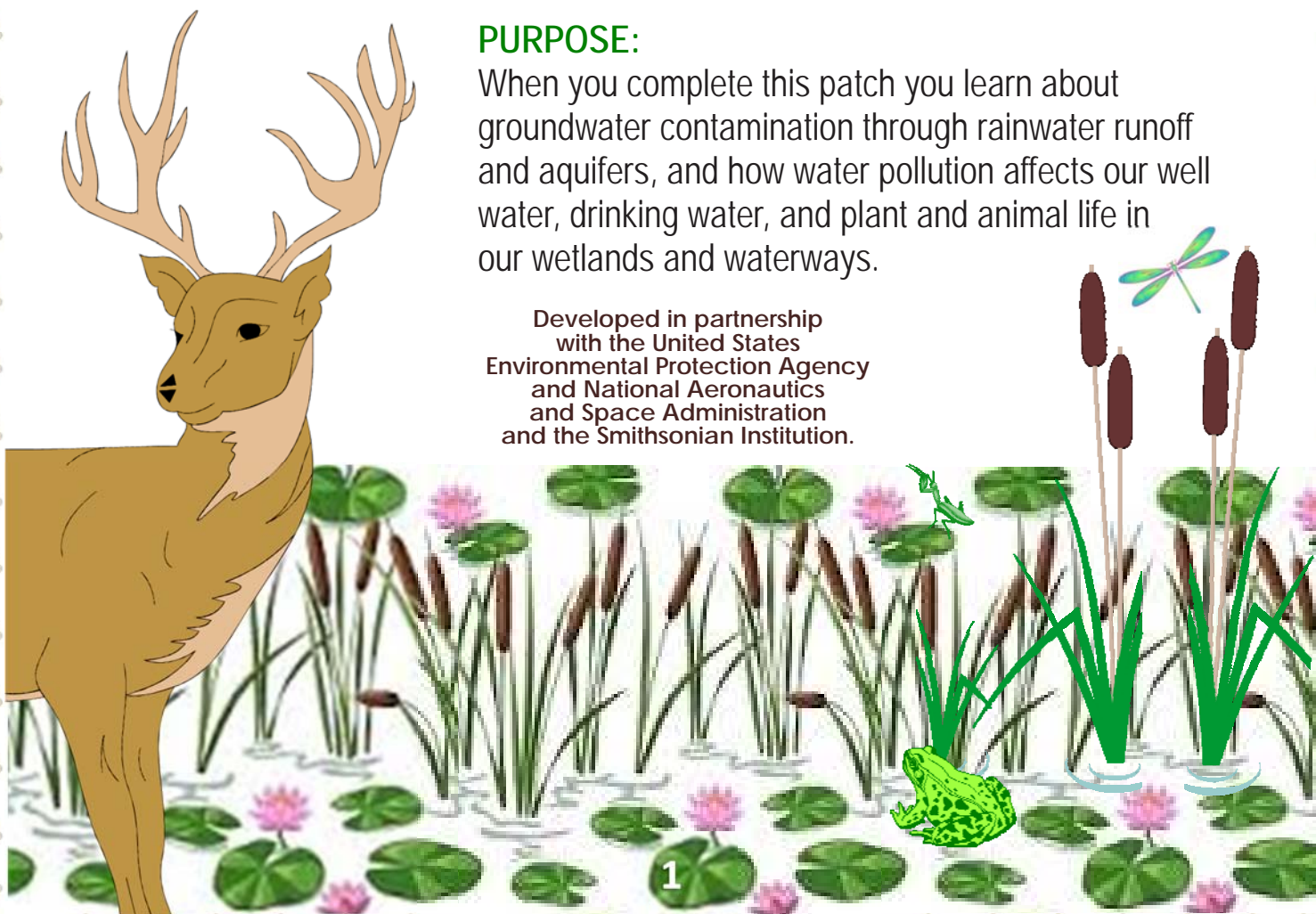
## **GOALS:**

- 1: Learn how to protect our water resources
- 2: Simulate an aquifer and learn how it affects groundwater contamination
- 3: Help protect a local waterway's precious ecosystem

## **PURPOSE:**

When you complete this patch you learn about groundwater contamination through rainwater runoff and aquifers, and how water pollution affects our well water, drinking water, and plant and animal life in our wetlands and waterways.

Developed in partnership  
with the United States  
Environmental Protection Agency  
and National Aeronautics  
and Space Administration  
and the Smithsonian Institution.





# Water Drop Patch

## for Brownies

### LEADERS:

The following guide is to help Brownies complete the Water Droplet Patch. You don't need to be an expert in water quality to help your Brownies with this journey! All of the requirements are simple, hands-on activities for both you and your Brownies to explore.

### STEP 1:

#### What trash goes down our drains and into our water supply?

All of the trash that you see on the streets and in our neighborhoods can easily end up in our lakes and our streams, affecting our drinking water and hurting fish, plants, and animals. This trash pools together when it rains and becomes rainwater runoff. Rainwater runoff goes down the storm drain and into a pipe system, which takes that water to a body of water close by.

Identify one or two women working in water resource protection or any particular water career and invite them to speak to your troop or group about their careers. Before they come to speak, develop a list of questions that you would like to ask.

Walk to the closest storm drain and take a look at everything you spot along the way that might end up in your local water resource. If you do not have a storm drain close by, walk along a road or path that often has some trash scattered. Pick up all of the trash that you see on your walk with protective gloves. Where did you find the most trash? What was the trash? Food waste? Cans? Paper? How many single-use plastic water bottles did you find?

By switching to a tap-filled reusable water bottle, you'll drink water just as pure and help reduce the global glut of plastic bottles. If you have not completed the Wonders of Water (WOW) Journey, create an attractive poster to hang in your school or community with messages about the importance and benefits of switching to tap-filled reusable water bottles instead of single-use water bottles (i.e., It is Better to Refill than to Landfill!). Display your poster where others in your community can see it such as a library, church, or school!





# Water Drop Patch for Brownies

## STEP 2:

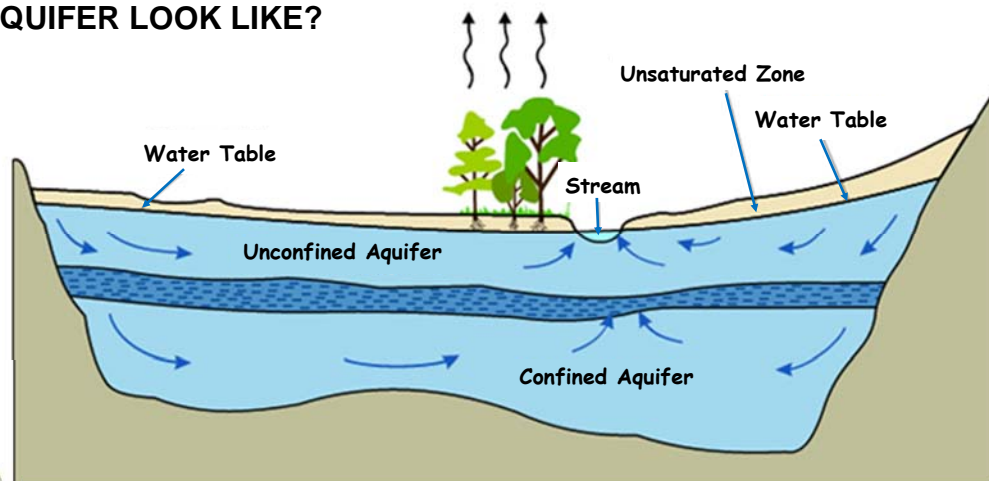
### What is an aquifer?

An aquifer is an underground layer of water-bearing rock. Water-bearing rocks are permeable, meaning that they have openings that liquids and gases can pass through. Rock such as sandstone, as well as sand and gravel, are examples of water-bearing rock. Water suppliers or utility officials drill wells through soil and rock into aquifers for the groundwater contained therein to supply the public with drinking water. Homeowners who cannot obtain their drinking water from a public water supply, will have their own private wells drilled on their property to tap this supply.

Contamination of the water in an aquifer can be traced to harmful chemicals leaching into the ground from poorly constructed and managed landfills, illegal dumps, fertilizers applied to farms, lawn care products, and household cleaners that were used or disposed of improperly after use. These chemicals can enter the soil and rock, polluting the aquifer and eventually the well. Such contamination can pose a significant threat to human and animal health.

The measures that must be taken by well owners and water plant operators to either protect or clean up contaminated aquifers are quite costly. Aquifer contamination is usually identified by samples taken from drinking water wells after the problem has already occurred. If the contamination cannot be fixed, the water from the aquifer must be treated or cleaned of that contamination before it can be consumed by humans or animals.

### WHAT DOES AN AQUIFER LOOK LIKE?







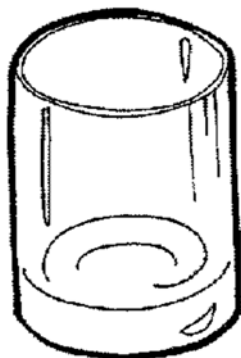
# Water Drop Patch for Brownies

## MAKE AN AQUIFER IN A CUP:

In this lesson, you will simulate the world's water supply and consider how much clean water is wasted every day while exploring changes you can make to live within the limits of nature. By understanding that clean water is a precious resource, you can begin to appreciate the importance of conserving water to sustain the Earth's fresh water supply.

### Supplies:

- 1 clear plastic cup that is 2 3/4" deep x 3 1/4" wide
- Red food coloring
- 1 piece of modeling clay or floral clay that will allow a 2" flat pancake
- Play sand that will measure 1/4" in bottom of cup
- Aquarium gravel (natural color if possible) or small pebbles (approximately 1/2 cup)  
(HINT: As many small rocks may have a powdery residue on them, you may wish to rinse them and dry on a clean towel prior to use so they do not add cloudiness to water.)
- Small cup of water



clear plastic cup



red food coloring



clay



aquarium gravel



play sand



cup of water



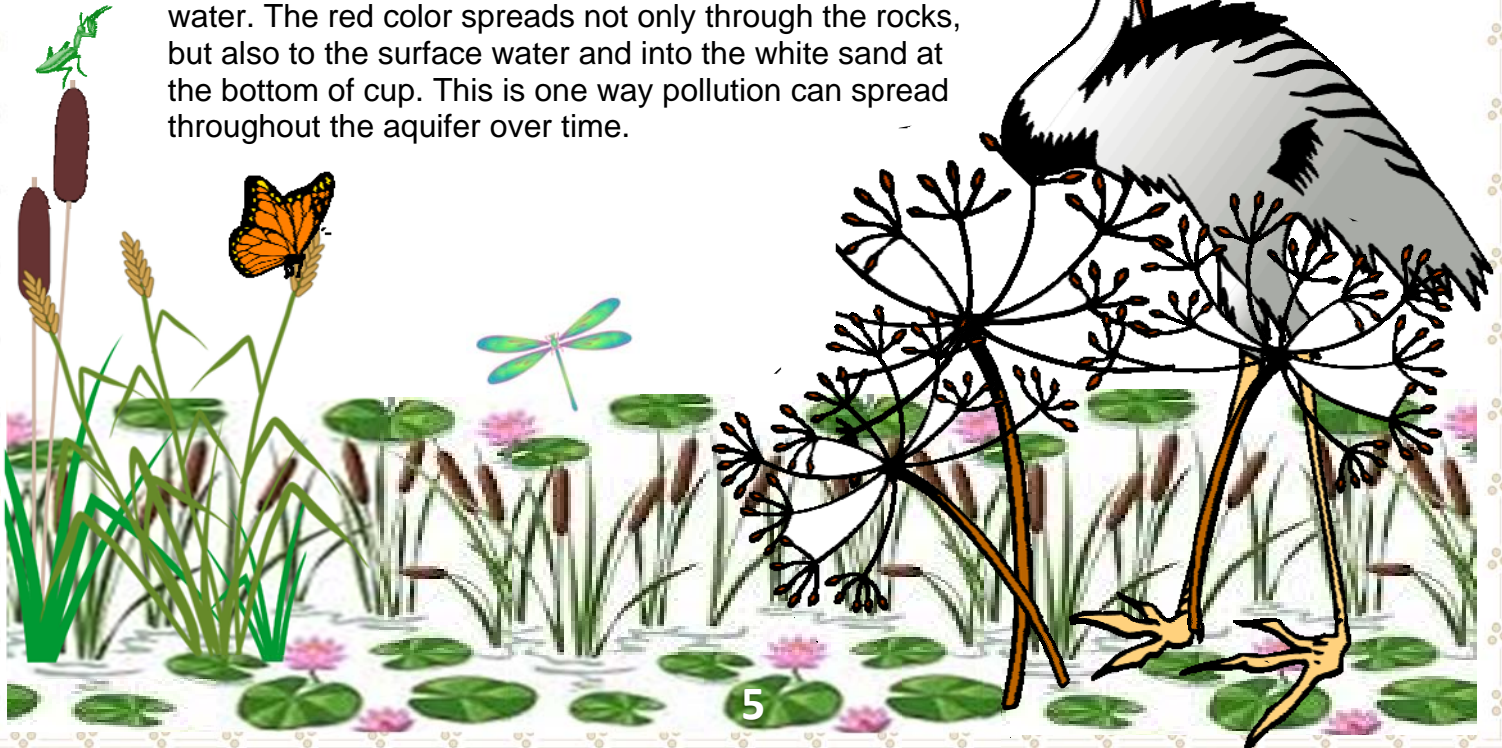


# Water Drop Patch for Brownies

## MAKE AN AQUIFER IN A CUP (continued):

### Steps:

1. Pour 1/4" of white sand in the bottom of cup completely covering the bottom of the container. Stop before the water is above the sand. Look closely at the line created by the water. This line is called the "water table" and the "unsaturated zone" is the area above the water table.
2. Flatten the modeling clay (like a pancake) and cover 1/2 of the sand with the clay (press the clay to one side of the container to seal off that side). The clay represents a "confining layer" that keeps water from passing through it. Pour a small amount of water onto the clay. See how the water remains on top of the clay, only flowing into the sand below in areas not covered by the clay.
3. Use the aquarium rocks to form the next layer of earth. Place the rocks over the sand and clay, covering the entire container. To one side of your cup, slope the rocks, forming a high hill and a valley. These layers represent some of the many layers contained in the earth's surface. Now pour water into your aquifer until the water in the valley is even with your hill and notice the water stored around the rocks. These rocks are porous, allowing storage of water within the pours and openings between them. Also notice a surface supply of water (a small lake) has formed, so both the ground and surface water supplies water which can be used for drinking water purposes.
4. Use the food coloring and put a few drops on top of the rock hill as close to the inside wall of the cup as possible. Often old wells used to dispose farm chemicals, trash, used motor oils, and other contaminants leak into the aquifer below and can end up in drinking water. The red color spreads not only through the rocks, but also to the surface water and into the white sand at the bottom of cup. This is one way pollution can spread throughout the aquifer over time.







# Water Drop Patch for Brownies

## STEP 1:

### Keep our wetlands and waterways healthy to protect ecosystem

Investigate why your local wetlands are unique by researching what kinds of animals and plants live in the wetlands in your state. Each plant or animal is unique. For example, a fish may experience the river wetland very differently than a bird. It is crucial that we understand the importance of conservation in keeping our wetlands healthy so that the variety of living and nonliving things dependent on the wetlands continue to play their own unique and important roles in the ecosystem.

Participate in a community clean-up day at a local waterway or wetland with a group or your troop. Design a poster board displaying photographed or cut out pictures of insects, birds, plants, and trees from the waterway or wetland, and then mount/label/describe the photos on the poster board. Display the posters at your next troop meeting and share with others in your troop what you have learned about the animals and plants in your local waterway or wetland.

