

Option 1 - Fran the Fish (Sparks, Brownies)

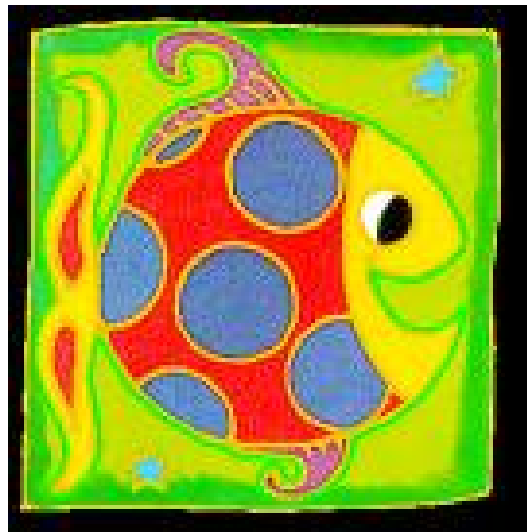
Show how polluted a river in a city can get by swimming with Fran the Fish for a day. Watch Fran as she travels through a construction site, a residential area, a commercial area, a park, and a landfill site.

Have the girls create a watershed on a large piece of paper by drawing all of the above landmarks beside a winding river. Fill a large glass bowl or jar with water and secure a piece of sponge in the shape of a fish to the bottom with a stone and piece of string. Introduce the fish as Fran the Fish. Tell the girls that Fran has grown up in a protected stream in a nature preserve, but she is about to leave the preserve and journey downstream. The girls are invited to share her adventures. Note how Fran looks and the water in the jar before moving on.



Move the bowl along the river and methodically have each girl add a teaspoon of dirt (soil from your garden), pesticide and fertilizer (green food colouring), road salt (table salt), pet waste (chocolate sprinkles), litter (confetti), and hazardous waste (red food colouring) into the bowl as it moves downstream. Explain that these things travel to the water when it rains or when snow melts. Every time one is added, the girl should be able to answer, "How is Fran?"

Afterward, save Fran by moving her back upstream and taking suggestions for how we can keep all of these things from getting into the water. Not only do they make the water unlivable for fish, but also to the humans who need to use the water to drink.



Option 3 – Aquifer in a Cup

BACKGROUND:

Many communities obtain their drinking water from underground sources called aquifers. Wells are drilled through soil and rock into aquifers to provide groundwater for use. Unfortunately, the ground water can become contaminated by harmful chemicals like lawn care products and household cleaners that were used or disposed of improperly. These chemicals can enter the soil and rock, polluting the aquifer and threatening human health. And cleaning up a contaminated aquifer is expensive!



OBJECTIVE:

To illustrate how water is stored in an aquifer, how groundwater can become contaminated, and how this contamination ends up in a drinking water source, get a clear understanding of how careless use and disposal of harmful contaminants above the ground can end up in the drinking water below the ground. This particular experiment can be done by each girl.

MATERIALS NEEDED PER GIRL:

- **1 clear plastic cup** that is 2 3/4" deep x 3 1/4" wide for each girl
- **1 piece of modeling clay or floral clay** that will allow a 2" flat pancake to be made by each girl for their cup
- **White play sand** that will measure 1/4" in bottom of each girl's cup
- **Aquarium gravel** (natural color if possible) or small pebbles (about 1/2 cup per girl)
(*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. It is best if they do not add cloudiness to water.*)
- **Red food coloring**
- **1 bucket of clean water** and **small cup** to dip water from bucket

PROCEDURE:

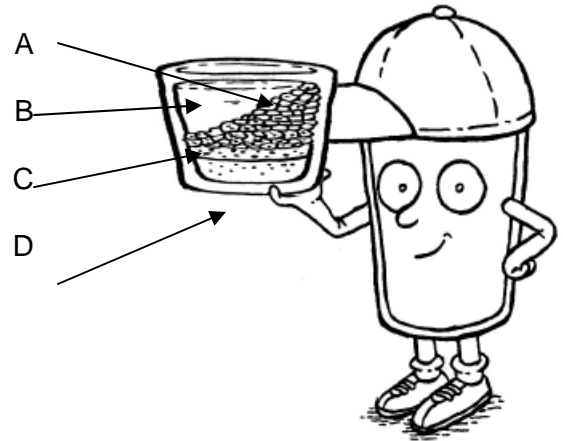
- 1) Pour 1/4" of white sand in the bottom of each cup completely covering the bottom of the container. Pour water into the sand, wetting it completely (there should be no standing water on top of sand). See how the water is absorbed in the sand, but remains around the sand particles as it is stored in the ground and ultimately forming part of the aquifer.
- 2) Flatten the modeling clay (like a pancake) and cover 1/2 of the sand with the clay (have each girl 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 (see illustration below). Explain that 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. See the water stored around the rocks. Explain that these rocks are porous, allowing

storage of water within the pours and openings between them. They will also notice a “**surface**” supply of water (a small lake) has formed. This gives a view of both the ground and surface water supplies 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. Explain that often old wells are used to dispose of farm chemicals, trash and used motor oils and other activities above their aquifer can end up in their drinking water. They will see that the color spreads not only through the rocks, but also to the surface water and into the white sand at the bottom of their cup. This is one way pollution can spread throughout the aquifer over time.

FOLLOW-UP:

Discuss other activities that could pollute an aquifer. Think about activities around your school or your home that could pollute drinking water. Drain off the water in your cups and take it home to show it to your family. Discuss your aquifer, how it gets contaminated, and how you can prevent contamination with someone. Think about what steps you can take as a household to prevent water pollution.



MATERIALS:

A: Rocks

B: Water

C: Clay

D: Sand

Option 4: Build Your Own Watershed – Girl Best suited to Guides, Pathfinders, Rangers

A **great** plan for creating a Watershed Model is given here:

<http://www.miseagrant.umich.edu/flow/pdf/U2/FLOW-U2-L1-MICHU-08-402.pdf>

OR, make this model:

Down the Hill

Girls will create a simple **watershed** model, discovering hills, rivers and lakes from a bird's eye view. They add rain to the model and describe water's flow pattern. This activity can be used to introduce the topic of water pollution.



Materials for one batch of salt dough – prepared in advance

- 2 cups of flour (250 ml)
- cup of salt (125 ml)
- 1 Tbsp of cooking oil (15 ml)
- 1 tsp cream of tartar (10 ml)

Mix and heat ingredients until a ball forms. You will also need:

- pans for each salt dough relief model (9x11 cake pans work great!)
- watering cans for each group (or jars with small holes poked in their lids)
- packages of powdered drink mixes
- coloured water (food colouring) or soy sauce

Procedure

Break the girls into small groups and have each group construct a simple watershed relief map in their pans. One end of their landscape should be higher than the other, and part of the landscape should include a Y-shaped valley, with the tail of the "Y" ending in a depression. You can use the diagram below for a model. Explain that water runs downhill. River water is water that has drained off the surrounding ground and water that comes from underground. Have the girls sprinkle rain over their model and observe the path of the water as it runs through the model. Where does the rain collect?

Explain that areas where water has collected become bodies of water (lakes, ponds, streams, rivers, etc.). Let the "rain" continue until the pan begins to fill. Explain that if water has no way to be carried off, then flooding occurs. Flooding can also occur when water cannot be carried off quickly enough.

Sprinkle a bit of powdered drink mix on the model, and explain that the drink mix represents chemicals that come from products we use daily. Ask the girls to name some of the products the drink mix powder might represent.

Sprinkle water on the model, and explain that now it is raining again. You've just demonstrated "runoff". Discuss how pollutants enter the water and are carried by the water.

Discuss point source pollution and non point source pollution. Simulate these by pouring coloured water into the river at one point in the model (point source) and by raining coloured water (non point source).

