

In this activity, students assume the role of a local water supply team. As they work through different water supply scenarios, students explore the urban water cycle and begin to understand the benefit of water reuse.

LEARNING GOALS

To develop an understanding of the urban water cycle.

To observe how water reuse can help to extend a community's water supply.

To identify the benefits of water reuse.

BACKGROUND

Similar to how water continuously moves through the natural water cycle, humans have created what is called the urban water cycle. The urban water cycle refers to the ways that humans have engineered systems to capture, clean, use and return water to the environment. With an increase in population and growing demand for water, the urban water cycle can put pressure on traditional water supply sources, such as groundwater and surface waters, and the natural ecosystems that they support. Water recycling, or reuse, is a form of alternative water supply that can help to make the water we have go further and reduce pressure on traditional sources and ecosystems.

Recycled water is treated to standards that match its intended use. For example, potable reuse refers to highly treated recycled water that people can use for drinking, cooking or bathing.

MATERIALS (per group)

- Clear pump bottle – 1
- Clear cups – 4
- Plastic Bowl – 1
- Pipette – 1
- Small pebbles – 5
- Pepper Shaker - 1
- Strainer – 1
- Coffee filter – 1
- Water
- Student Worksheets

PREPARATION

- Label the pump bottle “Water Source” and fill with water
- Label cup number one “Water Supply” and draw a blue horizontal line a quarter of the way up
- Label cup number two “Human Use”
- Label cup number three “Wastewater”
- Label cup number four “Reuse Treatment”
- Label the bowl “Environment”

DIRECTIONS

1. Begin this activity by explaining the urban water cycle and asking students if they know where their water supply comes from.
2. Briefly explain the concept of traditional water sources versus alternative water sources.
3. Split students into groups. Distribute copies of the activity sheet and materials. Provide an overview of the activity and review what each of the materials they will use represents.
4. Have students work in their group to complete the activity and record their findings.
5. Discuss student findings together. Ask students to draw a conclusion on whether water reuse is beneficial, and if so, how?

EXTENSION

Have students explore how recycled water is used in Florida. To get started, students can visit the Southwest Florida Water Management District's reclaimed water webpage or explore the One Water Florida initiative.

VISAV 11-21

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WATER REUSE

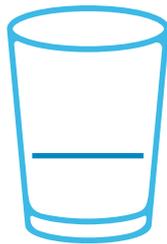
Congratulations! You are now the new water supply team for a local town in Florida. Part of your job is to make sure there is enough water available for your current and future residents. Follow the directions below to test different water supply scenarios.



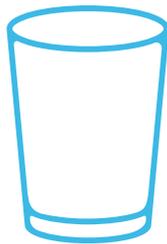
MATERIALS—Materials should be set up in the order pictured below from left to right.



Water Source



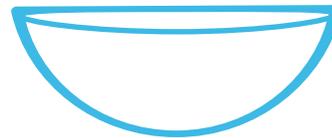
Water Supply



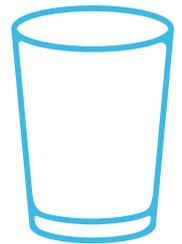
Human Use



Wastewater



Environment



Reuse Treatment



- **Water Source** = This represents where your town's water supply currently comes from.
- **Water Supply** = The blue line represents your town's current water supply needs.
- **Human Use** = This represents the water supply being used by humans.
- **Wastewater** = This represents the water supply after it has been used by humans.
- **Environment** = This represents a nearby water body or aquifer.
- **Reuse Treatment** = This represents the extra treatment done to wastewater so it can be used as a water supply.

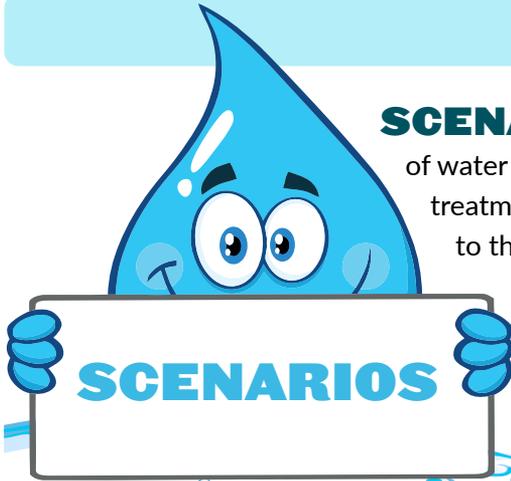
GROUP ROLES—Assign each person in your group one of the roles below.

- **Reader** - Read each scenario out loud and walk your group through each step outlined. Make sure each step is completed before moving onto the next.
- **Recorder** - Record your groups findings as you move through each scenario. Once the activity is complete, share what you recorded with the rest of the group to help answer the remaining questions.
- **Water Dispenser(s)** - Designate one-two people to be in charge of pouring the water as stated in the directions. Rotate who pours the water for each round if more than one person would like a turn.

ACTIVITY

Complete the activity on page two as a group by reading each scenario and following the steps outlined. Answer the questions on the *Observations* page once you are finished.





SCENARIO 1: Your town relies on groundwater and a nearby river as its source of water supply. The water is pumped from these sources and treated at your water treatment facility to remove any harmful bacteria or chemicals. It is then distributed to the residents of your town, where it is used in homes and businesses. After the water has been used, it becomes wastewater that goes back down the drain and is piped to a wastewater treatment plant. After the wastewater is treated, it is emptied out into a nearby body of water. **Complete the steps below to observe your town's urban water cycle.**

Step 1

Pump out water from the **water source** into your **water supply**. Stop once you reach the BLUE line.

Step 2

Pour the water from your **water supply** into the cup labeled **human use**.

Step 3

Add pebbles and pepper to the water in the **human use** cup to account for pollutants that may be found in wastewater. Pour the water with pebbles and pepper from the **human use** cup into the **wastewater** cup.

Step 4

Pour the water from the **wastewater** cup through the strainer and into the bowl labeled **environment**. The strainer should filter out some of the pollutants (pebbles) before the water enters the environment.

Step 5

Add a tick mark in the scenario one box on the *Observations* page to represent one round of water supply use. Repeat each step in order until your water source is empty. Make sure to add a tick mark at the end of each round.

SCENARIO 2:

In addition to groundwater and surface water, your team has decided to recycle a portion of the wastewater from the town and add it to your water supply. The wastewater will now receive a higher level of treatment to make it safe for reuse by humans. **Refill your water source bottle with fresh water and complete the steps below to observe your new urban water cycle with water reuse.**

Step 1

Pump out water from the **water source** into your **water supply**. Stop once you reach the BLUE line.

Step 2

Pour the water from your **water supply** into the cup labeled **human use**.

Step 3

Add pebbles and pepper to the water in the **human use** cup to account for pollutants that may be found in wastewater. Pour the water with pebbles and pepper from **human use** into the **wastewater** cup.

Step 4 (NEW)

Fill the pipette all the way with water from the **wastewater** cup and empty it through the strainer into the bowl labeled **environment**. Do this two times. This represents the portion of water not available for reuse.

Step 5 (NEW)

Pour the remaining water from the **wastewater** cup through the strainer and into the cup labeled **treatment**.

Step 6 (NEW)

Place the coffee filter into the strainer. Pour the water from the **treatment** cup over the coffee filter and into the **water supply** cup.

Step 7

Add a tick mark in the scenario two box to represent one round of water supply use. Repeat until your water source is empty.





OBSERVATIONS

Scenario 1 (No Water Reuse)	Scenario 2 (Water Reuse)

1. Which scenario allowed the town's water supply to last longer? _____

2. Based on your observations, is there a benefit to reusing wastewater? _____

3. How can reusing wastewater help with population growth? _____
