

Wetland in a Bottle Virtual Activity

Background:

The Lake Tahoe watershed is a 501 square mile area. Every drop of water that falls within this area will eventually drain to Lake Tahoe. Water in the watershed can travel to Lake Tahoe through rivers, streams, groundwater, and stormwater infrastructure.

Before the presence of humans, water flowing to Lake Tahoe was naturally filtered through an abundance of wetlands, marshes, and meadows. These wetlands are wet land that captures, stores, and slows the movement of water, trapping dirt and pollutants before they can reach Lake Tahoe. These natural filters are one of the reasons that Lake Tahoe is one of the clearest lakes in the world.

However, development over the past 60 years has destroyed 60-80% of Lake Tahoe's marshes, meadows, and stream environments, drastically reducing the Lake's ability to filter pollutants before they reach its crystal clear waters.

Urban stormwater runoff poses one of the greatest risks to Lake Tahoe's clarity. Every time it rains and snows, water from streets, highways, parking lots, and driveways runs off these surfaces carrying dirty stormwater directly to Lake Tahoe. Water runs off of these surfaces because they are impervious and water cannot soak through them. This stormwater contains pollutants such as fine sediment particles, litter, and nutrients like nitrogen and phosphorus that are harmful to Lake Tahoe's clarity.

Write a hypothesis about what you think makes a good filtering wetland and why:

Activity:

Today you will be building your own wetland in a bottle to mimic the infiltration and filtering provided by wetlands and stormwater basins. You will use natural materials that you find outside to try to create a wetland that will best filter water. We will be looking at two criteria

to analyze how effective your wetland is: how much water makes it through your wetland in 30 seconds and how clear the water is when it comes out.

Supplies:

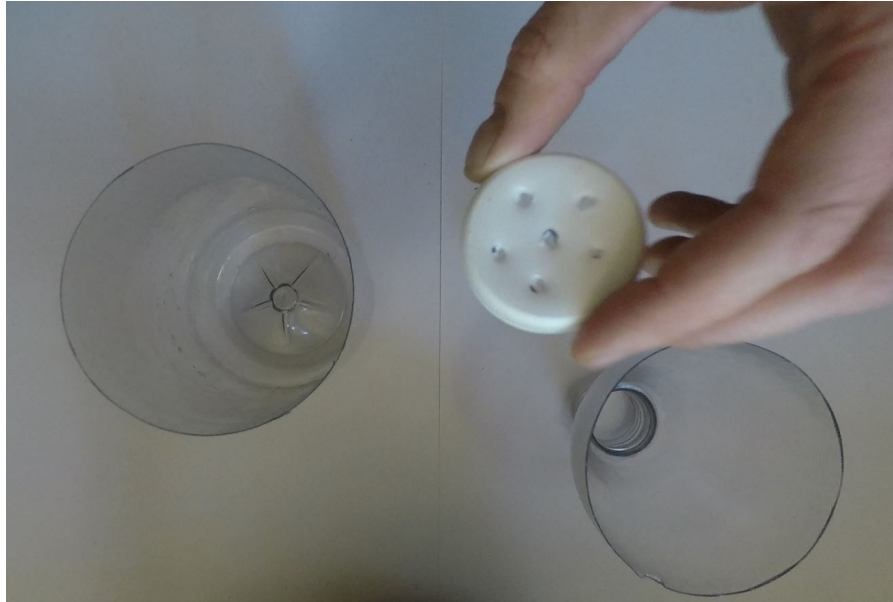
- Clear plastic bottle (2-liter bottles work great)
- Scissors
- Cup
- Various filtering items from nature
- Dirty water
- Spoon
- Stopwatch or timer
- Ruler

Instructions:

1. Create your bottle for the wetland (you will need help from an adult for this step)
 - a. First you will cut your plastic bottle in half about $\frac{1}{3}$ from the top



- b. Then you will poke drainage holes in the plastic cap of the bottle



- c. The end result will look like this



2. Now you will want to prep your dirty water by combining one heaping spoonful of dirt with 1 cup of water.

3. Next, you will create your wetland in the top half of your bottle using natural materials that you can find outside.
4. Once your wetland is created you are ready to get testing! You will want to give your dirty water one last stir before you begin, then pour your freshly stirred dirty water over your wetland and start your timer.
5. Once the timer reads 30 seconds you will want to separate your wetland from the bottom part of the bottle that is catching the water and record your observations on the water that went through the wetland.
6. Once you have recorded your observations rinse your bottle and create a different wetland. Test this wetland in the same way.

Observations:

Wetland #1: (Describe or draw your wetland)

How much water filtered through your wetland in 30 seconds? (Measure how high the water is from the bottom of your bottle with a ruler)

How clear is the water? Can you see through it at all? What color is it?

Wetland #2: (Describe or draw your wetland)

How much water filtered through your wetland in 30 seconds? (Measure how high the water is from the bottom of your bottle with a ruler)

How clear is the water? Can you see through it at all? What color is it?

Follow up questions:

1. Look back at the hypothesis you made at the beginning of this activity. Do your observations from the activity support your hypothesis? Why or why not?

2. Agencies and organizations all around the Tahoe basin have been working for decades to combat pollution and restore Lake Tahoe's clarity. A common tactic in urban areas is to create stormwater basins that trap stormwater so it can infiltrate into the groundwater just like it would do in a natural wetland. Research different kinds of

urban stormwater basins and compare them. What pros and cons do each of them have?

3. Based on this research, design your own urban stormwater basin and draw your design.