



Reuse, Reduce, Recycle: Water in the Garden

Total time ~60 minutes

Overview

Students will learn how greywater and blackwater can help reduce overall water consumption. They will brainstorm ways to reuse, reduce, and recycle water in the garden. Students will come to understand the importance of water conservation. In addition, this lesson serves as a foundational lesson for the garden. Students will learn basic garden water skills and rules that they will use for this lesson and future visits to the garden.

Objectives:

After this lesson students will be able to:

- **Define** greywater and blackwater.
- **Identify** ways we can use the Three R's in the garden.
- **Explain** why water conservation is important.
- **Practice** basic garden water skills.

Vocabulary:

- **Greywater:** Relatively clean water that has been used before in bathtubs, washing machines, showers, and bathroom sinks.
 - If students ask further:
 - *Relatively clean = no fecal contamination*
 - *Greywater may contain soap, but the soap must be non-phosphate.*
- **Blackwater:** Water that has been used to flush toilets.
 - If students ask further:

Materials:

- Picked fruits or vegetables
- Salt
- 30 plates
- 9 tubs
 - 6 tubs for washing dishes (3 rinse water, 3 non-phosphate soap water)
 - 3 tubs for washing fruits and vegetables
- 12 watering cans

Preparation:

- Pick fruits or vegetables for snack, gather food at the washing station.
- Distribute watering cans evenly at each of the five water spigots.
- Gather tubs at plate washing station and food washing station (do not fill).
 - 6 at plate washing station
 - 3 at fruit washing station
- Assign locations for adults.
 - Assign one adult to each water spigot (to observe and assist if necessary).
 - Assign remaining adults to certain areas in the garden to supervise and assist watering.

On The Board:

Vocabulary

Suggested Snack:

Fruits or vegetables from the garden.

- *Blackwater has to be processed and is different from greywater because it has fecal contamination..*
- **Waste water:** A general term for both greywater and blackwater. Water that has been used already.
- **Reuse:** Use again more than once.
- **Reduce:** Make smaller or less in amount, degree, or size.
- **Recycle:** Convert into reusable material.
- **Conservation:** Prevention of wasteful use of a resource.
- **Consumption:** The using up of a resource.

1. Introduction (5 mins.)

A. Warm-Up (3 mins.)

- a. Show Three R's symbol. **Ask students:** Can anyone tell me what this symbol means?
 - i. If they need a hint: Does anyone know what the Three R's are?
 - ii. The goal is for them to describe what they know about the concept: reuse, reduce, recycle.
 - iii. *This image is a symbol of reusing, reducing, and recycling. It reminds us of the way we should interact with the world to cultivate sustainability.*
 - iv. **Ask students:** Can anyone give an example of reusing, reducing, or recycling?
 1. *Reusable items*
 - a. *Refill reusable water bottles*
 - b. *Use reusable bags at the grocery store*
 2. *Reducing your waste output*
 - a. *Not wasting food*
 - b. *Purchasing products with less packaging*
 3. *Recycle*
 - a. *Recycle plastic, glass, paper, etc*
 - b. *Recycle/upcycle trash into art!*
- b. **Ask students:** Can the reuse/reduce/recycle idea be applied to water?
 - i. For example, can we reuse water? Reduce water consumption? Recycle water? Can anyone think of an example of reuse/reduce/recycle and water? At home, or in general?
 - ii. Some examples of RRR at home include:
 1. *Taking shorter showers*
 2. *Turning off the water when you brush your teeth*
 3. *Water your plants at dawn/dusk to prevent evaporation*
 4. *Rewear lightly worn clothes rather than washing.*

B. Video (2 mins.)

- a. Let's watch this video to learn about one way that we can recycle water!
- b. Show video: Waste Water Recycling - Putting Greywater to Good Use

2. Lecture: The Three R's in the Garden (15 mins.)

A. Handout (10 mins.)

- a. Define greywater
 - i. Talk with your elbow partner and explain what greywater means.
 - ii. **Ask students:** Now that you've discussed with a partner, can anyone share with the class what greywater is?
 - 1. *Relatively clean water that has been used before in bathtubs, washing machines, showers, and bathroom sinks.*
 - a. If students ask further:
 - i. *Relatively clean = no fecal contamination*
 - ii. *Greywater may contain soap, but the soap must be non-phosphate.*
- b. Define blackwater
 - i. Talk with your elbow partner and explain what blackwater means.
 - ii. **Ask students:** Now that you've discussed with a partner, can anyone share with the class what greywater is?
 - 1. Water that has been used to flush toilets.
 - a. If students ask further:
 - i. *Blackwater has to be processed and is different from greywater because it has fecal contamination.*
- c. When do we reuse, reduce, and recycle water?
 - i. When we **reuse** water, we are using **greywater** (*because it is relatively clean, so it's ready to use again as is*).
 - ii. When we **recycle** water, we are using **blackwater** (*because blackwater is dirtier than greywater, so it has to be processed before we can use it again*).
 - iii. We can also simply **reduce** our water consumption (*the amount of water we use up*).
 - iv. These are all ways that we can reuse, reduce, and recycle with water!
- d. Pass out one handout to each table group.
- e. On your handouts, there is a wordbank full of concepts that are different ways of reusing water (like using greywater), recycling water (like using blackwater), or just reducing water consumption.
- f. Designate one table member to be the scribe. With your table, talk about each concept and decide if it is a way to reuse, reduce, or recycle water. Also consider whether or not the concept would apply in the home, or in the garden. After

you're done sorting the concepts, come up with at least 3 original concepts. Try to come up with the most creative examples! (7 mins.)

- g. Share back with the class (3 mins.)
 - i. Have each table share one concept from the word bank. They should tell us which concept they're sharing, where they sorted it, and why.
 - 1. Write their answers on the whiteboard.
 - 2. Key for wordbank:
 - a. Using a rain barrel (*Garden; reuse*)
 - b. Planting native plants (*Garden; reduce*)
 - c. Taking shorter showers (*Home; reduce*)
 - d. Watering plants at dawn/dusk (*Garden; reduce*)
 - e. Using water from washing fruits or vegetables (*Home/Garden; reuse*)
 - f. Turning off the water when brushing teeth (*Home; reduce*)
 - g. Using pasta water to water plants (*Home; reuse*)
 - h. Installing house plumbing system to use blackwater (*Home; recycle*)
 - ii. Have each table share their most creative original example with the group. Tell the class where they sorted it and why.
 - 1. Write their answers on the whiteboard.

B. Activity Instructions (5 mins.)

- a. Explain that this activity will teach students basic garden water skills that they will be able to use for any lesson they have at the garden in the future.
- b. Students will split up into 3 groups that will rotate through these learning activities:
 - i. Washing dishes and reusing greywater to water fruit trees.
 - ii. Mindfully filling watering cans and watering plants.
 - iii. Washing fruits and vegetables.
- c. In order to reduce our water consumption, we want to spill as little water as possible in all activities!
 - i. We are going to have a **class competition**: if no student has wet shoes by the end of the activity, then everyone will be rewarded tajín for their snack.
- d. Assign groups and direct where to go.

3. Activity 1: Garden Basics (*Instructions for adult supervisor*) (20 mins.)

A. **Station 1:** Washing dishes + Reusing greywater for fruit trees

- a. Washing dishes
 - i. Preparation:

1. Gather 6 tubs at plate washing station (do not fill).
 - ii. Explain how the dish washing process works.
 - iii. Have students prepare two tubs per group:
 1. One rinse water
 2. One non-phosphate soap water
 - b. Reusing greywater for fruit trees
 - i. Tell students in order to reuse water from the sink, we will have tubs to capture extra water when washing food or tools. The water collected in the tubs can always be used to water the fruit trees. Try to water different fruit trees, not always the same ones, so that every tree can get some water!
 - ii. **Ask students** to make sure they understand: So, where can you always throw the water in the tubs? Answer: *On the fruit trees!*
- B. **Station 2:** Mindfully filling the watering cans + how to water plants
 - a. Mindfully filling the watering cans
 - i. Preparation:
 1. Distribute watering cans evenly at each of the five water spigots.
 2. Assign one adult to each water spigot (to observe and assist if necessary).
 - ii. **Ask students:** What is the best way to fill your watering can in order to reduce water consumption?
 - iii. Answer: *Whenever you fill your watering cans, do it as mindfully as possible. Do we want to waste water by letting it spill? No, all the water should go directly into the watering can with as little spills as possible. This will reduce our water consumption, and avoid wasting water!*
 - iv. Have students get into pairs and fill watering cans.
 - b. How to water plants
 - i. Preparation:
 1. Assign adults to certain areas in the garden to supervise and assist watering.
 - ii. Explain that to use water as efficiently as possible, we should water near the roots of the plants (rather than the leaves) because the plants take in water at their roots.
 - iii. Allow students to water. Adults will be stationed around the garden and will tell students what to water.
 1. Adults will remind students to water the roots, not the leaves.
- C. **Station 3:** Washing fruits and vegetables
 - a. Preparation:
 - i. Pick fruits or vegetables for snack, gather food at the washing station.
 - ii. Gather 3 tubs at food washing station (do not fill).

- b. Describe how we wash the food.
- c. Have students prepare one tub for washing.
- d. Explain that we can reuse this greywater after washing. The water collected in the tubs can always be used to water the fruit trees. Try to water different fruit trees, not always the same ones, so that every tree can get some water!
- e. **Ask students** to make sure they understand: So, where can you always throw the water in the tubs? Answer: *On the fruit trees!*

4. Activity 2: Prepare Vegetables + Water (10 mins.)

- A. Have a group of 6 volunteers to prepare the snack.
- B. The remaining students will water the garden in pairs.
 - a. Use watering techniques:
 - i. Mindfully filling the watering can
 - ii. Water at the roots
 - b. When volunteers are done washing the fruits or vegetables, ask for volunteers to use the greywater from washing the snack to water the fruit trees.

5. Snack + Wrap-Up (5 mins.)

- A. Eat fruits or vegetables as a snack.
 - a. Compare shoes, give out salt, discuss the experience and socialize.
- B. Wash plates.
 - a. If time, allow students to water the fruit trees with greywater from plate washing tubs for those who did not do it earlier.

5. Closing Activity (5 mins.)

- A. Discuss with students: What are three ways to use the Three R's in the garden?
 - a. *Reusing greywater*
 - i. *Capturing with tubs, watering fruit trees*
 - b. *Recycle blackwater*
 - c. *Mindfully filling the watering can*
 - d. *Water directly on the roots*
 - e. *Rain barrel*
 - f. *Native plants*
 - g. *Water at dawn or dusk to reduce evaporation*
 - h. *Use compost to cultivate soil that retains water*
 - i. *Use mulch to contain moisture*
 - j. *Plant so that the soil is shaded to keep in moisture*
 - k. *Work with nature: water less after it rains*

- l. Use efficient systems like drip irrigation on a hose timer*

6. Student Reflection Questions:

- 1) Why do we need to be smarter and more innovative about our water use?
- 2) What are some of the benefits of recycling waste water?

7. Assessment Questions:

1. What is greywater? Pick one.
 - a. Water that has been used to flush toilets, and has fecal contamination.
 - b. Water that looks gray because it is so dirty.
 - c. **Relatively clean water that has been used before in bathtubs, washing machines, showers, and bathroom sinks.**
 - i. If students ask further:
 1. Relatively clean = no fecal contamination
 2. Greywater may contain soap, but the soap must be non-phosphate.
2. How do you apply the Three R's to water use in the garden?
 - a. *Reusing greywater*
 - i. *Capturing with tubs, watering fruit trees*
 - ii. *Water from washing fruits or vegetables*
 - b. *Recycle blackwater*
 - c. *Mindfully filling the watering can*
 - d. *Water directly on the roots*
 - e. *Rain barrel*
 - f. *Native plants*
 - g. *Water at dawn or dusk to reduce evaporation*
 - h. *Use compost to cultivate soil that retains water*
 - i. *Use mulch to contain moisture*
 - j. *Plant so that the soil is shaded to keep in moisture*
 - k. *Work with nature: water less after it rains*
 - l. *Use efficient systems like drip irrigation on a hose timer*