

One Ticket to the City of Clean



Science Enhanced Lesson – Grade 3

TOPIC

Human Impact on Water

MATTER

3.3

The student will investigate and understand how materials interact with water. Key ideas include (a.) solids and liquids mix with water in different ways.

EARTH RESOURCES

3.8

The student will investigate and understand that natural events and humans influence ecosystems. Key ideas include (a.) human activity affects the quality of air, water, and habitats.

BACKGROUND INFORMATION

The water we need for everyday use is protected, cleaned and provided to the local community because of three key organizations: Fairfax Water, Virginia American Water and AlexRenew. These organizations work collectively to ensure the local community can use and reuse water from water resources, like local rivers and streams. Each organization's role with water is described below.

Fairfax Water – Manages the water treatment plant. They pull water from local water resources and clean it to get it ready for community use. Alexandria City's water supply is pulled from the Potomac and Occoquan River(s).

Virginia American Water – Is responsible for distributing

clean water from Fairfax Water to the local community. They manage the infrastructure (pipes and valves) that carries water to places like homes, schools and businesses.

AlexRenew – Manages the wastewater treatment plant. They clean water after it has been used in homes, schools and businesses. Once cleaned, water is returned to Hunting Creek and ultimately the Potomac river.

In this lesson, students will follow the journey of a drop of water. As the drop of water travels, students will learn how human actions impact water, but also how these three organizations clean, protect and distribute the water. Students will be encouraged to draw conclusions and make decisions about the flow of water.

MATERIALS FOR TEACHER

- 1 roll of masking tape or blue painter’s tape
- 4 stamps
- 1 stamp pad

MATERIALS FOR STUDENTS

- 1 set of 7 stormwater pollution cards (cut before lesson)
- 1 set of 7 water usage cards (cut before lesson)
- 1 wastewater treatment puzzle (cut before lesson)
- 1 water treatment puzzle (cut before lesson)
- 1 bucket or bottle of water with a Virginia American Water label
- 1 passport handout per student (cut and folded)
- 2 rolls of scotch tape
- 2 bowls/buckets filled half-way with water
- 1 bottle of soy sauce (with label that says “oil”)
- 1 bottle of chocolate sprinkles (with label that says “animal waste”)
- 1 packet of lemonade (with label that says “fertilizer”)
- 1 packet of red Koolaid (with label that says “pesticides”)
- 1 container of chocolate cocoa (with label that says “soil”)
- 1 candy wrapper or piece of paper (with label that says

“litter”)

- 1 packet of salt (with label that says “de-icer”)
- 1 bottle of hand soap (with label that says “washing hands”)
- 1 tube of toothpaste (with label that says “brushing teeth”)
- 1 bottle of shampoo (with label that says “bathing”)
- 1 piece of toilet paper (with label that says “flushing toilet”)
- 1 small bottle of dish detergent (with label that says “washing dishes”)
- 1 small bottle of laundry detergent (with label that says “washing laundry”)
- Couple pieces of spaghetti (with label that says “cooking”)

VOCABULARY

- Treatment plant, waterbody/waterway, reuse, passport

AVAILABLE HANDOUTS

- Passport
- AlexRenew and Fairfax Water Puzzles (2)
- Virginia American Water Labels
- Stormwater Pollution and Water Usage Cards

STUDENT/TEACHER ACTIONS

ROOM SET-UP BEFORE LESSON:

1. Identify four areas in the classroom that can serve as four different learning stations. You may need to move desks or tables to create pods. The stations should be spaced so they look like four corners of a square.
2. Use masking or blue painter’s tape to place a line on the ground between each station. There will be a total of four lines. One line from station 1 to station 2; one line from station 2 to station 3; one line from station 3 to station 4; one line from station 4 to station 1. This tape will represent a pipe that water flows through as it travels to different locations.
3. Distribute the following supplies to each station:

Station 1 (Potomac River):

- 1 set of 7 stormwater pollution cards (cut, flipped upside down and scattered like a game of “Go Fish”)
- 1 roll of scotch tape
- 1 bowl/bucket filled half-way with water
- 1 bottle of soy sauce (with label that says “oil”)
- 1 bottle of chocolate sprinkles (with label that says “animal waste”)
- 1 packet of lemonade (with label that says “fertilizer”)
- 1 packet of red Koolaid (with label that says “pesticides”)
- 1 container of chocolate cocoa (with label that says “soil”)
- 1 candy wrapper or piece of paper (with label that says “litter”)
- 1 packet of salt (with label that says “de-icer”)

- 1 stamp
- Station 4 (AlexRenew): 1 puzzle of the wastewater treatment process (pieces should be cut and scrambled), 1 stamp

Station 2 (Fairfax Water and Virginia American Water):

- 1 puzzle of the water treatment process (pieces should be cut and scrambled)
- 1 bucket or bottle of water with the Virginia American Water logo (provided) taped to the outside
- 1 stamp

Station 3 (House):

- 1 set of 7 water usage cards (cut, flipped upside down and scattered like a game of “Go Fish”)
- 1 roll of scotch tape
- 1 bowl/bucket filled half-way with water
- 1 bottle of hand soap (with label that says “washing hands”)
- 1 tube of toothpaste (with label that says “brushing teeth”)
- 1 bottle of shampoo (with label that says “bathing”)
- 1 piece of toilet paper (with label that says “flushing toilet”)
- 1 small bottle of dish detergent (with label that says “washing dishes”)
- 1 small bottle of laundry detergent (with label that says “washing laundry”)
- Couple pieces of spaghetti (with label that says “cooking”)
- 1 stamp

Station 4 (AlexRenew):

- 1 puzzle of the wastewater treatment process (pieces should be cut and scrambled)
 - 1 stamp
4. Students will be broken up into four stations. You may want to note the students you want in each station before the lesson begins. In addition, one student will represent a drop of water. The student that represents the drop of water will also be part of a learning station group.

TEACHER ACTIVITY INTRODUCTION:

- Ask the students, “How many of you have ever traveled to a different city or state? How many of you have been on an airplane? How many of you have traveled to another country?”

- Ask if a student can define a passport. After giving a student time to explain a passport, make sure the class understands that a passport is a document that allows people to travel to and from foreign countries. Share that when people visit different countries, they get a stamp in their passport.
- Share, “Did you know that a drop of water likes to travel? It travels to many places every single day. Today, we are going to travel with a drop of water. We are going to take a trip to four different places, but all places are within Virginia.”

TEACHER ACTIVITY INSTRUCTION:

Part 1:

1. Assign students to one of four stations and have them move to the correct location.
 2. Explain to students: “A drop of water is going to travel to each of your locations. But before the drop of water starts its journey, you have some things to do to get ready for its visit.”
 3. Share the places the drop of water is going to visit: Potomac River, Fairfax Water, Virginia American Water’s pipes, a house and AlexRenew.
 4. Explain the task (described below) each group needs to complete to get ready for water’s visit. Give approximately 10 minutes for the groups to work on the station activity. All groups will be working on their assigned activity at the same time.
- **Station 1 (Potomac River):** Have students in this group take turns selecting a card from the pile. When they flip the card over they will identify a way water in local water bodies (e.g. rivers, streams, lakes) gets dirty. Remind students that items on the ground can be picked up by stormwater and carried to the closest body of water. They should find the correlating labeled item and pour a little in their bowl/bucket of clean water. They will quickly see the clean water turn dirty. The stormwater pollution cards need to remain at this station because they will be used later.
 - **Station 2 (Fairfax Water and Virginia American Water):** Have students in this group assemble the puzzle that describes the Fairfax Water treatment process. The puzzle will highlight how dirty water from local waterways becomes clean. Once assembled have the students review the steps so they can share with the rest of the class. The puzzle should remain assembled at this station. This station should also have a bucket or bottle of water labeled with Virginia American Water’s logo.

Nothing needs to be done with the water at this time.

- **Station 3 (House):** Have students in this group take turns selecting a card from the pile. When they flip the card over they will identify a way we use water every day at home. They should find the correlating labeled item and pour a little in their bowl/bucket of clean water. They will quickly see the clean water turn dirty. The water usage cards need to remain at this station because they will be used later.
 - **Station 3 (AlexRenew):** Have students in this group assemble the puzzle that describes the wastewater treatment process. The puzzle will highlight how dirty water from homes, schools and businesses is cleaned by AlexRenew before being sent to back into a local waterway. Once assembled, have the students review the steps so they can share with the rest of the class. The puzzle should remain assembled at this station.
5. After students complete the activities at their assigned station, select one student to represent a drop of water.
 6. Distribute a passport handout to every student.

Part 2:

1. Identify the student representing a drop of water to the entire class. Tell the students, they are going to join the drop of water on its trip to four locations.
2. Have all students go to Station 1.
3. While at Station 1, tell the students they are starting their journey at the Potomac River. The Potomac River serves as a main water source for the people in Virginia.
4. Then, have the students assigned to this station share the ways water in the river can get dirty by reviewing the stormwater pollution cards and pointing out the dirty water in their bowl/bucket. As the students share their ideas with the rest of the class, have them tape the stormwater pollution cards on the student representing a drop of water. This will physically represent water getting dirty.
5. Once this is complete, stamp all student passports. It is time to travel someplace else.
6. Have the water drop student lead the rest of the class from Station 1 to Station 2 by walking on the tape placed on the ground.
7. Tell the students the tape represents pipes located under the ground that carry water from the Potomac River to the water treatment plant.
8. Once the students have arrived at Station 2, tell them they have traveled to Fairfax Water. Share that Fairfax Water cleans dirty water from local waterways to make it

safe for people to use.

9. Have the students assigned to the station share the puzzle they assembled. Have them read out loud the description of each treatment phase.
10. Share that once water travels through these phases, it is clean. Have the students remove the stormwater pollution cards from the student representing a drop of water. This will physically represent water getting clean.
11. Share with the students that once water is clean, it travels to schools, homes and businesses. But that doesn't just magically happen! Virginia American Water is the company that makes sure water makes it from the Fairfax Water plant to places like home, school and businesses. They manage the pipes that carry the water and distribute it to many places in the community.
12. Once this is complete, stamp all student passports. It is time to travel someplace else.
13. Before traveling to the next station, hand the bottle of water labeled with Virginia American Water's logo to the water drop student.
14. Have the water drop student lead the rest of the class from Station 2 to Station 3 by walking on the tape on the ground, while carrying the bottle of water.
15. Tell the students the tape they are walking on represents pipes located under the ground that Virginia American Water maintains to carry water from Fairfax Water to places like home, school and businesses.
16. Point out that the bottle represents 100 gallons of water. Share that on average every person uses about 100 gallons of water per day. American Virginia Water distributes 14 million gallons every day. That is enough water to fill over 21 Olympic-sized pools.
17. Once the students have arrived at Station 3, the water drop student can put the bottle of water on the table. It has safely arrived at a house in the community. Have the students assigned to this station share the ways water can get dirty at home by reviewing the water usage cards and pointing out the dirty water in their bowl/bucket. As they share their ideas with the rest of the class, have them tape the water usage cards on the student representing a drop of water. This will once again physically represent water getting dirty.
18. Once the cards are placed on the water drop student, stamp all student passports. It is time to travel someplace else.
19. Have the water drop student lead the rest of the class from Station 3 to Station 4 by walking on the tape on the ground.

20. Tell the students the tape represents pipes located under the ground that carry water from homes, schools and businesses to a local wastewater treatment plant.
21. Once the students have arrived at Station 4, tell them they have traveled to AlexRenew. Share that AlexRenew cleans dirty water from homes, schools and businesses before sending it back to a local waterway.
22. Have the students assigned to the station share the puzzle they assembled. Have them read out loud the description of each treatment phase.
23. Share that once water travels through these phases, it is clean again. Have the students remove the water usage cards from the student representing a drop of water. This will physically represent water getting clean.
24. Share that AlexRenew cleans 35 million gallons of dirty water every day in Virginia. That is enough water to fill 53 Olympic-sized pools.
25. Once this is complete, stamp all student passports.
26. Tell the students that all trips must come to an end and eventually people return to where they started their travels. This is also true for water.
27. Have the water drop student lead the rest of the class from Station 4 to Station 1 by walking on the tape on the

ground.

28. Once again, tell the students the tape represents pipes located under the ground that carry water from AlexRenew back to a local waterway.
29. When they arrive back to Station 1, tell students their travels are over for now.
30. Have all students return to a seat.

TEACHER ACTIVITY CONCLUSION:

- Ask students, “What is the longest car ride or airplane ride you have ever been on?”
- It takes a long time to clean water. Share with students it takes approximately 24 hours for AlexRenew to clean water at the wastewater treatment plant.
- As you learned today, water travels to many places and our actions impact how clean or dirty it can be. Next time you take a trip, maybe near some water, think about what we learned today.

ASSESSMENT

QUESTIONS

- What happens in the environment and at home/school that makes water dirty?
- What are the names of the treatment plants that help clean water, so we can reuse it?
- What is the name of the company that distributes clean water to our community?

JOURNAL/WRITING PROMPT

- Select another place for water to travel to (e.g. school, business, park, etc.). Write about water's journey.

EXTENSIONS AND CONNECTIONS

1. Reach out to AlexRenew, Fairfax Water and Virginia American Water to:
 - Schedule a tour
 - Schedule a classroom or virtual visit
 - Access other resources or visuals (such as videos) that explain the treatment process
2. Follow the water with a map. Pull up googlemaps and discuss how water flows from the Potomac to our homes and then back out to Hunting Creek/Potomac River.

STRATEGIES FOR DIFFERENTIATION

- Conduct this activity in a gym or outdoors and involve students from other classes.
- Invite representatives from each organization to participate in the lesson. Have the representatives discuss their organization's process at the appropriate stations.
- Draw the four stations on the board and lead a discussion with the entire class instead of breaking the students up into groups.
-